

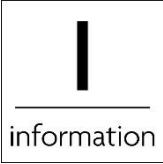
Stage 2 (Concept Design) Report

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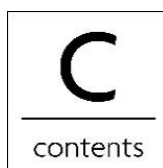
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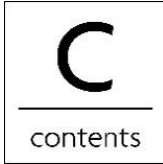
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1. Introduction

1.1. Stage 2 (Concept Design) Report

Hilson Moran have been appointed by Bruntwood to work with the design team in providing a Stage 2 (Concept Design) Report for the engineering and sustainability services associated with the development of 38-42 Mosley Street. The Stage 2 (Concept Design) Report summarises the status of the project up to the end of RIBA Work Stage 2.

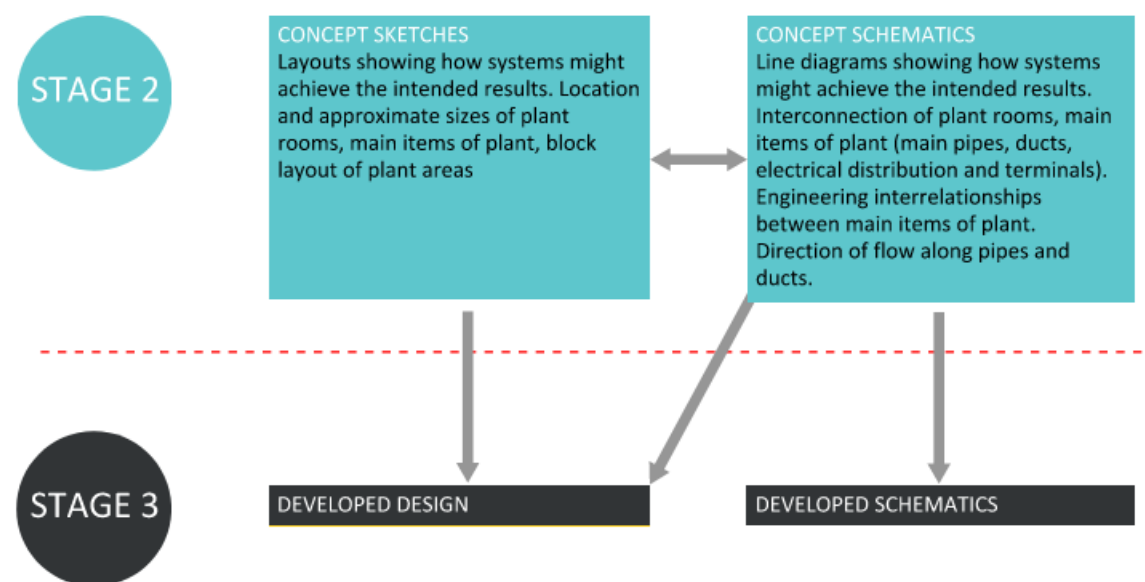


Figure 1.1: Stage 2 Design Outputs

The report has been structured to communicate the concept design strategies for the various engineering services systems within the different elements of the overall project.

This overview should be read in conjunction with the more detailed information contained within specific reports within the appendices, included in a separate document; these include the Operational Energy Assessment (to follow), Embodied Carbon Analysis (to follow in January 2022), Acoustic Feasibility Report, Noise Impact Assessment and Fire Strategy review.

The associated pack of drawings, included in a separate document, provide further detail, and illustrate the current development of the engineering services systems which will be further developed during the next design stage of the project.

1.2. 38-42 Mosley Street

38-42 Mosley Street is in central Manchester and is connected to the adjacent building 57 Spring Gardens sharing services and a common escape stair. The existing building is a Grade 2* listed building, and the services will be designed in accordance with Manchester Heritage.

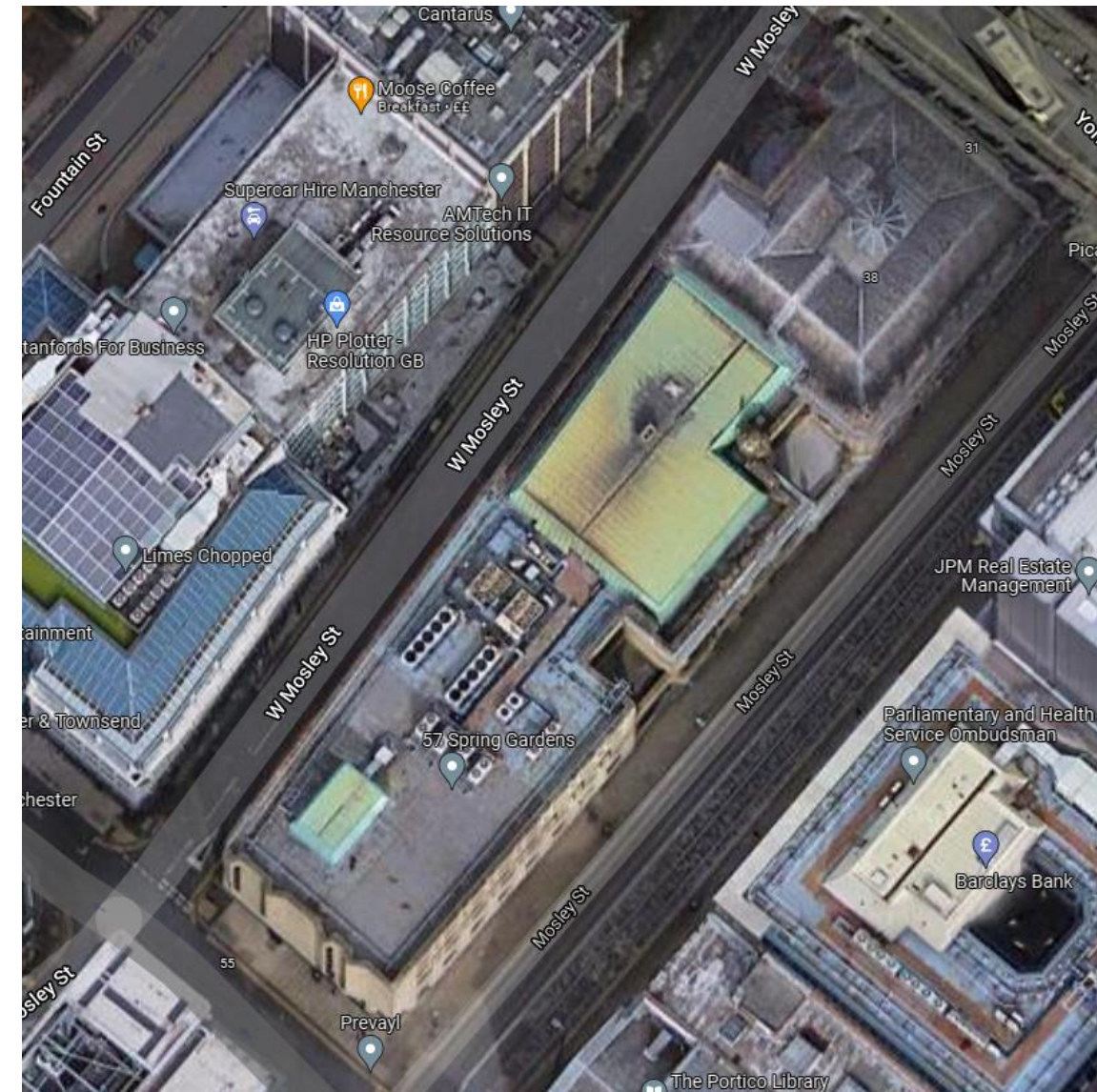


Figure 1.2: Satellite view of 38-42 Mosley Street (and 57 Spring Gardens)

The 6-storey building will have shared amenities at basement level, a ground floor F&B space with an option for co-working, a basement level containing principal plant, showers, changing rooms and cycle parking. Single- or multi-let offices will be provided at 1st, 2nd & 3rd floor levels. At rooftop level, plant serving both 57 Spring Gardens and 38-42 Mosley Street will be located in shared internal and external plant areas.

As part of the current fire strategy of the building the basement will require mechanical ventilation and sprinklers. However, options to omit or reduce the need for these services, including secondary power supplies is to be reviewed at the next stage.

1.3. Project Requirements

The environmental building services systems will be designed in accordance with the British Council for Offices (BCO) Guide to Specification (2019).

The services design will, where practical to do so, take in to account the requirements of WELL but no WELL assessment is planned.

As well as area zoning within the floor space, each floor plate will be split into zones to allow for 3 separate tenancy splits. Each tenancy will have access to risers within their demise (shared with other floor tenants) for routing of their own services to tenant plant areas.

1.4. Design Strategy

Occupancy level and the demand it places on building services systems needs to be considered from two perspectives - the maximum number of people a space needs to cater for, and the typical or average use of the space over a period. These two-different metrics are defined as workplace density and effective density.

For on-floor building services, office space design is based on workplace density, while most core and centralised system design are based on effective density where plant sizing diversity will be applied to reflect the average utilisation ratio of the space.

38-42 Mosley Street - HIGH DENSITY OFFICE

A workplace density of 8m² per person is used for terminal cooling load, small power and outdoor air allowance in the office space.

An effective density of 10m² per person is used for core design elements such as lifts and water storage calculations which provides an appropriate diversity for the sizing of central plant.

Office floors will be zoned in order to provide fit out flexibility. The shell and core and/or Cat A air-conditioning system will allow formation of perimeter and central zones, each with their own independent control of temperature. This allows the varying heating and cooling loads of the façade to be met and comfort conditions to be held stable.

FLOOR ZONING

Perimeter control zones should typically be no more than 6m wide and 4.5m deep.

Internal zones are not subject to façade heat losses and solar gains and can be larger; in the range of 50 to 70m²

2. Operational Energy Summary

To understand the potential carbon savings associated with current scope of works and potential fabric energy interventions, a simplified model has been generated. This model gives a reflective potential carbon saving for discussion with the design team in order to understand whether these interventions are applicable for this scheme, the following scenarios where investigated:

- Existing Building – Using assumed existing U-Values and assumed lighting and mechanical systems **(BENCHMARK BUILDING)**
- Proposed Mechanical & Electrical Upgrades - Using assumed existing U-Values and proposed lighting and mechanical systems **(AS PROPOSED)**
- Proposed Mechanical & Electrical Upgrades and *Wall Insulation Upgrade* – Improvement to external wall U-Value only and proposed lighting and mechanical systems.
- Proposed Mechanical & Electrical Upgrades and *Wall & Roof Insulation Upgrade with reduced Infiltration losses* - Improvement to external wall U-Value and roof only and proposed lighting and mechanical systems. Air tightness was also improved to 25m³/h.m² as part of the building fabric upgrade.

The results for the four scenarios can be seen below:

Run
Existing Building (BENCHMARK BUILDING)
Proposed Mechanical & Electrical Upgrades (AS PROPOSED)
Proposed Mechanical & Electrical Upgrades and <i>Wall Insulation Upgrade</i>
Proposed Mechanical & Electrical Upgrades and <i>Wall & Roof Insulation Upgrade with reduced Infiltration losses</i>

Building Emission Rate (BER) Benchmark and Intervention Results

The results indicate that interventions over and above the current scope of proposed mechanical & electrical works are 8% for fabric upgrades and 17% when fabric and infiltration interventions are implemented.

2.1. Operational Energy

Due to the early phase of the project, initial, and highly indicative calculations have been carried out using the methodology set out in CIBSE TM 54: 2013 (Evaluating operational energy performance of buildings at the design stage) and to meet the objectives of the Bruntwood Guide to Net Zero Operational Carbon.

