

Sister Manchester Plot C

Ventilation Statement

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Glossary

Term	Definition
AHU	Air handling unit
BCO	British Council for Offices
BREEAM	Building Research Establishment Environmental Assessment Method
CHW	Chilled water
FCU	Fan coil unit
GIA	Gross internal area
LTHW	Low temperature hot water
MCC	Manchester City Council
MEV	Mechanical extract ventilation
MVHR	Mechanical ventilation (with) heat recovery
PV	Photovoltaic
VAV	Variable air volume
WC	Water closet

1 Introduction

This document defines the basis of design and outline description of the ventilation systems for the Sister Plot C development, as required by the Manchester City Council Planning Authority.

The proposed development comprises the construction of two high quality commercial office buildings of 12 (Building C1) and 20 storeys (Building C2) connected by three podium levels (lower & upper ground floors and level 01) and the development of viaduct arches to the north of the site. As well as the main buildings there is also public realm & landscape enhancements, extensive cycle parking facilities, and associated highways and access arrangements.

A breakdown of buildings' floor space is detailed below:

Table 1.1: Sister Building C1

Level	Use	Area (GIA m ²)	Notes
Level 11 / Roof	Stair	33	Access stair to external roof plant area
Level 10	Open office & meeting rooms	1,038	GIA inc. toilets, building plant & building core
Level 09	Open office & meeting rooms	2,035	GIA inc. toilets, building plant & building core
Level 08	Open office & meeting rooms	2,035	GIA inc. toilets, building plant & building core
Level 07	Open office & meeting rooms	2,035	GIA inc. toilets, building plant & building core
Level 06	Open office & meeting rooms	2,047	GIA inc. toilets, building plant & building core
Level 05	Open office & meeting rooms	2,438	GIA inc. toilets, building plant & building core
Level 04	Open office & meeting rooms	2,438	GIA inc. toilets, building plant & building core
Level 03	Open office & meeting rooms	2,438	GIA inc. toilets, building plant & building core
Level 02	Open office & meeting rooms	2,443	GIA inc. toilets, building plant & building core
Level 01	Open office & meeting rooms	2,708	GIA inc. toilets, building plant & building core
Upper Ground	Open office & meeting rooms	2,725	GIA inc. toilets, building plant & building core
	Commercial units		
	Entrance / Reception		
Lower Ground	Commercial units	3,833	
	Loading Bay & service tunnel		GIA inc: service tunnel & ramp to loading bay
	Plant		
	Refuse		
	Changing & cycle store		GIA inc. toilets, showers, changing rooms
	Stores		
Basement	Commercial units	1,517	GIA inc. toilets, building plant & building core
Total		29,764	

Table 1.2: Sister Building C2

Level	Use	Area (GIA m ²)	Notes
Level 20/Roof	External plant area	26	GIA inc; Access stair to external roof plant area
Level 19	External plant area	59	GIA inc; Access stair to external roof plant area
Level 18	Open office, meeting rooms & flexible commercial space	1,756	GIA inc. toilets, building plant & building core
Level 17	Open office & meeting rooms	2,370	GIA inc. toilets, building plant & building core
Level 16	Open office & meeting rooms	2,370	GIA inc. toilets, building plant & building core
Level 15	Open office & meeting rooms	2,370	GIA inc. toilets, building plant & building core
Level 14	Open office & meeting rooms	2,370	GIA inc. toilets, building plant & building core
Level 13	Open office & meeting rooms	2,370	GIA inc. toilets, building plant & building core
Level 12	Open office & meeting rooms	2,370	GIA inc. toilets, building plant & building core
Level 11	Open office & meeting rooms	2,370	GIA inc. toilets, building plant & building core
Level 10	Open office & meeting rooms	2,361	GIA inc. toilets, building plant & building core
Level 09	Open office & meeting rooms	2,361	GIA inc. toilets, building plant & building core
Level 08	Open office & meeting rooms	2,361	GIA inc. toilets, building plant & building core
Level 07	Open office & meeting rooms	2,361	GIA inc. toilets, building plant & building core
Level 06	Open office & meeting rooms	2,352	GIA inc. toilets, building plant & building core
Level 05	Open office & meeting rooms	2,352	GIA inc. toilets, building plant & building core
Level 04	Open office & meeting rooms	2,352	GIA inc. toilets, building plant & building core
Level 03	Open office & meeting rooms	2,352	GIA inc. toilets, building plant & building core
Level 02	Open office & meeting rooms	2,352	GIA inc. toilets, building plant & building core
Level 01	Open office & meeting rooms	2,143	GIA inc. toilets, building plant & building core
Upper Ground	Open office & meeting rooms	2,810	GIA inc. toilets, building plant & building core
	Commercial units		
	Entrance / reception		
	Community space		
Lower Ground	Office	2,645	GIA inc. reception
	Loading Bay & service tunnel		
	Plant		
	Refuse		
	Changing & cycle store		GIA inc. toilets, showers, changing rooms
	Stores		
Total		47,231	

2 Basis of Ventilation Design

2.1 Overview

A good ventilation strategy is crucial to providing a high-quality indoor environment, whilst minimising energy consumption. A fully mechanical ventilation system is proposed delivering outdoor air to the back of fan coil units, which will deliver the air to the occupied zone while also providing space heating and cooling. Zonal MVHR units will allow demand control ventilation, adjusting the rate of air supply according to demand by monitoring and responding to carbon dioxide levels within the space.

