

Broad Street Mall, Reading

STAGE 2 FIRE STRATEGY

December 2023



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* Note: All changes have been highlighted by a line along the right-hand margin as shown here.

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1 Introduction

Introba has been engaged by McLaren Group as a specialist fire and life safety consultant to develop and validate the Fire Strategy for the Broad Street Mall development.

The following sections outline the key fire safety features that should be incorporated within the development. Some of the requirements may be negotiated down at a later date following discussion with the approving authorities.

1.1 Scope

The fire strategy is intended for discussion between the design team and to assist the design team in developing the layouts to ensure that once a Building Regulations application is made, all of the fire safety elements will be incorporated into the plans.

This report is based on the guidance in Approved Document B (ADB), 2020 edition incorporating the 2022 amendments.

This guidance has been developed to ensure the highest standard of fire safety is designed into the building development at an early stage of design.

1.2 Building Description

The Broad Street Mall development consists of part-demolition of existing retail units, car park and service areas, demolition and rebuild of car park ramp, and construction of a residential-led, mixed-use development fronting Queens Walk and Dusseldorf Way, including all necessary enabling and alteration works required.



Figure 1 – Broad Street Mall Site Plan at ground

All buildings have various connections from Basement up to Level 1 before they separate into independent residential towers. From Level 2 upwards, Blocks A and B will be served by a single core comprising two stairs and Block C/D will be served by one core comprising two stairs and a second core comprising an escape stair only. At Level 8, Block C/D (technically the same building) reduces in area to become served only by the single core with two stairs, with the secondary escape core ending at Level 7.

The following table provides information of each building:

Building	Number of Storeys	Top Storey Height (m)
A	Basement + Ground + Levels 1 to 29	89.3m
B	Basement + Ground + Levels 1 to 25	77.3m
C/D	Basement + Ground + Levels 1 to 18	56.3m

Table 1 – Building descriptions

1.3 Fire Strategy Overview

The proposals outlined in this document demonstrate a level of fire safety equal to or greater than the general standard implied by compliance with the recommendations of the ADB. This level of safety therefore satisfies the functional requirements of the Building Regulations relating to fire safety.

The fire strategy described in this report can be summarized as follows:

- Means of escape will be based on each apartment evacuating independently. The residential amenity spaces, commercial units, ancillary areas and car park will each have independent means of escape and shall implement a simultaneous evacuation strategy.
- Generally, travel distances and escape widths are acceptable, with the exception of some common areas of the residential accommodation, which contain extended travel distances. A system of smoke clearance via a Mechanical Smoke Ventilation System is proposed for all blocks, which shall mitigate the extended travel distances.
- The fire alarm systems within the development will be.
 - Within apartments – LD1
 - Common Corridor – L5
 - Residential Amenity Spaces – L3
 - Commercial Units – Manual
 - Ancillary Areas – L3
 - Car park – L5
- Structural fire protection will be provided in accordance with Table B4 of ADB. Each floor will be designed as a compartment floor.
- Sprinkler coverage is provided to the residential apartments and could be extended to cover the ancillary areas and residential amenity space where these accommodations do not exceed the areas within Table 4 of BS9251. All commercial accommodations will be provided with sprinklers in accordance with BS EN 12845.
- Since Building A and Building B have a floor area up to 900m² and are over 18m in height, each will be provided with a firefighting shaft. Since Building C/D has a floor area over 900m² and is over 18m in height, two firefighting shafts will be provided. Since all cores are over 50m in height, each firefighting shaft includes a firefighting stair, wet riser and a firefighting lift.

2 Legislation

2.1 Building Regulations 2010

The development will consist of new buildings, hence, will be undergoing building works as defined in Regulation 3 of The Building Regulations 2010. All buildings will therefore have to comply with the requirements of Schedule 1 of the Regulations.

The requirements of the Schedule relating to fire safety are:

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

The principle aim of the Building Regulations is to ensure the health and safety of people in and around a building.

The 'requirements' set out broad objectives or functions, which the individual aspects of the building design and construction must set out to achieve. They are therefore often referred to as 'functional requirements' and are expressed in terms of what is 'reasonable', 'adequate' or 'appropriate'.