The primary aim is to carry out this building modelling to provide initial high-level advice; highlighting and identify opportunities to reduce operational carbon, or measures which can be taken to mitigate against risks which may cause energy consumption, and associated carbon emissions, to increase at this very early stage (ensuring they can be acted upon going into stage 3). Due to considerable uncertainty linked to how incoming tenants will operate spaces post occupancy, it is not meaningful to provide a single figure for an operational

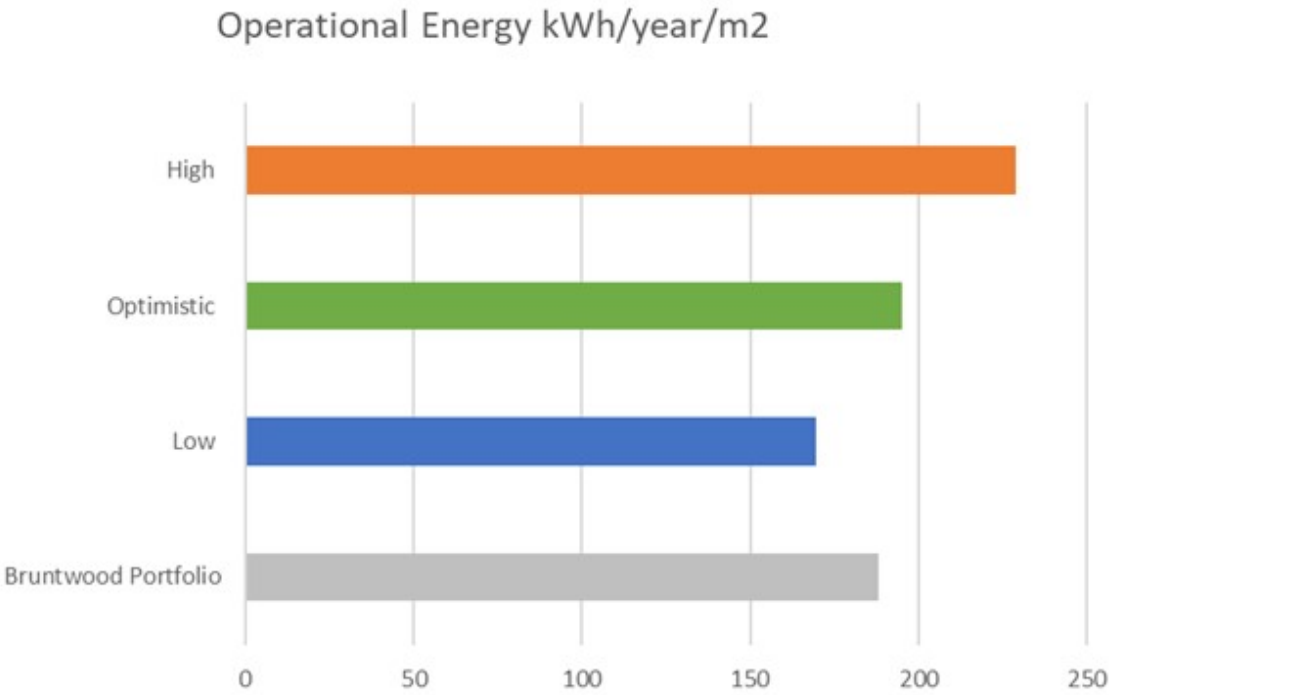
energy prediction. It is more useful to estimate the range in which energy consumption is likely to be, low, central and high. Inputs for each scenario has been referenced by Bruntwood. The results for operational energy can be seen below:

Scenario	Heating	Cooling	Auxiliary	Lighting	Hot Water	Equipment	Servers	Lifts	Catering (Environmental)	Total (kWh/year /m²)
1 Low	42.1	0.1	7.9	11.3	1.6	16.9	0.2	2.9	86.6	169.6
2 Central (Optimistic)	45.0	0.3	8.7	15.6	2.2	33.0	0.3	3.2	86.6	194.9
3 High	40.0	1.2	9.1	19.3	2.8	65.9	0.7	3.3	86.6	228.9

Operational Energy Results

Based on the current information it is estimated that the total annual energy consumption for Gross Internal Area (GIA) could be in the range of 169.6 kWh/year/m2 to 228.9 kWh/year/m2.

The operational energy results have been plotted against the Bruntwood Existing Building Portfolio, where only the low scenario falls under the existing building Bruntwood portfolio figure of 188 kWh/year/m2.



Operational Energy Compared to Bruntwood's Existing Building Portfolio



2.2. Embodied Carbon

Following a workshop with Bruntwood on Wednesday 24th November 2021, a full scope of works for an embodied carbon assessment has been developed. As part of the retrofit there is the opportunity to reduce embodied carbon through low carbon measures, Hilson Moran will advise on methods to reduce the embodied carbon impact. This study will quantify the lifecycle environmental impact of retrofit solutions using robust life cycle environmental assessment tools and environmental data. This then allows design decisions to be made to reduce the impacts.

In order to inform decisions made by Bruntwood or the design team, the Stage 2 embodied carbon figure can only be calculated after the retrofit design has been frozen and the Bill of Quantities produced by the QS.

3. Utilities Overview

Incoming utilities services will enter the building at high level basement from the St Mary's Parsonage elevation.

The development will be served via a new Electricity North West (ENWL) substation located at ground floor within the building demise.

The incoming communication systems will enter the building at high level Basement at diverse routes within the building via cable duct system.

There is a main communication room located at Basement level, with diverse risers independently located from each other, with both risers served from the diverse communication entry points into the building.

3.1. Incoming Mains Water Service

Currently an incoming water main is provided from the United Utilities network in Mosley Street west.

The main then splits off into two branches to serve 38 Mosely Street and a further branch which routes around the 38 Mosely Street basement and to serve 57 Spring gardens. It appears that the existing branch to 57 Spring Gardens is not metered.

The incoming supply appears suitably sized for the Building proposals and shall be maintained but altered at the incoming point to incorporate new incoming isolation valve and new meters serving branches to both 57 Spring Gardens and 38 Mosely street branches. The meters will be provided by Bruntwood's metering team to their standard requirements. The 38 Mosely street incoming branch shall feed a potable storage water tank located within the Building Basement in a suitable location.

This water main will serve the Landlord's domestic cold water storage tank and boosted distribution systems. A branch connection taken downstream of the utility meter will serve the sprinkler tank, located at basement level.

3.2. Incoming Gas Service

Currently an incoming gas main is provided from the United Utilities network in Mosley Street West.

The main then rises up the building to serve the buildings gas fired LPHW heating boilers which are currently redundant and isolated.

The gas service shall be removed back to the incoming point where it shall be isolated and capped off for in the instance where it may potentially be reused to serve the ground Floor F&B Space if suitably sized.

3.3. Incoming telecommunication Service

Mosley Street is served by its own dedicated incoming telecoms ducts, located within the basement LV switchroom. Previous tenant's services remain installed and these may need to be removed prior to arranging for new incoming telecoms services for both landlord and future tenant requirements.

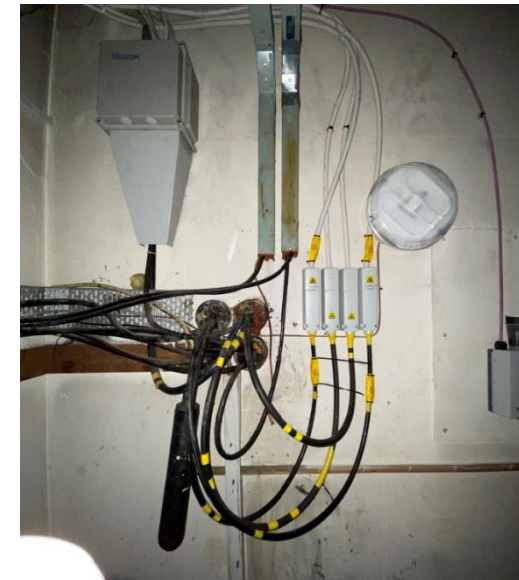


Figure 3.1: Mosley Street Incoming Telecoms Services

Diverse routes do not appear to exist and if this was a requirement then it may be feasible to review incoming telecoms services from Spring Gardens as an alternative route.

3.4. Incoming Electrical Service

38-42 Mosley Street is served from the main LV switchboard located in 57 Spring Gardens via a 630A-rated TP&N fuse.

The estimated maximum demand for the refurbishment of the building is 340kVA and this is predominantly due to the change from gas to electric heating via new VRF heating and cooling units to be located on the roof of Spring Gardens. This also includes a worse-case solution for the food & beverage operation on the ground/basement levels.

The existing transformer is rated at 1000kVA with the sub-mains cables rated to meet this capacity. The current authorised supply capacity for both buildings is set at 500kVA and can be increased to suit the final design load.

The requirement for mechanical smoke ventilation and sprinkler pumps will impact on the building load under emergency conditions and this will require further review at the next stage of the design.

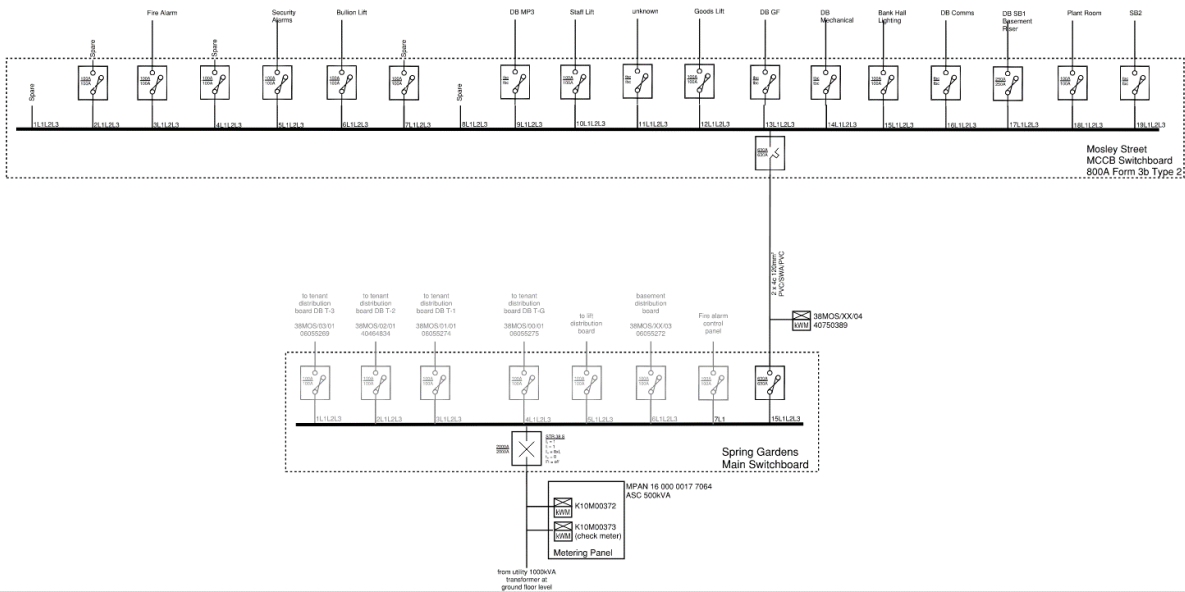


Figure 3.2: Mosley Street Existing Electrical Distribution Schematic

No separate utility-metered service is planned for the food and beverage unit on the ground/basement level. This will be sub-metered along with the commercial office units on the 1st, 2nd and 3rd floors.



Figure 3.3: Spring Gardens Main LV Switchboard (left) and Mosley Street LV Switchboard (right)

4. Mechanical Services

Whilst a broader range of environmental control systems are available to provide comfort conditions, there are mitigating circumstances that have influenced the decision to proceed with the design based on a refrigerant fan coil solution.

4.1. Comfort Criteria

External Design Parameters

- Summer External Design Temperature: 28°C dry bulb / 21°C wet bulb
- Winter External Design Temperature: -4°C saturated

Air cooled equipment will be designed to operate up to a maximum ambient temperature of 35°C dry bulb / 22°C wet bulb

Internal Design Parameters

- Office Summer Design: 24°C +/- 2°C (No humidity control)
- Office Winter Design: 21°C +/- 2°C (No humidity control)
- Basement Gym: 16°C +/- 2°C (No humidity control)
- Toilets: 18°C winter minimum
- Stairs: 18°C winter minimum

Relative Humidity

Humidity control is not proposed.

Occupancy Density

The table below outlines the assumed occupancy density for each space type.

Space Type	Occupancy Density (m ² /person)
Office	8 ¹
Water storage calculations	10 ¹
Ground Floor F&B	As per Architectural G.A seat layout/ cover numbers

¹ Satisfies BCO recommendations for 'High Density Offices'

Ventilation

The table below shows the ventilation rates allowed for in each space type.

Space Type	Ventilation Rate
Office	14 l/s/person
Back of House Plant	2ACH
Ground Floor F&B Space	10 l/s/person
Retail kitchen Extract (Riser/duct allowance)	50 ACH for Kitchen space area indicated on Architectural drawings
Toilets	10ACH (Extract) / 8ACH (Supply)

¹ Satisfies BCO recommendations

Infiltration

The following are the assumed infiltration rates.

	ACH rate
Infiltration summer	0.5
Infiltration winter	1.0
Infiltration Reception	1.5

Cooling Design Conditions

The table below summarises the design assumptions made for the office area cooling load calculations.

Parameter	Assumption
Occupancy gains	12 W/person (Sensible) / 55 W/person (Latent)
Lighting	10W/m ²
Small Power	5W/m ² ¹
Equipment	25W/m ²
Supplementary Allowances	None

¹ 80% utilisation at central plant.

Noise Levels

Internal noise levels are as follows:

- General Offices: NR38 (L_{eq}) (maximum)
- Toilets: NR45 (L_{eq}) (maximum)
- Reception: NR38 (L_{eq}) (maximum)

Water Provisions

- Storage not to exceed 15 litres /person/day based upon diversified building occupation of 1 person / 10 m². Water temperature to be kept below 20°C to reduce the risk of legionella disease.
- Water storage for future Ground Floor F&B usage is not considered as a CAT A provision and will be undertaken by the future CAT B fit out Contractor / design Consultant.