To ensure the quality of outside air drawn into the building, several factors have been considered, such as avoiding recirculation of exhaust air and the intake of contaminants. Extract discharges and air intakes will be spaced to minimise cross-contamination and short-circuiting in accordance with CEN/TR 16798-4 to achieve targeted BREEAM points for BREEAM Excellent rating.

2.2 Design Criteria

The internal design parameters displayed in the table below have been used as a basis for ventilation system design. These parameters are based on BCO and CIBSE guidance, and the client design standards.

Table 2.1 Internal Design Criteria

Room type	Noise criteria (NR)	Ventilation rate	
		air changes / hour	litres/sec / person
Office Space (Open Plan)	<42		12
Retail Spaces	35-40		12
Internal Plant Room	<50 dBA	To suit plant requirements	
External Plant Room	<50 dBA	N/A	
Reception/Lobby	<45		12
Circulation Space	<45		TBD
WCs / Changing / Showers	<45	6	
Restaurant	35-40		12
Gym	35-45		12
Kitchen (Commercial)	40-45	To BESA Guidance	
Refuse Store		3	
Cycle Store		1	
Carpark		6 (ventilation) 12 (smoke)	

2.3 Building regulations

The Building Regulations 2000 provide legislation with regards to the minimum building design requirements and guidance on ventilation systems in order to ensure good indoor air quality. The **Building Regulations Approved Document F1: Means of Ventilation (2010)** provides the requirement for means of ventilation that are capable of limiting the accumulation of moisture which could lead to mould growth, and pollutants originating within a building which would otherwise become a hazard to health of the people in the building. The requirement can be achieved by providing means of ventilation which:

- Extract, before it is generally widespread, water vapour from areas where it is produced in significant quantities;
- Extract, before they are generally widespread, pollutants which are a hazard to health from areas where they are produced in significant quantities;
- Rapidly dilute, when necessary, pollutants and water vapour produced in habitable rooms, occupiable rooms, and sanitary accommodation;
- Make available over long periods a minimum supply of outdoor air for occupants and disperses, where necessary, residual pollutants and water vapour;
- Are designed, installed, and commissioned to perform in a way which is not detrimental to the health of the people in the building; and
- Are installed to facilitate maintenance where necessary.

The guidelines state that ventilation is the removal of stale indoor air from a building and its replacement with fresh outside air. This assumes that this outside air is of reasonable quality.

2.4 BREEAM New Construction 2018 (UK) assessment criteria

BREEAM has comprehensive assessment criteria by which to ensure good indoor air quality. These include:

- The specification of materials with low pollutant content and emissions;
- Minimum design criteria that provide fresh air and prevent the ingress of external pollutants;
- Carbon dioxide (CO₂) sensors to ensure a balanced indoor air composition in areas of variable occupancy;
- Limits and air quality tests for specific indoor pollutants;
- Measures to remove, control and dilute pollutant sources; and
- Design strategies to ensure that buildings can be completely naturally ventilated where possible.

2.5 Industry Guides

- Chartered Institution of Building Services Engineers (CIBSE)

3 Description of Ventilation Systems

This section describes the ventilation systems proposed during RIBA Stage 2. It may be necessary to adjust these systems as the design develops, while maintaining the requirements described in the previous section.

3.1 Sister Buildings C1 & C2

3.1.1 Tenant Offices

Main offices will be served by local MVHR units with façade fresh air intakes and exhaust air discharges. Each office floor can be split into two tenancies, and each tenancy will have multiple zonal MVHR units capable of varying supply air volume based on the carbon dioxide sensor levels within the zone served. MVHR units will be used to shut off the air supply to a single tenancy if unoccupied.

3.1.2 Reception Areas & Collision Engine

The reception areas and Collision Engine space are interconnected and will be provided with mixed mode ventilation. External facades to the north and south of the Collision Engine will be provided with high and low level actuated windows to induce a combination of natural cross flow and stack ventilation to the spaces. During ambient conditions where natural ventilation is no longer favourable the reception areas will be served by local MVHR units with façade fresh air intakes and exhaust air discharges to the northern façade.

3.1.3 Landlord-provided amenities

3.1.4 Changing Facilities

The changing facilities associated with the cycle stores on the lower ground floor will be ventilated using an AHU ducted to louvres in the façade on lower ground floor. Supply air to the changing facilities will be filtered and heated to provide comfortable conditions.