2.2 Approved Document B (ADB)

The Department for Levelling Up, Housing and Communities (DLUHC) has produced a number of guidance documents to assist designers in meeting the relevant requirements of the Building Regulations. These 'Approved Documents' provide guidance on different aspects of the Regulations. Approved Document B – Fire safety (ADB) provides general design guidance on ways in which the functional fire safety requirements can be satisfied.

The Building Regulations 2022 require reasonable standards of health and safety for persons in or about the building to be provided.

However, as with many "deemed to satisfy" documents, the ADB is general in its approach and cannot contain sufficient detail for the multiplicity of building designs and varieties of building fire loads and occupancies encountered in practice.

The recommendations presented in the ADB provide guidance on how to satisfy the functional requirements of the Building Regulations. However, there is no obligation to adopt any particular solution contained in the document. The document recognises this and accepts that, if the requirement can be demonstrated to have been satisfied by alternative solutions, then this is equally acceptable.

This report considers the amendments to the Approved Documents in May 2020 and June 2022 and considers Regulation 7.

2.3 Regulatory Reform (Fire Safety) Order

Once the buildings are occupied, the Regulatory Reform (Fire Safety) Order (RRO) becomes the controlling fire safety legislation.

The Order came into force on 1st October 2006 and revoked the existing Fire Precautions Act and the Workplace Regulations. Under this order it will be necessary for the owner/ occupier of the building to carry out and maintain a fire safety risk assessment.

The building management team will also be responsible under this order to ensure that the buildings' fire safety provisions are appropriately managed, maintained and tested over the whole life of the building.

3 Means of Warning & Escape

Schedule 1 of the Building Regulations requires the following functional requirements to be met in respect of B1, Means of Warning and Escape:

“The building shall be designed and constructed so that there are appropriate provisions for the early warning of fire, and appropriate means of escape in case of fire from the building to a place of safety outside the building capable of being safely and effectively used at all material times.”

The general principle to be followed when designing for means of escape is that any person confronted by a fire within a building can turn away from it and make a safe escape and therefore alternative means of escape should be available from most parts of the building.

3.1 Evacuation Strategy

Residential means of escape is somewhat different from many other types of buildings in that only the particular apartment that has a fire in it is immediately evacuated. The reasoning behind this is due to the level of compartmentation between each of the apartments and to reduce false alarms affecting all the people within the building. Additionally, an evacuation alert system will also be provided in the buildings over 18m in height to allow the Fire Service to undertake the evacuation part or the whole building if necessary.

The residential amenity spaces, car park, ancillary accommodations, storage, plant facilities and commercial units on the site will be considered completely independent of the residential elements. It is proposed that these areas adopt independent simultaneous evacuation approaches. This is particularly important for areas that may have members of the public who are unfamiliar with the building and any evacuation procedures. An alarm raised within the commercial areas will not cause the evacuation of the residential areas or other commercial areas.

3.2 Travel Distances

The travel distances for the building should follow the recommendations of ADB, which is detailed in the table below.

Purpose Group	Accommodation	Travel within	Maximum travel distance (m)	
			In one direction	More than one direction
1(a)	Apartment	Within apartment / hallway	9m	N/A
	Common Areas	Within common corridor	7.5m	30m
4	Commercial	Within commercial units	18m	45m
5	Assembly & Recreation	Within residential amenities	18m	45m
7	Storage and Car Park	Within stores / car park	25m	45m
	Plant Room	Within room	9m	35m
		Within enclosed escape route	18m	45m
		In open air	60m	100m

Table 2 – Travel Distance Requirements

3.3 Escape within Residential Accommodations

3.3.1 Escape within Apartments

Where an apartment has an open living area and a bedroom provided as an inner room, these are classified as open plan apartments.

Throughout the development there are open plan apartments. Since ADB does not provide specific guidance on the design of open plan apartments, supplementary guidance can be taken from BS9991, which states that they are acceptable should they conform to the following:

- The size of the open plan flat should not exceed 16m x 12m.
- Open-plan flats should be situated on a single level only.
- The ceilings within the open plan flat should have a minimum height of 2.25m.
- The kitchen should be enclosed in open-plan flats having an area exceeding 8m x 4m.
- Cooking appliances in open-plan flats having an area smaller than 8m x 4m should not be adjacent to the entrance of the flat.