Hot Water Generation

1) Central Storage

- Centralised hot water storage and systems will be designed in full accordance with BS EN 806, The Water Supply (Water Quality) Regulations 2010 and The Water Supply (Water Fitting) Regulations 1999.
- All domestic hot water will be stored at 60°C and will be distributed at 55°C.
- Storage volume will be based on 50% of the peak demand volume with full recovery in a period not greater than 1.5 hours
- Peak hot water demand will be based on the central shower ablution area with the shower usage as follows:
 - I. Morning Peak Period – 0730-0900hrs
 - II. A single shower hot water contribution from a 9l/m shower for a duration of 7 minutes with a 66/34% (hot/cold) split.
 - III. Any one shower will be visited 4 times within a single one-hour period.

Sanitary Pipework Systems

The sanitary pipework systems will be designed as a secondary ventilated one pipe system in accordance with BS EN 12056 Part 2 and the Building Regulations approved document 'H'.

Pipework system capacity: The sanitary pipework system capacity will be calculated in accordance with BS EN 12056 Part 2, Table 2, System III discharge units.

4.2. Ventilation

Outdoor air is required for respiration and to prevent build-up of odours.

In accordance with the current recommended 2019 BCO Guidance, fresh air to be provided to Office spaces at a rate of 14 l/s based on 1 person per 8m²

Other spaces will be provided with the following fresh air ventilation rates generally in accordance with CIBSE recommendations.

- Basement Gym – 20 l/s/person based on architectural drawing equipment and workout space headcount
- Basement Viewing Area – 10 l/s/Person based on architectural drawing seating headcount
- Cycle store – 1 air change / hour
- Basement showers – 10 air changes / hour based on Superloo and enclosed shower room spaces
- Ground floor F&B – 10 l/s/person based on architectural drawing seating numbers / covers
- Future F&B kitchen – 40 air changes in accordance with DW/172 recommendations.

4.2.1. General office Areas

The building was served via an AHU which also serves the adjacent 57 Spring Gardens building. The AHU is located within the 38 Mosely Street building plantroom and although most of the fresh air systems have been stripped out from the Mosley Street Building the AHU still runs to serve the 57 Spring Gardens Building.

It is proposed that two new AHU's will be provided to separately serve both the 57 Spring Gardens and 38 Mosley Street buildings. The fresh air supply to 38 Mosely street Fresh air will be provided to each floor via a dedicated building AHU with heat recovery section. A separate AHU will be provided to serve the 57 Spring Gardens project.

The Client , Bruntwood, have confirmed that it is not proposed to split the Buildings up in terms of plant services provision and therefore the AHU's shall both be located within the internal plantroom above 38 Mosely Street.

Primary tempered supply fresh air shall be ducted via existing ventilation duct risers via newly sized primary supply ductwork which will be distributed at each floor level to discharge at the back of exposed ceiling void fan coil units in most cases. Exceptions to this rule will be the 3rd floor Board Room where fresh air will be delivered via wall mounted louvres. Extract air shall be provided to most Office spaces via bellmouth duct sections. Refer to indicative mechanical services layouts for further details.

4.2.2. Entrance / Reception Area

The reception area will be naturally ventilated by the transfer of air via the main entrance doors.

4.2.3. Ground Floor Food and Beverage Space

The Ground floor F&B space, formerly known as the Banking Hall, shall be provided with tempered fresh air to satisfy the requirements of a Multilet usage of an F&B space which is considered as worst-case scenario.

The Ground floor F&B seating area shall be provided with ventilation via the Landlords CAT A general AHU which serves the Office spaces within the rest of the building. Existing mesh supply louvres shall be

used where existing space for new ducting supplies permit whilst taking into consideration future space planning requirements for potential restaurant kitchen ductwork distribution. A new supply duct and grille has been indicated at the entrance end of the Hall subject to National Heritage approval.

Space allowance for ductwork serving the Ground floor F&B Kitchen fit out has been indicatively shown on the Mechanical services drawings. An allowance has been made for 40 air changes per hour; 40 air changes per hour is the minimum in accordance with BESA DW/172 recommendations for a future commercial Restaurant Kitchen where actual extract / supply rates are not known. Initial rates considered, based on 40 air changes per hour serving a Kitchen area volume of 46m² by 2.7m high, i.e. 126m³. This equates to 1.41m³/s at an air velocity of 7m/s. Supply and extract ducts are sized at 500mm each to allow space allocation for ducts.

It is proposed that a new riser will be formed by taking out one of the lifts adjacent to an existing mechanical services riser; refer to mechanical drawings for details of proposed route of potential future ducts to roof.

4.2.4. Basement Cycle Store, Gym and Viewing Space ventilation

Fresh air will be provided to the basement area Cycle store, Gym and viewing Spaces via the General Office AHU ventilation system.

The shower and changing spaces will be ventilated and heated by a small, dedicated air handling unit, providing full fresh air, located within the rooftop internal plantroom. The AHU will be complete with motorised dampers, panel filter, bag filter, plate recuperator, heating coil and supply and extract fans. Supply and extract ductwork will distribute into the space with ceiling mounted supply and extract grilles.

4.2.5. Toilet Ventilation

Toilet extract ventilation will be provided by a small, dedicated AHU located at roof level and an extract valve within each toilet cubicle and supply make up air into the toilet lobby or adjacent corridor. The AHU will be complete with motorised dampers, panel filter, bag filter, plate recuperator, heating coil and supply and extract fans.

Toilet supply and extract ducts will run from each toilet area to a vertical riser within the toilet space which will exhaust vitiated air to atmosphere at roof plantroom level.

4.3. Heating and Cooling

Hilson Moran will be undertaking a simulation of the proposed building redevelopment; using fully dynamic thermal modelling software (EDSL TAS), compliant with the requirements of CIBSE AM11. This analysis is intended to define the required peak load of the building when in full use.

The heating and cooling loads on the office floors are made up of the following components:

- Heating - Fabric, mechanical ventilation, and infiltration heat losses.
- Cooling - Fabric, mechanical ventilation, solar gain, infiltration, occupancy (people loads) small power and lighting.

The heating and cooling loads within the Basement Gym and Viewing Space are made up of the following components:

- Heating - Fabric, mechanical ventilation, and infiltration heat losses.

- Fabric, mechanical ventilation, infiltration, occupancy (people loads) small power and lighting.
- Cooling - Mechanical ventilation, infiltration, occupancy (people loads) small power and lighting.

Cooling loads to the Basement shower and changing Space are minimal and will be dealt with via a high ventilation air rate, i.e., 10 air changes per hour.

Due to limitations of running services to the Ground Floor Food and beverage space cooling will not be considered for the space. Albeit with extraction of warmer air from vitiated air from the high-level space, Heavyweight fabric construction and the fact that it is very shaded from surrounding buildings that cooling of the space is at this stage considered a requirement. Some peak lopping may be possible from lowering the temperature of the fresh air volume to lower than 21°C, i.e., say 18°C or by utilising free cooling when external temperatures permit.

4.3.1.1. Heating and Cooling

The heating and cooling load of the building will be met by VRF refrigerant heating / cooling units linked to a number of reverse cycle air source heat pumps (ASHP) located on the external roof plant space of 57 Spring Gardens by interconnecting refrigerant pipework. These units will be selected to match both the peak summer and the peak winter building loads.

4.3.1.2. Office Spaces

In general for office spaces heating and cooling refrigerant distribution will supply refrigerant fan coil units located in the exposed ceiling void space, and the FCU will distribute heated and cooled air to the space.

Terminal Unit (Fan Coil Units) cooling loads will be derived from the instantaneous peak output within the zone they serve. In the case of a perimeter units this will include the solar gain, infiltration and user related loads driven by the workplace density. For internal FCU's the solar gain is significantly reduced as is the impact of infiltration through the façade.

4.3.1.3. 3rd floor Boardroom

The third-floor boardroom will be served via wall mounted Fan coil units mounted within a casing to the architect's detail so as to be sympathetic with the Boardroom finishes.

An option for fan coil units(s) to be mounted within a ceiling bulkhead at the external façade side of the room will be offered to the National Heritage consultant for review.

4.3.1.4. Ground floor F&B

A number of systems were considered for the Ground Floor F&B space however due to limitations of space and National Heritage considerations these were not possible for the following reasons;

- Full fresh air Heating / cooling – restrictions in current space allowances for ductwork sized for full fresh air heating. National heritage considerations, unable to install destratification fans to recirculate warm air at high level down to lower level.
- Wall mounted fan coil units or convection units. National heritage considerations. Preference to maintain low level wall mounted panelling. Future Restaurant would possibly not want heating installed on the wall at low level, i.e. would restrict their Restaurant space plans.

National heritage considerations, unable to install destratification fans to recirculate warm air at high level down to lower level.

- Displacement ventilation system – National heritage considerations. Unable to run ducts to or install low level displacement louvres.

The remaining option therefore is to propose that an underfloor heating system is installed to the space for provision of an even gradient heat distribution to the space. The system could be installed by the CAT A fit out Contractor in agreement with a potential Ground Floor F&B tenant or the system could be installed by the Tenant as part of their CAT B fit out. A different system could also be installed by the CAT B fit out Contractor in agreement with National Heritage stipulations.

4.3.1.5. Basement Level

Within the Viewing Area heating and cooling refrigerant distribution will supply refrigerant fan coil units located within the exposed ceiling void space, and the FCU will distribute heated and cooled air to the space.

Tempered air only will be provided to the Cycle store via the general supply and extract ventilation system.

The shower and changing spaces will be heated / cooled by an all-air system provided by a small dedicated air handling unit, located within the rooftop internal plantroom.

Basement toilets shall be heated via wall mounted electric panel heaters.

4.3.1.6. Transient corridor spaces

Where required to offset heat losses within corridor and other transient spaces heating shall be by wall mounted electric panel heaters.

4.1. Fire protection

4.1.1. General

In accordance with the Fire engineering section of this report the following mechanical fire protection systems will be required to comply with the requirements of BS 9990

4.1.2. Dry riser

A new dry riser installation will be provided to comply with the requirements of BS 9990.

The system shall comprise of a dry riser inlet box / connection point with suitable access on the face of the building. In the case of a building fitted with dry fire mains, there should be access for a pumping appliance to within 18 m and riser outlets at each level located within protected lobbies. Riser Outlets may also be sited on landings or half-landings to the stair, provided that sufficient space is available for their use by firefighters without obstructing the opening of doors.

4.1.3. Fire Vehicle Access

Dry main inlet will be provided on the face of building. Access roadways should generally be positioned to allow pumping appliances to be positioned within 18 m of, and in sight of, any inlet points.

4.1.4. Basement Ventilation / Smoke Extract System

The basement has a floor area greater than 200 m². On this basis a smoke ventilation system is required. The system may be either natural or powered, however in this instance is likely to be powered.

A powered extract system should:

- Provide ten air changes per hour;
- Be capable of handling gas temperatures of 300°C for not less than 60 min;
- Come into operation automatically either on activation of the sprinkler system or by an automatic fire detection system conforming to BS 5839-1:2013 (at least L3 standard).

In addition:

- replacement air should be provided and open automatically, using the same activation method as in c) above;
- the system should have an independent power supply which would operate in the event of failure of the main supply;
- the ductwork should be a fire-resisting duct system.

The fire resistance should be not less than 60 min or equivalent to the fire resistance rating of any compartment boundary through which it passes, whichever is the greater;

- all wiring associated with the fans should be in accordance with BS 8519.

4.1.5. Basement Sprinkler System

Powered smoke and heat ventilation will be required to be installed in conjunction with a Sprinkler system. The sprinkler system should be an OH3 category system within the Basement level. The system will be installed in accordance with BS EN 12845.

A sprinkler storage tank will be required either within the Basement or roof level plantroom. It is envisaged that an actual storage capacity of 135m³ is required.

5. Public Health Services

5.1. Domestic Cold Water

WATER STORAGE

Water storage of 15 litres per person per day will be allowed based on effective density of one person per 10m²

Whilst water storage is no longer a statutory requirement for commercial offices, it is specified to allow continued occupation if the mains water supply fails. It is important not to oversize the central water storage to ensure that the water is 'turned over' frequently, reducing the risk of Legionnaires' disease.

No allowance provision will be considered for water storage for a future Ground Floor F&B facility at CAT A fit out stage, however space allocation will need to be considered for some future water storage plant, hot water heater within the basement as part of a Restaurant CAT B fit out. Refer to mechanical services drawings for notes on consideration.

It is envisaged that space will be required for a bulk cold water storage tank, potable water and booster set within the Basement. Water will be distributed to the toilet cores and shower area via a variable speed cold water booster pump to serve the Basement shower space and toilet spaces on all levels.

A dedicated branch connection will be provided within the Basement for a future Restaurant fit-out by means of a valved stub piece which can be easily isolated for the introduction of a tee branch fitting in the future. As these areas will be operated by an external specialist, check water meters will need to be installed as part of their CAT B fit out to monitor and log the volume of water used. Subject to agreement, the check meters will provide the facility for sub-billing.