3.1.5 Cycle stores

The cycle stores will be provided with mechanical extract ventilation. Extract air will be ducted to the louvres on the façade of the lower ground floor; make-up air for the extract will be via the façade louvres on the lower ground floor.

3.1.6 Toilets

AHUs located on the roofs of C1 & C2 will provide ventilation to WCs on all floors of each building. The extract is positioned to mitigate the risk of being drawn into other areas of the building and surrounding developments.

3.1.7 Ancillary areas

Corridors and circulation spaces will be ventilated by the circulation of air from surrounding spaces, resulting from general movement around the building.

3.1.8 Commercial Units

Commercial units at lower and upper ground floors are designed to a shell and core level of fitout and the ventilation system will be provided by the future tenant. A louvre-band has been provided above the glazing for the tenant ventilation systems.

Where a retail unit is expected to have a commercial kitchen, a dedicated riser has been provided to allow an exhaust to be routed to the roof of both C1 and C2. The commercial kitchen extract system a suitable kitchen extract/odour abatement system shall be installed to minimise odours to the site. The provision of such systems would fall under the end tenant's responsibility.

The kitchen extract systems shall be designed and installed in accordance with DW172 and 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.

3.1.9 Manchester Room

The Manchester Room is a community space and will be provided with a dedicated AHU supplying conditioned air to a pressurised floor plenum and then into the space via floor diffusers to create an underfloor displacement ventilation system. Extract air from the space will be from high level. The air intake for the AHU will be from the façade louvres provided at level 01 and the exhaust air will be discharged into the service tunnel ramp below via a wall louvre.

3.1.10 Loading Bay & Service Tunnel

The service tunnel and loading bay will be provided with mechanical extract ventilation for the provision of removal of vehicle exhaust fumes and smoke extract in the event of a fire. The service tunnel and loading bay will meet the requirements of BS 9999 for a basement car park.

The service tunnel and loading bay is a single space and the ventilation system will adopt a push-pull arrangement with reversible smoke fans at the ends of the tunnel and reversible impulse fans throughout the space to direct contaminated air to the nearest extract point.

Extract air will be ducted to the louvres on the plant room on the upper ground floor; make-up air for the extract will be provided via supply mechanical supply fans at the exit of the service tunnel.

- The smoke clearance system will be design to achieve the following:
- Provide ten air changes per hour;
- Be capable of handling gas temperatures of 300°C for not less than 60 minutes;
- Comes into operation automatically either on activation of the sprinkler system or detection;
- Have an independent power supply which would operate in the event of failure of the main supply.

3.1.11 Bin store

The bin/refuse stores will be provided with mechanical supply and extract ventilation. Extract air will be ducted to the louvres in the service tunnel; make-up air for the extract will be via transfer duct from the service tunnel area. The bin store will achieve 3 ac/hr ventilation rate.

The bin store will also be provided with smoke extract ventilation from the lower ground floor smoke extract system. All ductwork will be fire rated.

Bin exhaust discharges will exhaust away from public spaces and air intakes.

3.1.12 Plant rooms

Plant rooms will be ventilated naturally by louvred openings where connectivity to the external environment is practicable. Local mechanical ventilation will be provided to prevent stagnation where natural ventilation cannot be achieved.

3.1.13 Firefighting Shafts

Each fire-fighting stair core has a shaft to provide a smoke-ventilated lobby on each floor. Smoke ventilation fans will be located on the roof of the associated C1/C2 building with discharge to atmosphere away from building intakes and adjacent buildings.

3.2 Viaduct Arches

The viaduct arches are designed to a shell and core level of fitout and the ventilation system will be provided by the future tenant. A louvre-band has been provided within the façade for the future tenant ventilation systems. It is anticipated that a future tenant will connect local MVHR units to façade louvres for the provision of mechanical ventilation to the space.

Where a viaduct arch tenant requires a commercial kitchen extract system a suitable kitchen extract/odour abatement system shall be installed to minimise odours to the site. The provision of such systems would fall under the end tenant's responsibility. The kitchen extract systems shall be designed and installed in accordance with DW172 and 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.

4 Conclusion

The ventilation strategies described in this document will comply with Part F of the building regulations and ensure that the air quality and occupant comfort within the buildings is satisfactory.

Any negative impact of ventilation systems on accommodation within the proposed development or neighbouring properties has been mitigated by:

- Avoiding exhausting onto neighbouring buildings or locations where people are likely to be present.
- Installing noise attenuation equipment on ventilation plant to comply with the acoustic criteria.
- Ensuring carbon filtration is used in kitchen exhaust systems to mitigate potential odours.

This document describes the ventilation systems proposals during RIBA Stage 2. It may be necessary to adjust these systems as the design develops, while maintaining the intent to meet the basis of design described in the previous section.

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