In addition to the above, the open plan apartments should be provided with an LD1 fire alarm and detection system in accordance with BS5839 Part 6 as well as a sprinkler system in accordance with BS9251.

It should be noted that in the open plan apartments, occupants should not have to make their escape past a kitchen. Therefore, the kitchen shall be placed in a location remote from the means of escape route from the apartment. Where this is not possible an assessment will be made on the escape route and the proximity to the kitchen. This is to be developed at the next stage of design, however the minimum distance between the hob and the escape route should be 1.8m, with a minimum width of 750mm for the escape route.

Examples of hob clearance and escape routes are shown in the figure below.

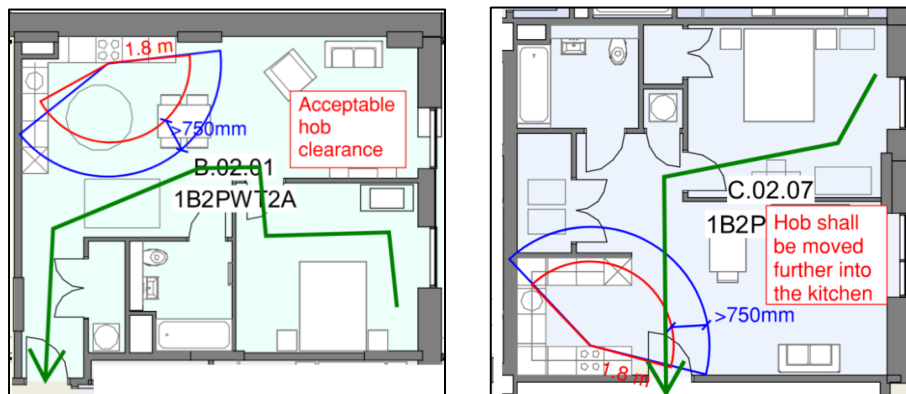


Figure 2 – Hob clearance examples

3.3.2 Escape within Common Corridors

All buildings contain floors over 11m in height, therefore the common corridor should be provided with automatic smoke venting to assist means of escape.

Where travel distances are within 7.5m, either natural or mechanical smoke ventilation is acceptable. Natural ventilation can be provided via a smoke vent with a free area of 1.5m² located on an external wall. Where travel distances from the furthest apartment entrance doors to the stair doors exceed 7.5m in a single direction as recommended in ADB, smoke ventilation should be provided via a 0.6m² mechanical smoke shaft within 7.5m of the dead end of the common corridor to mitigate the extended travel distances.

Buildings A, B and C/D will also be provided with a fire sterile lobby at all upper levels to provide a waiting area for disabled occupants in the event of a fire. Therefore, doors shall be provided to separate the

stair/ lift lobby from the corridors that serve the apartments and the mechanical smoke ventilation system will be provided and designed to prevent smoke ingress into this lobby to allow disabled occupants a safe waiting space prior to evacuating the building.

At Level 1, Building A is connected to Buildings B and C/D, resulting in the common corridor being served by seven escape stairs.

At dead end corridors of Building A, the travel distances from the furthest apartment to the stair in single direction or up to a point where an alternative escape route is available are within 7.5m. There is another dead end corridor in Building C/D, where the travel distances from the furthest apartment to the stair in single direction or up to a point where an alternative escape route is available are also within 7.5m. Apartments in all other sections of the corridors at this level are provided with multi-direction escape routes, and most of these travel distances are within 30m in single direction except the travel distance of Apartment B.01.03 of Building B that has slightly exceeded the travel distance requirement by 1.6m. Therefore, it is recommended that this apartment entrance door should be relocated.

To protect the lift lobby from smoke ingress, mechanical smoke ventilation via a 0.6m^2 mechanical smoke shaft below will be provided as highlighted in green in the figure below. Additionally, since all cores are over 50m in height, it is recommended that a 0.6m^2 natural air supply shaft shall be provided adjacent to the stair / lift as part of the smoke ventilation system to provide additional air supply other than from the staircase.