Dedicated branch connections will be provided at each level to serve future Office Kitchenettes spaces. by means of a valved stub piece at each level within the BCWS riser adjacent to the building stair core. Again check water meters will need to be installed as part of any Office CAT B fit out to monitor and log the volume of water used to Kitchenettes. Subject to agreement, the check meters will provide the facility for sub-billing.

For façade wash-down and general maintenance, a non-potable system will be provided within the basement plantroom areas and at roof level.

5.2. Domestic Hot Water

The use of domestic hot water will vary in terms of loads during different parts of the day and in different locations within the building.

The largest peak demand will be from the showers located at basement level when used by cyclists and runners first thing in the morning. A similar, but reduced peak is expected at lunchtime.

To best manage the variance in domestic hot water loads, the hot water to the toilet cores and basement shower areas will be generated via reduced storage, fast recovery indirect cylinders located at roof plantroom level.

The cylinders will be heated by mechanical ASHP refrigerant plant with electrical immersion heater back-up if required.

5.3. Soil and Waste

A fully vented gravity drainage system will be provided to serve the toilet core and Basement Shower space.

The foul water drainage pipework will be routed vertically down to basement level for connection into the sewer outfall existing stub connections within the basement.

Pumped above drainage may be required for the Basement shower spaces subject to investigation of existing stub connection sizes within that area. Refer to notes on Mechanical drawings.

The sewer outfall will connect to the external infrastructure in Mosely Street.

All drainage stacks will terminate at roof level, ensuring natural ventilation.

Dedicated soil and waste branch connections will be provided at each level ready to serve future Office Kitchenettes spaces by means of a capped branch soil and waste connection within the BCWS / drainage riser adjacent to the building stair core.

5.4. Fire protection

5.4.1. General

In accordance with the Fire engineering section of this report the following mechanical fire protection systems will be required to comply with the requirements of BS 9999.

5.4.2. Dry riser

New dry riser installation(s) will be provided to comply with the requirements of BS 9990.

The system shall comprise of a dry riser inlet boxes / connection points with suitable access on the face of the building, indicatively shown at each staircase position. In the case of a building fitted with dry fire mains, there should be access for a pumping appliance to within 18 m and riser outlets at each level located within protected lobbies. Riser Outlets may also be sited on landings or half-landings to the stair, provided that sufficient space is available for their use by firefighters without obstructing the opening of doors.

Due to initial review of fire hose distance requirements it is envisaged that three separate dry riser installations will be required, however this shall be reviewed at design stage 3.

5.4.3. Fire Vehicle Access

Dry main inlets will be provided on the face of building. Access roadways should generally be positioned to allow pumping appliances to be positioned within 18 m of, and in sight of, any inlet points.

5.4.4. Basement Ventilation / Smoke Extract System

The basement has a floor area greater than 200 m². On this basis a smoke ventilation system is required. The system may be either natural or powered, however in this instance is likely to be powered.

A powered extract system should:

- a) Provide ten air changes per hour;
- b) Be capable of handling gas temperatures of 300°C for not less than 60 min;
- c) Come into operation automatically either on activation of the sprinkler system or by an automatic fire detection system conforming to BS 5839-1:2013 (at least L3 standard).

In addition:

- 1) replacement air should be provided and open automatically, using the same activation method as in c) above;
- 2) the system should have an independent power supply which would operate in the event of failure of the main supply;
- 3) the ductwork should be a fire-resisting duct system.

The fire resistance should be not less than 60 min or equivalent to the fire resistance rating of any compartment boundary through which it passes, whichever is the greater;

- 4) all wiring associated with the fans should be in accordance with BS 8519.

5.4.5. Basement Sprinkler System

An automatic fire suppression sprinkler system in compliance with BS EN 12845 shall be provided throughout the basement only due to the basement being mechanically vented. The system hazard classification shall be Ordinary Hazard Group 3 (OH3) book tabled 15m high system to suit the use of the basement, it is anticipated that the system shall be a stored water pumped system at this stage with the plant located within the basement or within the roof plantroom space. The effective stored water capacity shall be 135m³ held within a twin compartment water storage tank as detailed in BS EN 12845. The pumping arrangement shall be twin electrical 18 kw pumps in duty standby configuration providing the required system reliability as detailed in Annex K of BS EN 12845 in addition the pumps shall be afforded supplies from the building life safety generator.

During the next design stage town's main only and reduced stored water capacity system design shall be explored once further details have been gained on the capabilities of water network supplying the area. Additionally alternative systems shall be explored such as high pressure watermist fire suppression which can offer reduced basement plant requirements, however these approaches can have residual risks for Building control and insurer acceptance.

6. Electrical Services

6.1. Main LV Distribution

The existing main LV distribution from Spring Gardens to Mosley Street will be retained and modified to suit the refurbishment of the building.

New LV distribution boards will be installed to serve the refurbished areas including the ground/basement level food and beverage suite and upper floor office suites.

Each distribution board will be sub-metered using MID meters; however each office suite will not be separately metered.

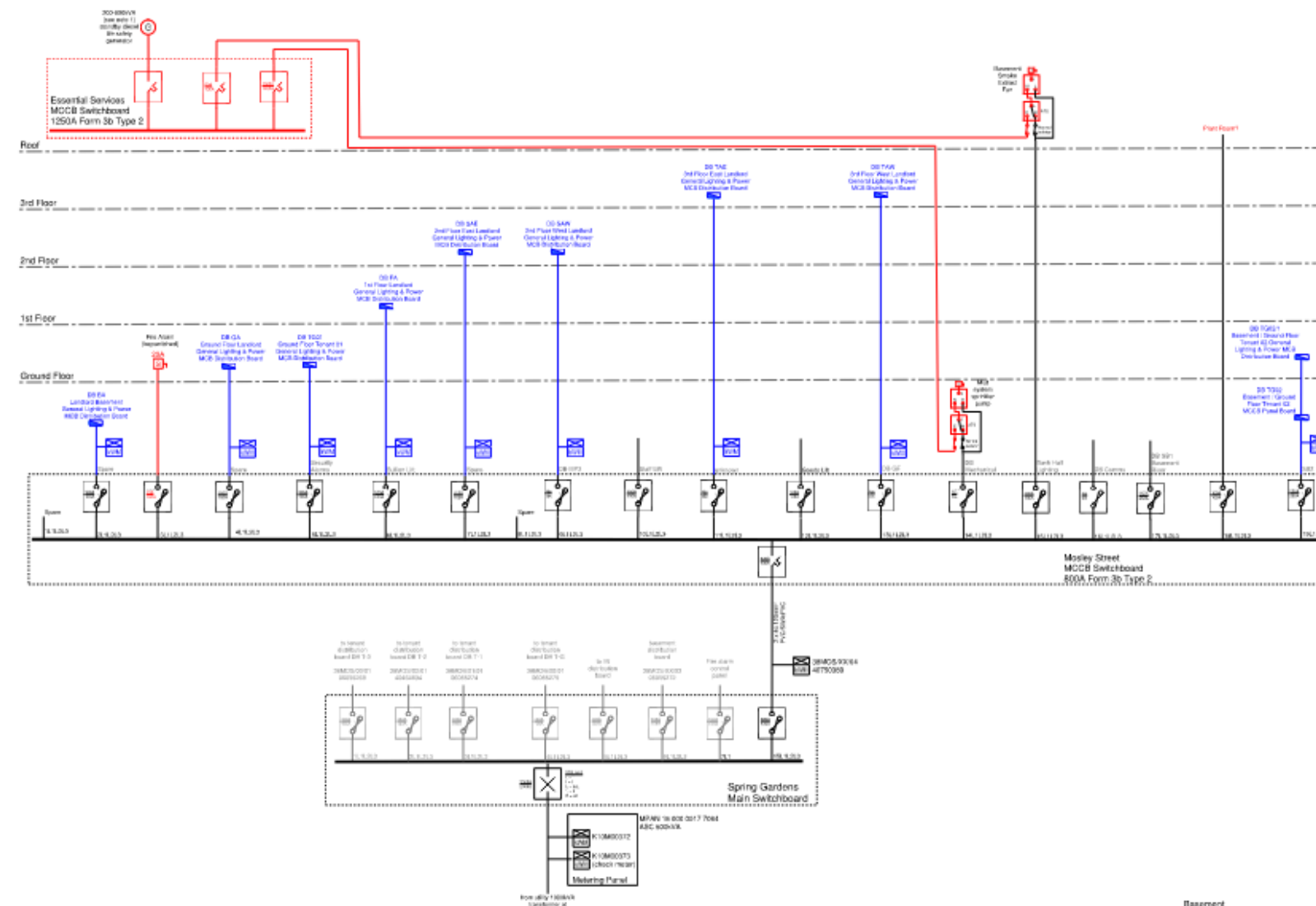


Figure 6.1: Mosley Street Proposed Electrical Distribution Schematic

6.2. Standby Generation and Life Safety Power Supplies

The proposed smoke extract system and sprinkler system will require secondary power supplies. The mist system pumps will both be electric and depending on the final design could require a standby generator of between 200kVA and 800kVA due to the locked rotor current of the pump motor.

The generator will be located on the roof of 57 Spring Gardens and will have an acoustic enclosure to meet Manchester City Council's noise criteria.

A new life-safety switchboard will be installed in the roof plant room above 38-42 Mosley Street, with the exact location to be agreed at the next stage of the design.

An alternative electrical riser route will be required to ensure the supplies to the vent plant and sprinkler pumps follow diverse routes. Automatic transfer switches will be installed adjacent to the plant.

6.3. General Small Power

Electrical Design Loads

The following table summarises the electrical design loads.

System	Load
Lighting	8W/m ²
Small Power	20-23W/m ² on floor distribution, 13-15/m ² diversified load with additional allowance for Tenant SER. 20-25% spare ways in board
Mechanical Power	50W/m ² (Cat A/B allowance)

General small power will be provided to suit the refurbishment of the building and include:

- Power to mechanical services including HVAC plant and local water heaters
- Power to electrical services including fire and security control panels and associated equipment
- Power to audio-visual equipment in reception, screening room etc, details to be developed at the next stage)
- Power for IT equipment include equipment cabinets etc
- General small power for cleaning and maintenance purposes
- General small power to landlord areas including gym/studio, lounge, reception etc
- General small power to toilets and shower rooms including hand driers etc
- Power to main entrance door motor

6.4. Structured Data Cabling

Containment only will be provided for structured data cabling by others.

Containment including cable basket will be provided from the incoming telecom point (LV switchroom) to the electrical risers A & B indicated on the drawings.

Containment will be installed to landlord equipment cabinets, details of which will be developed at the next stage.

6.5. General and Emergency Lighting

6.5.1. General Requirements

The design of the internal lighting will be in accordance with the best practice guidance contained within the following documents.

- CIBSE Lighting Guides
- BS EN 12464-1 Light and Lighting of Workplaces
- BCO Guide to Lighting – Best Practices for Lighting of Offices
- SLL Lighting Handbook
- Manchester City Council Heritage

Colour temperature of LED luminaires will be 4000K unless indicated otherwise.

Luminaires will be surface mounted or suspended unless indicated otherwise to suit the visual appearance of the areas.

Location	Lighting Level (Average Maintained)	Glare (U _{GR})	Uniformity (U _o)	Colour Rendering Index (R _a)	Efficacy (W/m ² /100lx)	Control
Offices	450lux at working plane (0.75m AFFL)	19*	0.6	80**	1.6	Occupancy/day light linking
2 nd Floor Boardroom	450lux at working plane (0.75m AFFL)	19*	0.6	80**	1.6	Occupancy/day light linking
Reception	200lux general 300lux over reception desk and seating area	22	0.6	80**	3.5	Manual / Scene Setting
Gym / Studio	200 lux at floor level	22	0.6	80	1.6	Occupancy/ Scene Setting
Bike Store	100	25	0.4	40	3.5	Occupancy
Screening Room	200 lux at floor level	22	0.6	80	1.6	Occupancy/ Scene Setting
Lounge	200 lux at floor level	19	0.6	80	1.6	Occupancy/ Scene Setting
Toilets / Showers	250lux above basins 150lux elsewhere	25	0.4	80	3.0	Occupancy
Stairs	200lux main circulation stairs, 150 lux secondary staircases	25	0.6	80**	1.6	Occupancy
Lift Lobbies	200lux	25	0.4	40	2.5	Occupancy

Plantrooms & Risers	200	28	0.4	80	1.75	Manual
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* In accordance with design intent of WELL
** WELL requires CRI >90

Note: Luminaire images shown in the following section are indicative of the type and style only. Exact details of selected luminaires will be agreed at the next stage of design.

Emergency lighting will be designed in accordance with BS 5266 and BS EN 1838 to maintain the following levels of illumination for a minimum period of three hours:

- Open Plan Areas: 1 lux

Escape Routes: 1 lux

Firefighting equipment / call point: 5 lux

Fire alarm panel: 15 lux

Plant rooms: 15 lux

6.5.2. Main Entrance & Lounge Lighting

The main entrance and lounge are subject to specialist interior lighting proposals and will be developed at the next stage to suit the design of these spaces.