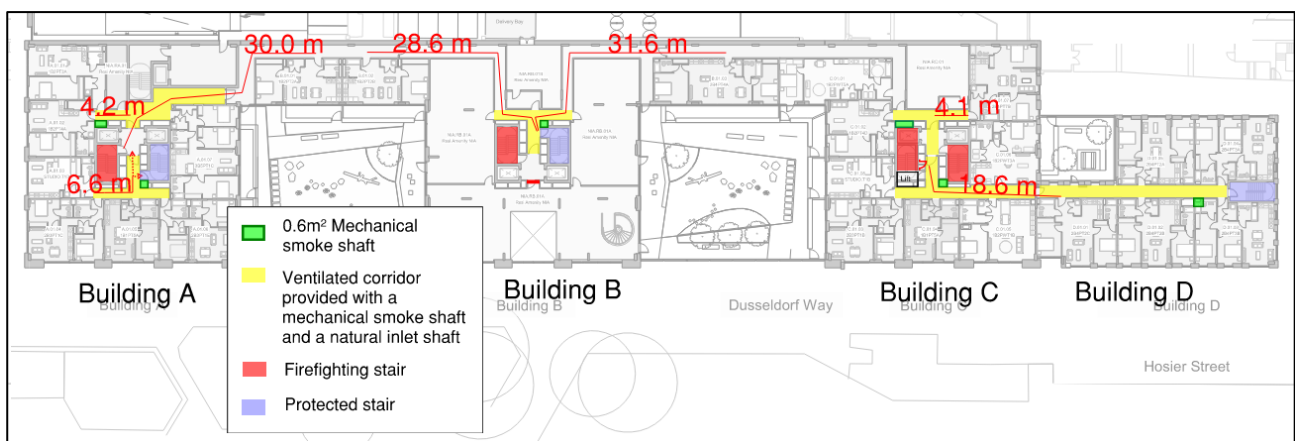


Figure 3 – Travel distances of all buildings at Level 1

Additionally, to separate the corridor that connects the staircases, double-swing cross-corridor doors will also be provided in accordance with ADB. It is acceptable for these cross-corridor doors to be held open on magnetic devices during normal operations, which would release upon smoke detection in the common corridors.

At Level 2, Buildings A, B and C/D are no longer connected.

Building A is provided with two protected stairs. The travel distances from the furthest apartment to the closest stair door are 6.7m and 8.1m in single direction. Both corridors will be ventilated by the 0.6m^2 mechanical smoke shafts extended from the level below as shown in the figure below.

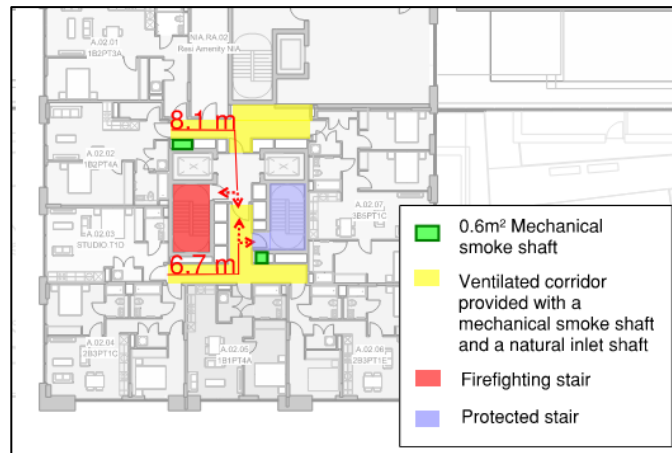


Figure 4 – Travel distances of typical levels in Building A

Building B is also provided with two protected stairs. The travel distances from the furthest apartment to the closest stair door are 6.1m and 8.2m in single direction. Both corridors will be ventilated by the 0.6m² mechanical smoke shafts extended from the level below as shown in the figure below.