6.5.3. Office Lighting

The primary goal of office lighting is to promote good visual communication for occupants with well-lit vertical surfaces and an interesting degree of contrast. The office worker will have enough illumination at their workspace to undertake most modern-day tasks with the ability to enhance the illumination at the workspace to a higher level through task lights or controls.

Lighting throughout will be via suspended LED fittings. The target lighting energy use for the office areas is 1.6W/m²/100lux with the remaining areas to be assessed against Part L energy requirements.

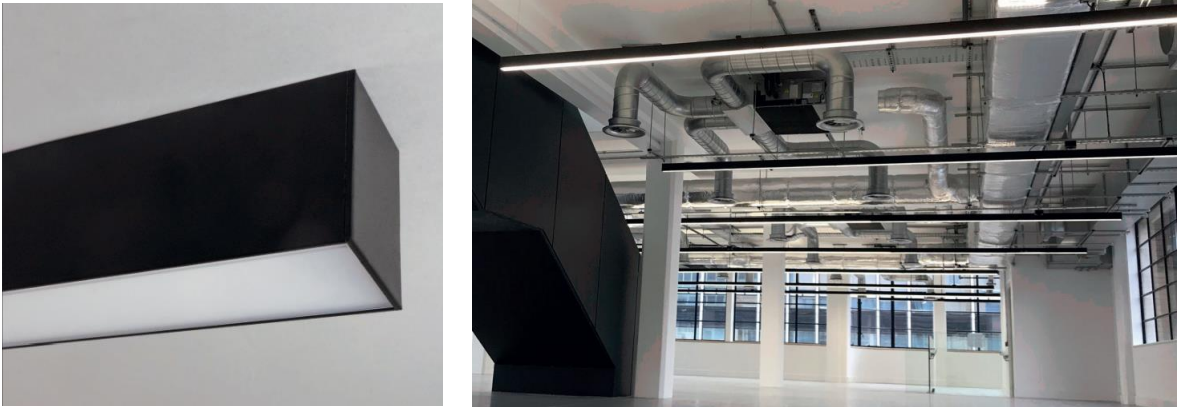


Figure 6.2: Proposed Suspended Office Lighting

Luminaires will be provided with DALI control gear to allow dimming for both local control and daylight control. Luminaires will be suspended on a regular open plan arrangement and coordinated with other services to provide a good visual appearance to the space and ensure the architectural features are maintained.

6.5.4. Ground Floor Banking Hall Lighting

The existing wall and pendant lighting in the Banking Hall will be retained as existing and re-served from the new LV distribution board for that tenant.

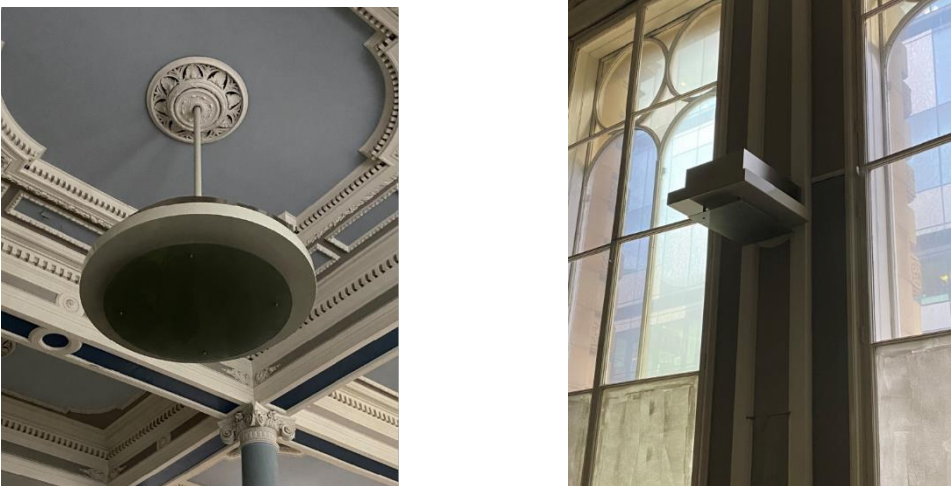


Figure 6.3: Proposed Suspended Office Lighting

The luminaires will be cleaned, re-lamped and, where practical to do so, upgrade the control gear to ensure that they are fully operational for the incoming tenant.

As the luminaires are existing, the lighting performance cannot be detailed at this stage. Once they are functional light level measurements will be taken to confirm the performance.

Existing luminaires will be manually switched.

6.5.5. 2nd Floor Boardroom Lighting

Due to the existing structure of the 2nd floor Boardroom the lighting will be designed to maintain the architectural features (note that the lighting will be the same for the alternative multi-let scheme).



Figure 6.4: 2nd Floor Boardroom Layout & Image

Suspended linear LED luminaires, similar to those installed within the general offices will be installed in front of the external windows.

Recessed LED downlights will be installed within the corner bulkheads as the existing. The downlights will be fixed with a wide beam angle to get as much illumination in to the centre of the room as possible.

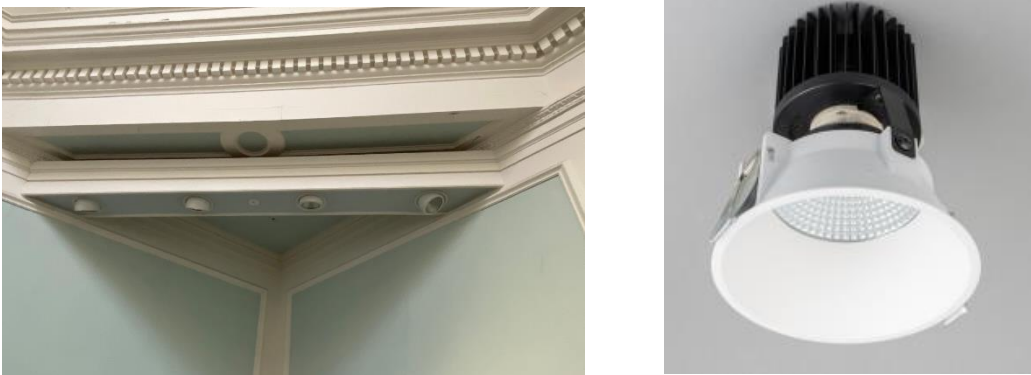


Figure 6.5: Proposed Boardroom Downlights

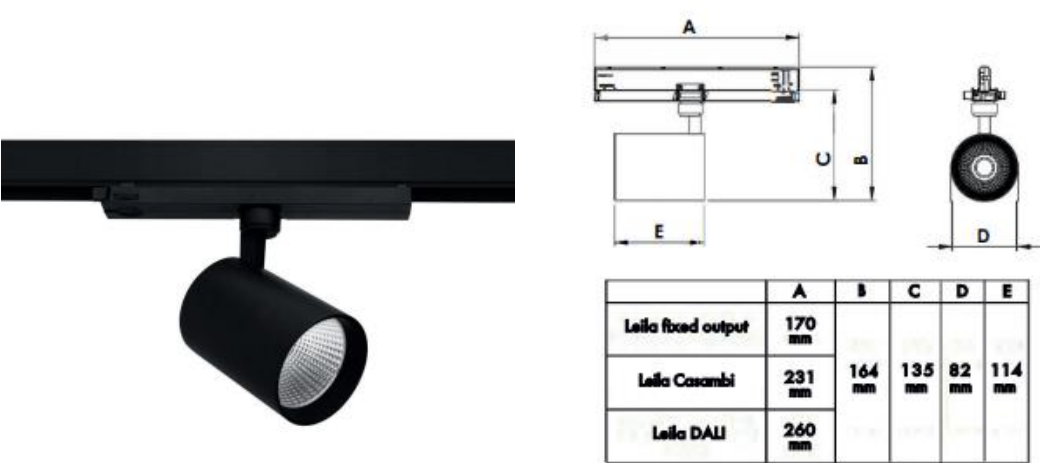
Linear LED tape will be installed around the coving to illuminate the ceiling between it and the glass dome. The LED tape will be a fixed white LED although options for RGBW and tunable white will be considered with the architect and MCC Heritage.



Figure 6.6: Proposed Cove Lighting

6.5.6. Gym / Studio Lighting

The existing wall and pendant lighting in the Banking Hall will be retained as existing and re-served from the new LV distribution board for that tenant.



6.5.7. Screening Room Lighting

New surface mounted LED downlights will be installed in the screening room. Luminaires will be provided with DALI dimmable control gear to allow the lighting to be dimmed to suit the use of the space.



Figure 6.7: Stair Lighting, with options of polished chrome or gold

Decorative / feature lighting will be considered for this room, including linear LED tape to highlight features including AV etc. Further details will be developed at the next stage of the design.

6.5.8. 2nd & 3rd Floor Circulation (West)

Within the circulation corridors at the west end of the building, at 2nd and 3rd floor levels circular pendant luminaires will be installed to suit the architectural finishes in this area.

The luminaires will be selected to have integral lighting controls and emergency lighting to reduce the need for separate installations within this space. The diameter of the luminaire will be agreed with the architect at the next stage of the design.

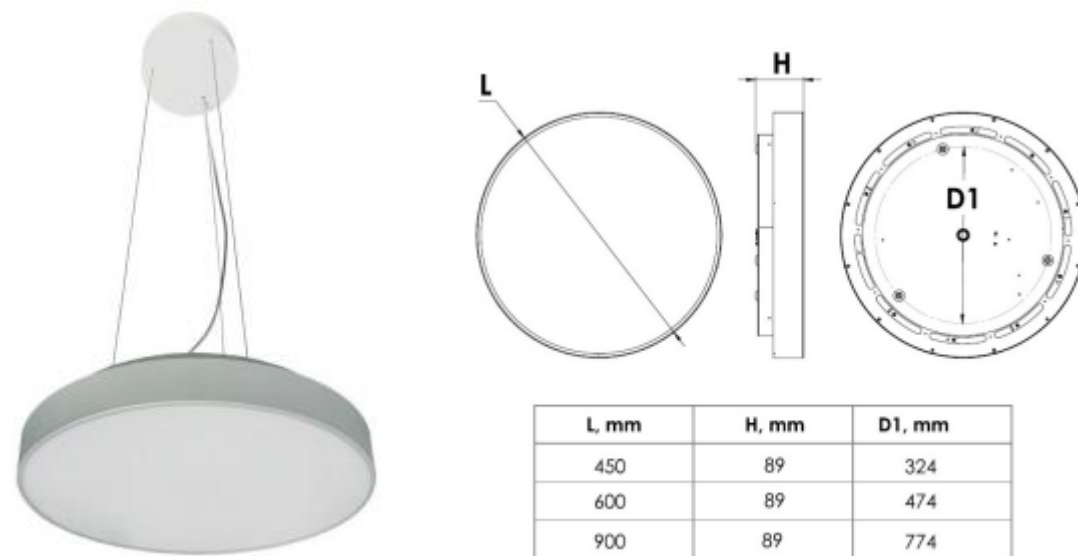


Figure 6.8: Proposed Circulation Lighting

6.5.9. Stair Lighting

There are three main stairs within Mosley Street, one at each end and one in the centre, referenced herein as stair A, B and C.

Stair A, immediately adjacent to 57 Spring Gardens and is used as a shared means of escape. Existing lighting in this stair will generally be retained, except at ground and basement levels which are the means of access to the Bike Store. The existing wall mounted luminaires will be replaced by a circular LED wall mounted luminaire.



Figure 6.9: Stair Lighting, with options of polished chrome or gold

Stair B, in the centre and is assumed to be the main circulation stair for the building. Existing wall mounted lighting in this stair will generally be replaced with the similar luminaire detailed above.

Stair C is located at the far end of the building and provides an alternative means of circulation and means of escape. The existing suspended lighting will be replaced with a similar suspended linear LED luminaire.



Figure 6.10: Stair Lighting, with options of polished chrome or gold

6.5.10. Toilets & Shower Room Lighting

The existing wall and pendant lighting in the Banking Hall will be retained as existing and re-served from the new LV distribution board for that tenant.

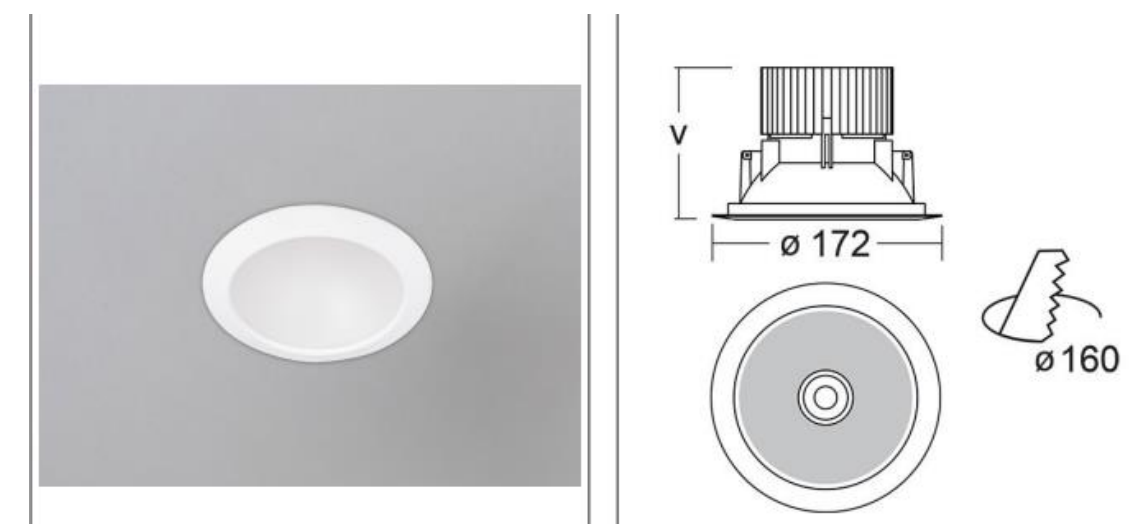


Figure 6.11: Proposed Bike Store & Plant Room Lighting

6.5.11. Common Areas Lighting

Lighting to common areas including lobbies, corridors, toilets and cycling facilities will use LED luminaires. Control will be presence based with dimming back to a low threshold level. WC cubicles will have individual occupancy control to minimise energy usage when lightly used.



Figure 6.12: Proposed Bike Store & Plant Room Lighting

6.5.12. Bike Store & Plantroom Lighting

Linear LED, impact resistant luminaires will be installed in the Bike Store and plant rooms to meet the design requirements of these rooms / areas.

Within risers, where linear LED luminaires may not be suitable, a circular or square equivalent will be installed.



Figure 6.13: Proposed Bike Store & Plant Room Lighting

6.6. Lighting Controls

Lighting controls are an essential part of the system and their application is a key aspect of achieving compliance with the requirements of Part L of the Building Regulations. The lighting control system will be designed to optimise energy saving while maintaining the three key principles of lighting: visual comfort, performance and safety.

The lighting control system will have the following features:

- Dimming in response to available daylight
- Automatic adjustment of light output over time to compensate for deterioration in light source performance and room/luminaire cleanliness
- Presence/absence detection
- Time based control
- Control zones of not more than 40m²
- Energy recording and reporting

6.7. Fire Alarm Systems

An addressable fire alarm system will be provided throughout the building meeting the requirements of BS 5839 Part 1 Category L2 or as otherwise defined in the Fire Strategy. Detection will comprise smoke and heat point detection with alarms being raised with electronic sounders supplemented with strobes.

Beam detection or an air sampling system may be installed within the 2nd floor boardroom to suit the fabric finishes in this area.

Fire alarm interfacing will be provided to equipment required to shut down in the event of a fire alarm activation including lifts (to return to ground), ventilation plant, gas services (to ground floor tenant).

Mosley Street shares a common emergency exit stair with Spring Gardens. Therefore the new fire alarm system will interface with the Spring Garden fire alarm control panel to initiate an alert in the event of a fire alarm activation, and vice versa.

The fire alarm system will interface with the proposed sprinkler system.

6.8. Emergency Voice Communication System (Disabled Refuge Intercom)

Every escape stair should be provided with a disabled refuge with two-way communication designed in accordance with BS 5839 Part 9 to allow disabled occupants to communicate with the building management and fire brigade at the main fire alarm control panel.

Disabled refuges are not currently provided within the building but it is understood that such refuges will be installed within the tenant demise, details of which are to be confirmed.

This is an existing condition which should be covered by the Fire Risk Assessment for the building and an emergency voice evacuation system (EVCS) is not necessarily required. However, provision for an EVCS will be included as part of the proposed design.

6.9. Disabled Toilet/Shower Alarm

Disabled alarms will be installed in disabled toilets and shower rooms in the basement and upper floor landlord toilets with local audible and visual alarms and a centralised repeat alarm located in the reception area.

6.10. Security

Containment only will be provided for security systems provided by others including access control to landlord and tenant areas, intruder alarms to landlord areas on the ground floor and CCTV to landlord areas on the ground floor entrance/exit points and around the external perimeter of the building.

7. Building Management System

A full Building Management System (BMS) will be provided.

The BMS will control and monitor the mechanical services plant and will monitor aspects of the electrical services distribution.

The Front-End server terminal will display dynamic colour graphic plant schematics and building/floor layout pages, and will provide multi-user password protection, calendar based time programs, categorised alarm reporting with retransmission capability (e.g. SMS, email, mobile application notification), historical data reporting and live data trend graphing.

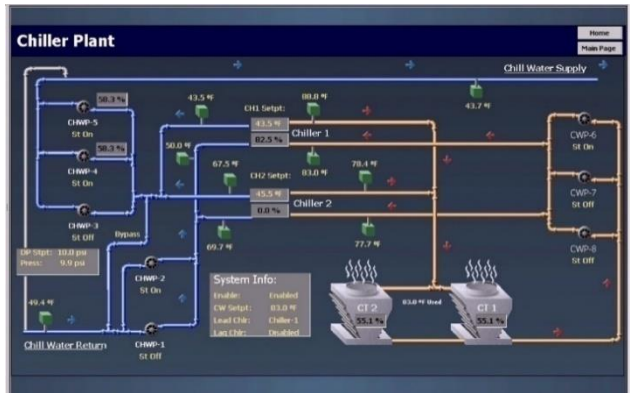


Figure 7.1: Typical Plant Schematic Graphic

Control panels complete with fascia switching and indication will be provided at each plant room location.



Figure 7.2: Typical Mechanical Services Control Panel

8. Acoustics

Acoustic Reports have been provided for the purposes of the Stage 2 feasibility study (Acoustic Feasibility Report) and for the Planning Application (Noise Impact Assessment). These are provided in the Appendices to this report. Summaries of the findings of the Acoustic reports are provided below.

8.1. Acoustic Feasibility Report Summary

The Acoustic Feasibility Report sets out the proposed acoustic criteria for the development with reference to the RIBA Stage 2 concept design, addressing control of external noise intrusion; control of vibration intrusion; internal sound insulation; reverberation control and building services noise emissions.

8.1.1. Internal Ambient Noise Levels

Internal ambient noise levels include the contribution of external noise ingress through the building envelope and internal noise levels from building services.

Based on measurements undertaken in the existing building it was concluded that the existing glazing and secondary glazing (where present) is suitable in terms of controlling noise ingress to acceptable levels. Advice on natural ventilation strategies and rooflight considerations is provided.

Target noise levels are provided for internal building services to achieve. Where ranges are presented for recommended building services noise rating levels, the aim should be to achieve a noise level as close as possible to the upper limit of the range.

8.1.2. Vibration Ingress

The Metrolink tramline running along Mosley Street is a source of vibration at the site.

Tactile vibration (vibration you can feel) was found to be largely insignificant in the building.

Groundborne noise (vibration you can hear) however was clearly noticeable onsite and was measured to be above levels recommended by the British Council for Offices for office use. This is characterised by a low frequency ‘rumble’ observed when trams run past the site. Consideration of options to control groundborne noise is recommended, and a table detailing these has been provided in the Acoustic Feasibility Report. It should be noted that it can be difficult to control groundborne noise effects in refurbishment projects, and effective measures may be prohibitive in terms of cost. This requires consideration early in the next design stage so as to define a clear approach in controlling these effects.

8.1.3. Internal Sound Insulation

Performance requirements have been defined for internal sound insulation of walls, floors and doors. Measurements of a sample of constructions showed that floor constructions are likely to be sufficient in many areas, although these will need to be verified through investigation of the actual floor build-ups.

The fit-out of the gym requires specific consideration and should incorporate treatments to control vibration and structure-borne noise breakout to adjoining spaces (such as floating floors, resilient floor matting etc.). The treatments required will depend on the activities proposed.

8.1.4. Reverberation

Criteria for reverberation times are provided, although the reverberation times in tenanted spaces will depend largely on the fit-out of incoming tenants. Some level of base-build reverberation control is recommended to reduce groundborne noise. Limitations on material locations due to the heritage of the ceilings may mean it is difficult to control reverberation in the banking hall and the domed office space. Carpet flooring is recommended where possible.

8.1.5. Building Services

Building services noise emission to the environment requires control by Manchester City Council (MCC) and BREEAM. Limits are set to achieve at the nearest residential property, and also at nearby commercial properties so as to provide a quality development.

Outline advice is provided on controlling internal and external noise from building services, although it will be the responsibility of the contractor and their appointed acoustic consultant to design and install the MEP systems and associated noise control measures to achieve the noise criteria.

8.2. Noise Impact Assessment Summary

A noise impact assessment has been undertaken to determine the key noise considerations and impacts associated with the planning application for the development, with limits set for the development to achieve based on MCC planning criteria.

A noise survey was undertaken at the site, which confirmed the site to be exposed to noise levels expected of an urban location, with elevated noise levels at the façade of the building overlooking the Metrolink tramlines.

Building services plant noise emission limits are specified in accordance with MCC's standard planning criteria. All fixed plant shall be designed during the subsequent project stages to collectively achieve these limits. Emergency plant noise limits have also been proposed.

Noise break-out associated with the restaurant/bar unit would be controlled by the sound insulation of the building fabric and is shielded from sensitive receptors by intervening buildings. Limits have been set for entertainment noise based on MCC's standard entertainment noise criteria.

Based on the outcomes of the noise assessment, it is considered that impacts associated with the operation of the development can be controlled to an acceptable level and that the site should be considered suitable for the proposed development.

9. Fire Strategy

9.1. Statutory Control

9.1.1. The Building Regulations 2010

The design of the development needs to comply with the Building Regulations 2010 Part B (fire safety), and the objective of this fire safety strategy report is to meet the functional requirements of Schedule 1 Part B of the Building Regulations.

For fire safety, the functional objectives of the Building Regulations relate to:

- B1 – Means of warning and escape
- B2 – Internal fire spread (linings)
- B3 – Internal fire spread (structure)
- B4 – External fire spread
- B5 – Access and facilities for the fire service

9.1.2. Standard Guidance

The standard that will be adopted for this report is BS 9999:2017.

Where it has not been possible to comply with the recommendations of the codes of practice, an engineered alternative solution will be explored and proposed.

Acceptance of this fire strategy is subject to agreement with the statutory authorities.

The diagrams used in this report are indicative only; reference should be made to the architect's drawings for a more accurate representation of the layout of the building.

9.1.3. Regulatory Reform (Fire Safety) Order 2005

The Fire Precautions Act, Fire Precautions (Workplace) Regulations and other selected fire safety legislation have been repealed and replaced by the Regulatory Reform (Fire Safety) Order (FSO) implemented in April 2006.

The Building Regulations continue to apply to new buildings and extensions but virtually all buildings (except dwellings) are also subject to the FSO when they are occupied. It is a requirement of the legislation that the responsible person (owner/occupier) carries out a fire risk assessment, and where more than 5 people are employed, this assessment should be documented and available for inspection by the fire authority if requested.

A review of the premises fire risk assessment must be carried out in accordance with article 9 of the Regulatory Reform (Fire Safety) Order 2005. Any documentation and necessary safety measures must be in place on the completion of the project. Firefighting equipment is to be installed in the premises in accordance with BS EN 3-7:2004 or equivalent acceptable standard.

Doors forming part of the means of escape must be readily openable and available when the premises are occupied, and only fitted with hardware that allows easy egress without the use of a key.

This Fire Strategy should form part of the Health and Safety documentation for 38 Mosley Street and is required to be presented to the responsible person for the building in line with Regulation 38.

9.1.4. Risk Profile

A risk profile needs to be established for the building in order to determine the most appropriate fire strategy to the design features of the building. In order to establish an appropriate risk profile for the building, the occupancy characteristics and fire growth rate should be considered.

Occupancy Characteristics

Table 2 of BS 9999:2017 details the various occupancy characteristics with examples of buildings to which the characteristics apply.

Occupancy Characteristic	Occupancy Description	Examples
A	Occupants who are awake and familiar with the building	Office and industrial premises
B	Occupants who are awake and unfamiliar with the building	Shops, exhibitions, museums, leisure centres, other assembly buildings, etc.
C	Occupants who are likely to be asleep	
Ci	Occupants who are likely to be asleep: Long-term individual occupancy	Individual flats without 24 h maintenance and management control on site
Cii	Occupants who are likely to be asleep: Long-term managed occupancy	Serviced flats, halls of residence, sleeping areas or boarding schools
Ciii	Occupants who are likely to be asleep: Short-term occupancy	Hotels
D	Occupants receiving medical care	Hospitals, residential care facilities

Table 9.1: Extract from Table 2, BS 9999:2017

The occupancy characteristics that are applicable to the building are shown in the table below.

Occupancy Type	Occupancy Characteristic
Office	A (Awake and familiar)
Plant	B (Awake but unfamiliar)
Retail, Lounge	B (Awake but unfamiliar)

Table 9.2: Occupancy characteristics applicable to 38 Mosley

Fire Growth Rate

The fire growth rate is the rate at which it is estimated that a fire will grow. The fire growth rate should be categorized in accordance with Table 9.3.