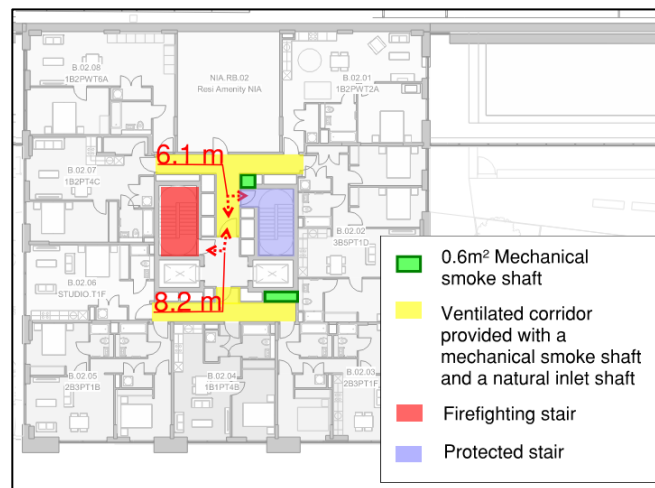


Figure 5 – Travel distances of L2-L23 of Building B

At Level 24, only one corridor serves apartments with a travel distance from the furthest apartment to the closest stair being within 7.5m in single direction. However, a vented lobby shall also be required to separate the amenity from the lift lobby and to provide a protected route from the podium as shown in the figure below. Therefore, both mechanical smoke shafts will be extended from the levels below.

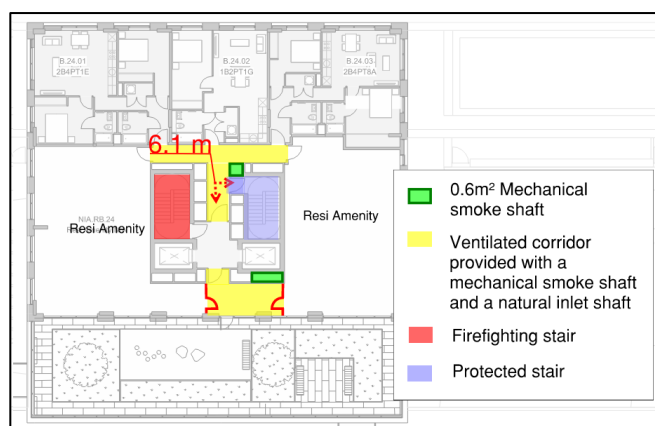


Figure 6 – Travel distances of L24 of Building B

At Level 25, two corridors are provided to serve apartments again and the travel distances are similar to Levels 2 to 23. Therefore, this floor will be provided with mechanical smoke ventilation strategy similar to the lower levels.

Building C/D is connected at all upper levels so technically they are the same building.

Building C/D is provided with three protected stairs. Double-swing cross-corridor doors will also be provided at all upper levels to separate the corridor that connects the staircases.

At Level 2, the travel distances from the furthest apartment to the closest stair door or to a point where an alternative escape route is available are 8.0m and 4.4m respectively. The corridors will be ventilated by the 0.6m² mechanical smoke shafts extended from the level below as shown in the following figure.