Category	Fire Growth Rate	Fire Growth Parameter kJ/s3
1	Slow	0.003
2	Medium	0.012
3	Fast	0.047
4	Ultra-fast	0.188

Table 9.3: BS 9999: Fire Growth Rate

Category 2, medium growth rate, is the most appropriate fire growth rate for all areas for a building of this type.

Combining the occupancy characteristic and fire growth rate gives a risk profile for 38 Mosley Street of A2 for the offices and B2 for the retail area and plant rooms. These risk profiles can be used in conjunction with BS 9999 to assist in determining the means of escape and other fire protection measures for the proposed alterations to the building. Other areas will also have risk profiles assigned to them. The risk profiles for 38 Mosley are summarised in Table 9.4.

The potential for a fire to rapidly develop and threaten the integrity of the escape routes is a key consideration in the overall fire safety of the building and will vary according to its use as illustrated below.

Location	Fire Growth Rate
Office	2 (medium)
Plant	2 (medium)
Retail, Lounge	2 (medium)

Summary

The risk profiles for each occupancy type are categorised below.

Location	Risk Profile
Office	A2
Plant	B2
Retail, Lounge	A2

Table 9.4: Risk profiles for the building

9.2. Means of Warning and Escape

9.2.1. Evacuation Strategy

The building employs a single stage evacuation strategy. For a fire in the building all floors will evacuate in one phase.

9.2.2. Estimated Number of Occupants

Where the number of occupants in a building is not known then a realistic estimate of the number of occupants should be made. An estimate can be made by dividing the floor area for each space by the floor space factor. Table 9 of BS 9999 provides floor space factors for various occupancy types. By using the floor space factors an estimate for the number of occupants in the building can be made. As Stair-B is shared by the occupants in two buildings, occupancy figures for 57 Spring G. should be considered too.

Floor	Use	NIA* m ²	Floor Space Factor m ² /person	Calculated Occupancy
Basement*	Bike-Store	57	Number of bikes	40
	GYM	132	5	26
	Shower & Chang. Room	70	Number of rooms	10
	Retail Unit Rooms**	380	7	54
Ground***	Retail	420	1	420
	Office	180	6	30
	Lounge (Serving Office)	96	1	96
First	Office	360	6	60
Second	Office	677	6	113
Third	Office	580	6	97
Total (Occupants using the stairs)-Stair B, C and D*				816

Table 9.5-a: Building Occupancy – 38 Mosley Street

*The values for GYM, Shower & Changing Room, Bike Store are considered incidental in terms of the stair capacity calculations as these areas used by only the office occupants in the building and only given to ensure that the escape from these rooms or that storey is sufficient.

**It has been assumed that this area is the part of the retail unit at ground level (not a different unit) and comprised of storage, food preparation areas, plant rooms, etc. Considering kitchen areas, floor space factor has been taken as '7'.

***As the worst-case scenario, it has been assumed that the main entrance exit would be blocked and only stairs at ground level would be used.

Floor	Use	NIA* m ²	Floor Space Factor m ² /person	Calculated Occupancy
Ground	Office	360	6	60
First	Office	520	6	87

Second	Office	525	6	87
Third	Office	530	6	88
Total (Occupants using the stairs)-Stair A and B				322

Table 9.5-b: Building Occupancy – 57 Spring Gardens*

*Areas measured from PDFs (previous fire strategy report ref: 28354-RP-FE-001 Spring Gardens Fire Strategy)

See Drawings Appendix - Fire Strategy Drawings for stair references & locations.

As 57 Spring Gardens has two staircases, i.e., Stair A and Stair B, half of the occupants in this building are expected to use the common staircase (Stair B), i.e., $322/2 = 161$ people. Therefore, the actual total number of occupants using the stairs (Stair B, C and D) at 38 Mosley Street would be 977 (816+161). Egress Width and Capacity Calculations are given in Appendix-5.

9.2.3. Fire Alarm and Detection Systems

An addressable fire alarm system will be provided throughout the building meeting the requirements of BS 5839 Part 1 Category L2.

The detection system should generally utilise optical smoke detectors, but heat detectors should be installed where there is a potential for steam or fumes, etc., to give rise to unwanted alarms (e.g., in kitchens and plant rooms).

9.2.4. Design of Horizontal Escape Routes

In accordance with Table 11 of BS 9999, the travel distances to a final exit or place of relative safety within a protected route must comply with the limits shown in Table 9.6 in relation to the risk profile.

Where the fit out of a room is not known, BS 9999 recommends taking two-thirds of the actual travel distance to account for this.

Floor	Use	Risk Profile	Actual travel distance		Direct travel distance	
			Single direction	Alternative directions	Single direction	Alternative directions
Basement Level	Retail Unit Part, Plant, Common Areas	B2	20m	50m	13m	33m
Ground Level	Offices Retail, Lounge	A2 B2	22m 20m	55m 50m	15m 13m	37m 33m
Upper Levels	Offices	A2	22m	55m	15m	37m
Roof Level	Plant		60m	100m	40m	66m

Table 9.6: Travel Distance Limits

Floor	Use	Risk Profile	Direct travel distance		Increased direct travel distance	
			Single direction	Alternative directions	Single direction	Alternative directions
Basement Level	Retail Unit Part, Plant, Common Areas	B2	13m	33m	15m	38m
Ground Level	Offices Retail	A2 B2	15m 13m	37m 33m	17.3m 15m	42.6m 38m
Upper Levels	Offices	A2	15m	37m	17.3m	42.6m
Roof Level	Plant		60m	100m	N/A	N/A

Table 9.7-a:- Increase in Travel Distances – (where the fit out of a room is not known)

The travel distances in bold have been used for the assessment.

Where the fit out of a room is known, increased actual travel distances can be considered.

Floor	Use	Risk Profile	Actual travel distance		Increased actual travel distance	
			Single direction	Alternative directions	Single direction	Alternative directions
Basement & Ground level	Retail Unit Part, Plant, Common Areas	B2	20m	50m	23m	57.5m
Ground Level	Offices Retail	A2 B2	22m 20m	55m 50m	25.3m 23m	63.2m 57.5m
Upper Levels	Offices	A2	22m	55m	25.3m	63.2m
Roof Level	Plant		60m	100m	N/A	N/A

9.7-b: Increase in Travel Distances – (where the fit out of a room is known)

Where premises contain provisions for the consumption of alcoholic beverages (if the retail has alcoholic beverages) then a reduction in the travel distances of 25% might be advisable for those particular parts of the premises.

Travel distances in the building are within the recommended limits provided in BS 9999. Travel distances mark-ups are given in Drawings Appendix - Fire Strategy Drawings.

The maximum number of occupants in any room in which there is only one available exit from the room or in a room where the doors do not open in the direction of escape is limited to 60 persons.

Number of Exits

The number of escape routes and exits from any room, tier or storey should be not be less than the minimum recommended in the table below for the intended number of occupants.

Maximum number of persons	Minimum number of escape routes/exits
60	1
600	2
More than 600	3

Table 9.8: Minimum number of escape routes from a room, tier or storey

The number of storey exits provided meets the minimum requirements given in the table above. However, egress width calculations might be limiting as well. (See Appendix 5 - Fire Strategy: Egress Width and Capacity Calculations).

Exit Access

All doors on escape routes should either not be provided with a securing device or be provided with a securing device that is easily openable without the use of a key and without having to manipulate more than one mechanism. The escape provisions should be coordinated with the security/access design. Access control doors or automatic sliding doors must fail safe open.

Inner Rooms

Inner rooms are rooms where the only escape route from the room is through another room, which is called the access room.

For compliance the following must be provided for inner rooms 37 Mosley street:

- A suitably sited vision panel not less than 0.1m² is located in the door or walls of the inner room; or
- The access room is protected by an automatic smoke detector that operates an alarm that is immediately audible in the inner room.

Provisions for Mobility Impaired People

The means of escape provisions for mobility impaired occupants must be taken into account.

Every escape stair in a building must be provided with a disabled refuge at each level. Each refuge must be provided with a 2-way intercommunication device designed in accordance with BS 5839-9 to allow disabled users to communicate with the building management and the fire brigade at the fire alarm panel.

The refuges are a minimum of 900 mm x 1400 mm and located out of the flow of other occupants using the stair.

It is the responsibility of every tenant to operate their own policy on providing assistance to occupants who cannot negotiate stairs unaided and for ensuring that hearing and visually impaired occupants are notified of a fire and assisted to an evacuation point. This must form part of their internal procedures.

9.2.5. Exit Signage

Every doorway or other exit providing access to a means of escape, other than exits in ordinary use (e.g. main entrances), will be distinctively and conspicuously marked by an exit sign in accordance with BS ISO 3864-1:2011 and BS 5499-4:2013.

9.2.6. Emergency lighting

Suitable lighting should be provided to the offices to enable the safe movement of persons along escape routes to a place of relative or ultimate safety. Emergency escape lighting should be provided in accordance with Table 9.9, BS 5266-1 [9], and BS EN 1838 [10].

Occupancy characteristic	Areas needing emergency escape lighting
A	Open-plan areas of more than 60 m ²
B	All escape routes
A&B	All sanitary accommodation with a floor area over 8 m ² Windowless sanitary accommodation with a floor area not more than 8 m ²

Table 9.9: Provisions for emergency escape lighting

9.3. Internal Fire Spread

9.3.1. Surface Lining

In general wall and ceiling linings should achieve a reaction to fire classification of Class 1 (National – BS 476: Part 7 [15]) or Class C-s3, d2 (European - BS EN 13501-1: 2018 [16]).

Linings within protected means of escape, i.e. circulation space, should achieve a reaction to fire performance classification of Class 0 (National – BS 476: Part 6/7) or Class B-s3, d2 (European – BS EN 13501-1: 2018).

Smaller rooms that have a plan area of less than 30m² may be provided with linings that achieve a lower reaction to fire classification of Class 3 (National - BS 476: Part 7 [15]) or Class D-s3, d2 (European - BS EN 13501-1: 2018).

These limitations will be subject to normal limits regarding the extent of areas allowed to have a lower performance classification, as described in the guidance. These limits are summarized below:

- 60m² of wall linings per fire compartment or;
- an area of wall linings equivalent to half of the floor area - whichever is the lesser value

9.3.2. Concealed Spaces

Concealed spaces and cavities in the building can allow the rapid unseen spread of fire and smoke to areas remote from the seat of an incident.

If conceal spaces or cavities are created, cavity barriers will be required. The cavity barriers must provide a minimum of 30/15 minutes fire resistance period in term of integrity and insulation respectively. Cavity barriers must be securely supported so as to guarantee integrity and insulations properties irrespective of the failure of un-rated components.

In accordance with BS 9999, cavity barriers should be provided as follows:

- All junctions between an external cavity wall and every compartment floor and compartment wall
- All junctions between an internal cavity wall and every compartment floor, compartment wall, or other wall or door assembly which forms a fire-resisting barrier.

For a protected escape route, i.e. protected corridor, a cavity that exists above or below any fire resisting construction should either be fitted with cavity barriers on the line of the enclosures to the protected escape route or for the cavities above the fire resisting construction, enclosed on the lower side by a fire resisting ceiling which extends throughout the building, compartment or separated part.

Where the dimension of uninterrupted ceiling void is greater than 20 m. The maximum dimensions of cavities should be less than 20 m in any direction.