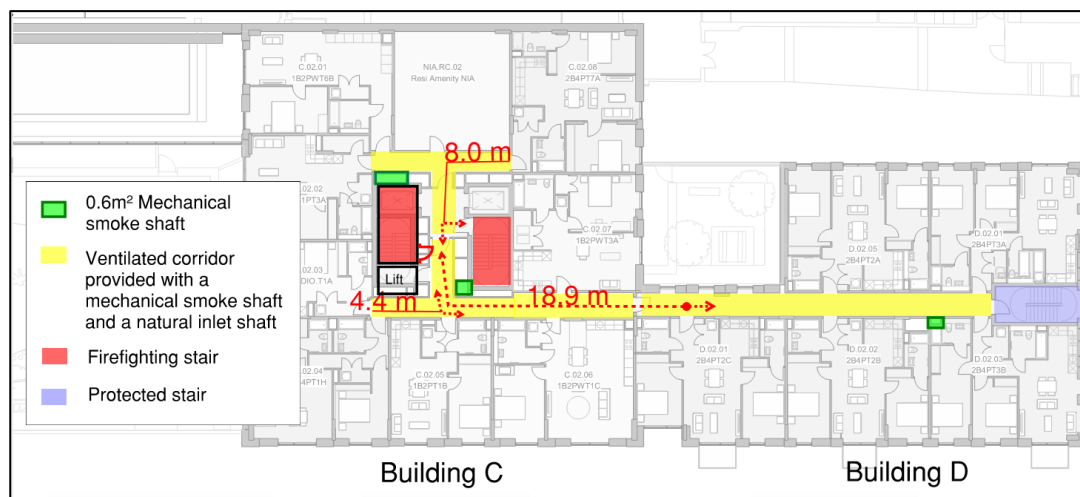


Figure 7 – Travel distances of Building C/D

At Level 8, the building steps back, resulting in the corridor reduced in length. The travel distances from the furthest apartment to the closest stair are 8.0m and indicatively 10.6m (due to the door to Apartment C.08.04 not shown). Both corridors will be ventilated by the 0.6m² mechanical smoke shafts extended from the level below as shown in the figure below.

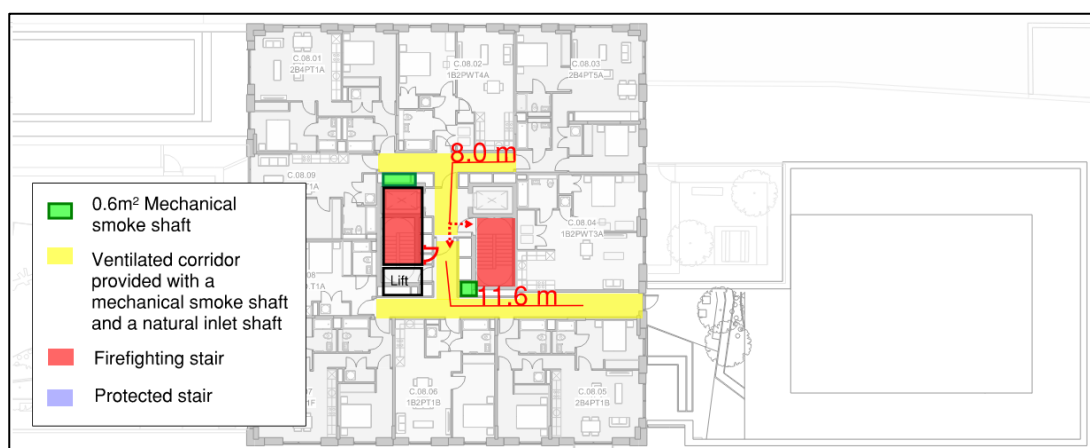


Figure 8 – Travel distances of Building C at L8

The mechanical smoke shaft should achieve a minimum of 0.6m² internal free area with a 0.6m² Automatically Opening Vent (AOV) opening into each smoke shaft from each common corridor. The mechanical smoke shaft should be located within 7.5m of the dead end of the corridor.

Since all cores are over 50m in height, replacement air will be provided via the 1.0m² AOV at the head of the firefighting stair and a 0.6m² natural air supply shaft shall be provided adjacent to the stair / lift to ensure sufficient air supply to the extract shafts. Additionally, the firefighting stair door will open into the lobby and the lift lobby door will open into the corridor for replacement air for the mechanical smoke

extraction system. The secondary stair will open into the staircase. At a later stage of design, a Computational Fluid Dynamics (CFD) assessment will be undertaken to validate the smoke venting strategy for all buildings.

3.3.3 Vertical Escape

Buildings A, B and C/D serve floors at more than 18m in height and therefore Building A and Building B will be provided with a firefighting shaft each. Since Building C/D also has a floor area over 900m², two firefighting shafts will be provided.

Each firefighting staircase serving residential accommodations will be at least 1100mm wide, assuming the handrails do not protrude more than 100mm into the stair. The storey exits leading into the staircase at each level are required to have a minimum clear width of 850mm. The exit route from the staircase should be at least as wide as the stair width. The final exit firefighting doors at ground level should be at least as wide as the stair door, i.e. 1100mm.

Due to the fact that the staircases shall be designed for firefighting, no service risers shall be accessed from or pass through the staircase unless they are for the specific use of equipment with the firefighting shaft, such as emergency lighting or ventilation. Where risers are provided along the protected escape route at ground floor, they will be provided with upgraded fire rated doors with smoke seals to achieve the fire resistance same as element of structure.