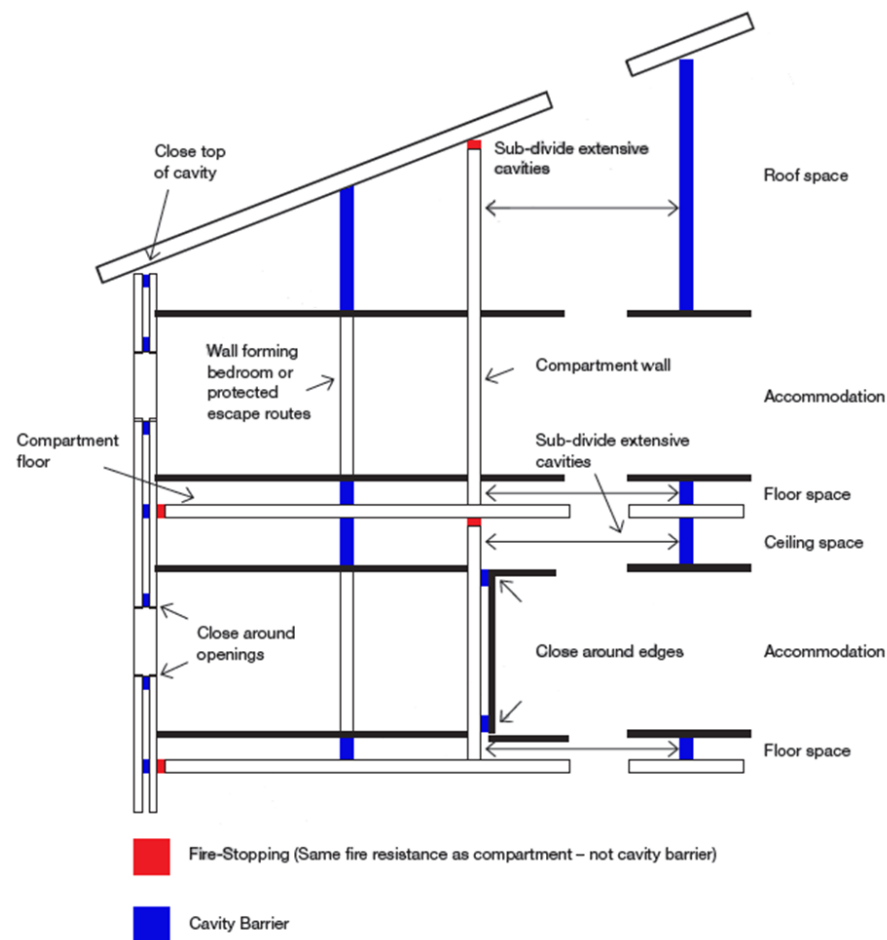


Figure 9.1: Typical fire stopping and cavity barrier detail

Construction of the protected escape routes will be as per the base build fire strategy (slab to slab). Where the office floor includes subdivision for cellular offices the base build strategy assumes cavity barriers will be provided above the internal partition walls. Cavity barriers within the ceiling void should be provided every 20 m.

9.3.3. Compartmentation

The top floor height of the building is over 11 m from Ground level but less than 18 m, meaning the structural fire resistance would need to achieve 60 minutes.

Different Risk Profiles

The risk profiles do not differ and no fire separation is required between tenancies at upper office levels. Due to the height of the building being less than 30m and simultaneous evacuation in place, there is no requirement for compartment floors other than horizontally between the ground and first & second levels (Separate risk profiles). A compartment floor is also required between the ground floor and basement.

Construction separating the two different risk profiles (B and A) should achieve a fire resistance of at least 60 minutes.

Shafts

Any shafts (stairs, lifts, and risers) must be designed as protected shafts achieving 60 minutes fire resistance.

Fire Doors

Fire doors require to be provided in accordance with BS 9999, Table 30. These are shown in the compartmentation drawings in Appendix (Fire Safety Drawings-Compartmentation Plans).

Plant and Ancillary Areas

Plant rooms and ancillary areas must be enclosed in fire resisting construction as per Table 29 of BS 9999, shown in Figure 9.2: Table 29 of BS 9999.

9.3.4. Fire Stopping

All elements and services that penetrate a compartment wall, floor or other element of fire resisting construction is to be fire stopped using a method appropriate to element penetrated and the surrounding construction.

Typical fire stopping materials include:

- Cement mortar
- Gypsum-based plaster
- Cement-based or gypsum-based vermiculite/perlite mixes
- Glass fibre, crushed rock, blast furnace slag or ceramic-based products (with or without resin binders) and
- Intumescent mastics.

Systems used must be designed, installed, tested and maintained in full accordance with the relevant BS 476 standard.

Any ventilation ductwork should also be fire protected where it penetrates a fire separating element. As ventilation ducts provide a potential route for fire spread through the duct consideration of how this will be fire stopped must also be made. Three basic methods should be considered:

- Protection using fire dampers
- Protection using fire resisting enclosures
- Protection using fire resisting ductwork

Where a ventilation duct serves more than one part of a compartmented or fire separated protected escape route, smoke detector operated fire dampers should be provided where ductwork enters each fire separated or smoke separated section of the escape route.

Table 29 Structural fire protection of areas of ancillary accommodation

Area of ancillary accommodation	Type of construction needed to separate ancillary accommodation from other parts of the building
1 Storage areas greater than 1 m ² in area but not greater than 450 m ² (other than refuse storage areas).	Robust construction having a minimum standard of fire resistance of 30 min ^{A)}
2 Repair and maintenance workshops where flammable or highly flammable liquids are not used or stored	
3 Kitchens (separately or in conjunction with an associated staff restaurant or canteen)	
4 Transformer, switchgear, and battery rooms for low-voltage or extra-low-voltage equipment	
5 Engineering services installation rooms (other than those covered by items 8, 15 and 19)	
6 Dressing rooms or changing rooms	
7 Cinema projection rooms ^{B)}	
8 Storage areas greater than 450 m ² (other than refuse storage areas)	Robust solid non-combustible construction having a minimum standard of fire resistance of 60 min ^{A)}
9 Car parks within or adjoining the building and not greater than 450 m ² in area	
10 Service installation rooms (other than those covered by items 4, 16, 17, 18, 19)	
11 Places classified as high fire risk areas	
12 Repair and maintenance workshops where flammable or highly flammable liquids are used or stored	
13 Covered loading bays and storage areas other than those covered in items 1 and 8	
14 Car parks within or adjoining the building and greater than 450 m ² in area	Robust solid non-combustible construction having a minimum standard of fire resistance equivalent to that required for the elements of construction of the building and in no case less than 60 min ^{A)}
15 Refuse storage areas	
16 Boiler rooms	
17 Fuel storage spaces	
18 Transformer and switchgear rooms for equipment above low voltage	
19 Rooms housing fixed internal combustion engine(s)	
20 Scene docks	Robust solid non-combustible construction having a minimum standard of fire resistance of not less than 120 min ^{C)}
21 Any electrical substation or enclosure containing any distribution board, generator, powered smoke control plant, pressurization plant, communication equipment, and any other equipment associated with life safety and fire protection systems	

^{A)} Any openings in the required construction should be protected by doors having a similar standard of fire resistance.

^{B)} Attention is drawn to the Cinematograph (Safety) Regulations 1955 [47] in particular in respect of cellulose nitrate film.

^{C)} Any openings in the required construction should be protected by doors having a fire resistance not less than 60 min.

Figure 9.2: Table 29 of BS 9999

9.4. External Fire Spread

As an existing building, there will only be a requirement to comply with the external fire spread risk guidance if there are substantial changes to the unprotected areas of the elevations or the building has a material change of use.

9.4.1. Façade

To reduce the likelihood of fire spreading up the outside of the building, the surface materials of the external façade must comply with the recommendations of BS 9999 as shown in Figure 9.3 below. Figure e) is applicable in the case of 37 Mosley Street.

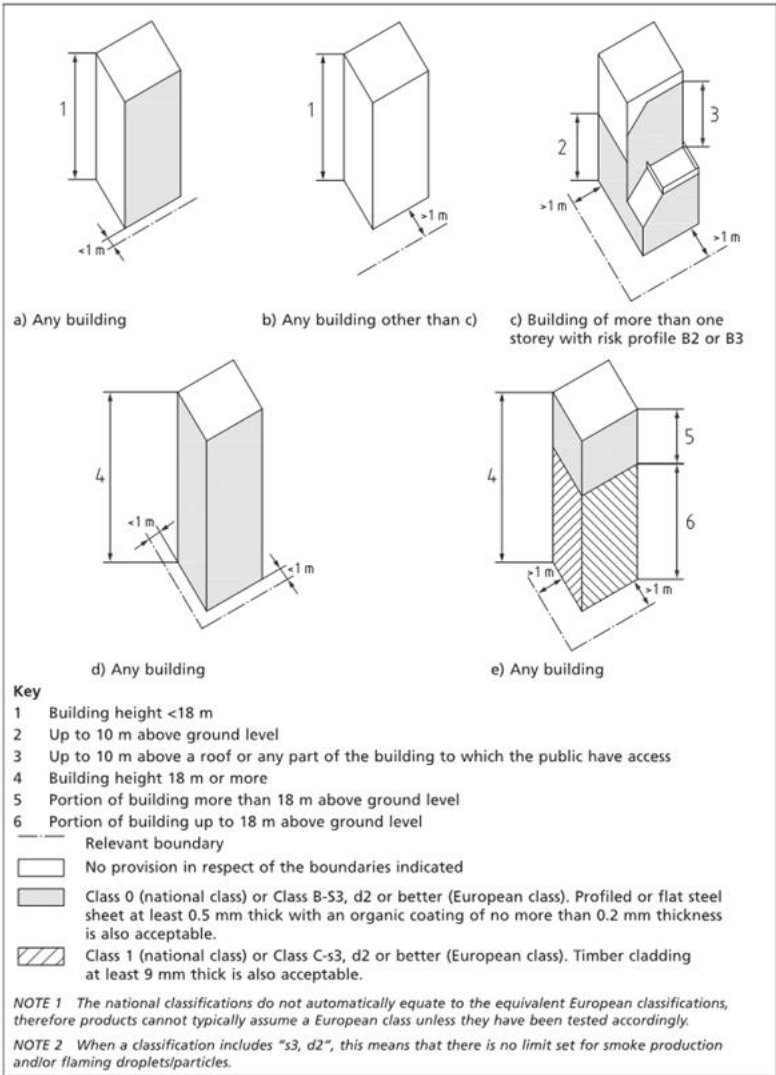


Figure 9.3: External Material Limitation

As the total height of the building is greater than 18 m above ground level (based on the figure above-Figure 47 of BS 9999), any insulation product, filler material (not including gaskets, sealants and similar), etc. used in the external wall construction should be of limited combustibility.

9.5. Access and Facilities for the Fire Service

9.5.1. Firefighting Facilities

Any building in occupancy risk category A or B and with a height of 11 m or more, but less than 18 m (topmost occupied storey) should be provided with fire mains which should be designed and installed in accordance with BS 9990.

In the case of a building fitted with dry fire mains, there should be access for a pumping appliance to within 18 m of each fire main inlet connection point, typically on the face of the building, and the inlet should be visible from the appliance.

The riser outlets should be located within protected lobbies. They may also be sited on landings or half-landings to the stair, provided that sufficient space is available for their use by firefighters without obstructing the opening of doors.

BS 9990 recommends that existing fire hydrants must be provided within 100 m to the entrance of the building and no more than 100 m apart.

9.5.2. Fire Vehicle Access

Dry main inlet will be provided on the face of building. Access roadways should generally be positioned to allow pumping appliances to be positioned within 18 m of, and in sight of, any inlet points.

9.5.3. Basement Ventilation

The basement has a floor area greater than 200 m². On this basis a smoke ventilation system is required. The system may be either natural or powered.

Natural smoke outlets should be both of the following.

- a) Sited at high level in either the ceiling or wall of the space they serve.
- b) Evenly distributed around the perimeter, to discharge to the open air.

The combined clear cross-sectional area of all smoke outlets should be a minimum of 1/40 of the area of the floor.

Powered smoke and heat ventilation is acceptable provided that the basement is fitted with a sprinkler system. The sprinkler system should be in accordance with BS EN 12845.

If a powered extract system is used, it should:

- c) Provide ten air changes per hour;
- d) Be capable of handling gas temperatures of 300°C for not less than 60 min;
- e) Come into operation automatically either on activation of the sprinkler system or by an automatic fire detection system conforming to BS 5839-1:2013 (at least L3 standard).

In addition:

- replacement air should be provided and open automatically, using the same activation method as in c) above;
- the system should have an independent power supply which would operate in the event of failure of the main supply;
- the ductwork should be a fire-resisting duct system.

The fire resistance should be not less than 60 min or equivalent to the fire resistance rating of any compartment boundary through which it passes, whichever is the greater;

- all wiring associated with the fans should be in accordance with BS 8519.

10. Further Work

During the next stage of Developed Design (RIBA Plan of Work 2013 Stage 3), the engineering services will be subject to design development.

It is recommended that the following works are progressed in the early stages to resolve/close these issues:

- Review of basement smoke ventilation and sprinkler strategy
- Coordination with the appointed Gym/Studio specialist regarding MEP provisions and requirements.
- Services riser and fabric hole requirements with Structural Engineer.
- Development of the Clients preferred IT/Comms strategy.
- Basement plant space setting out requirements.
- Basement drainage review and associated toilet setting out requirements.
- Review and development of tenant future space allowances (riser and plant locations) with the Client in coordination with targeted customer market.
- Consideration of options to control groundborne noise with the Client and Architect (also possibly Structural Engineer and Heritage Consultant), as effective measures may be prohibitive in terms of cost and project constraints.

10.1. Risks

Basement smoke ventilation and sprinkler system including service routes horizontally and vertically

Service routes through Basement and other congested areas.

Structural openings for services riser and horizontal distribution, i.e., through vaults and riser floor penetrations.

National Heritage and Planning restrictions.

10.2. Opportunities

A high-level PV option has been developed as part of this initial Stage 2 report. There is an opportunity to understand the feasibility of PV in more detail as the design progresses. During Stage 3 it is recommended that a specialist PV supplier is engaged to develop a feasible option for the building.

In some instances, the building fabric is subject to heritage and listed building consent. The operational energy analysis will identify the opportunities to reduce building energy consumption for further financial and listed building review.