The secondary stair shall not be designed for firefighting. Therefore it is recommended that the secondary stair should be at least 1000mm wide.

All stairs will descend to the final exits at the fire access level, i.e. Ground level. Only the firefighting stairs in each building will be extended to the basement level. All other secondary stairs will terminate at ground level.

3.3.4 Final Exit Routes

Approved Document B requires that any discharge paths from the staircase must be along a protected route with any access into adjacent accommodation being by way of a protected lobby.

Therefore, where there are ancillary accommodations including amenity space, plant rooms, stores and the car park that are accessed from the residential escape route, a protected lobby vented by 0.4m² permanent ventilation shall be provided. Alternatively, the corridors shall also be served by the mechanical smoke ventilation systems extended from the upper levels where available.

Buildings A, B, C/D are over 18m in height so Building A and Building B will be provided with a firefighting shaft each whereas Building C/D will be provided with two firefighting shafts as discussed in Section 3.3.3. Where risers and cupboards are accessed from the firefighting access route, these risers should be enclosed with 120 minutes fire resisting construction with FD120S doors. In Building C/D, since the entrance lobby is part of the fire service access route, it would require to be a fire sterile lobby and any post boxes will require to be fire rated for 120 minutes. The ground floor common corridors serving the apartments should be separated from the firefighting access route by 120 minutes fire resistant walls with FD60S doors.

In Building A, the retail service corridor should not be connected to the residential common areas. Therefore, the door connecting the retail service corridor to the lift lobby should be removed. In Building B, the residential common areas should be separated from the back of house spaces and amenity space via a vented lobby as shown in the figure below.

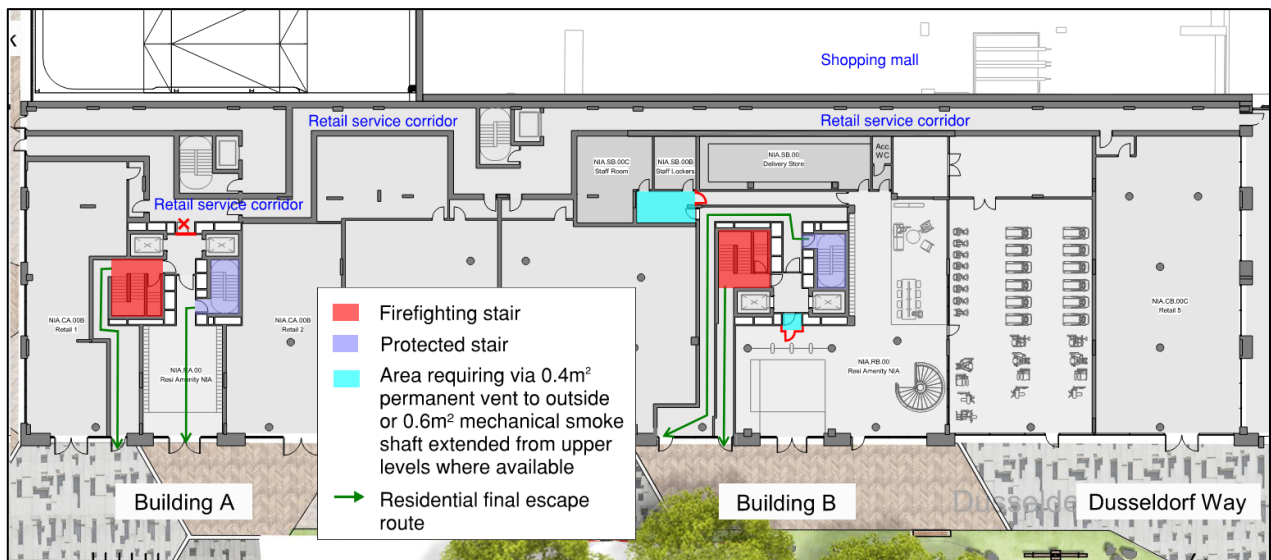


Figure 9 – Final exits and lobbies in Buildings A and B at Ground

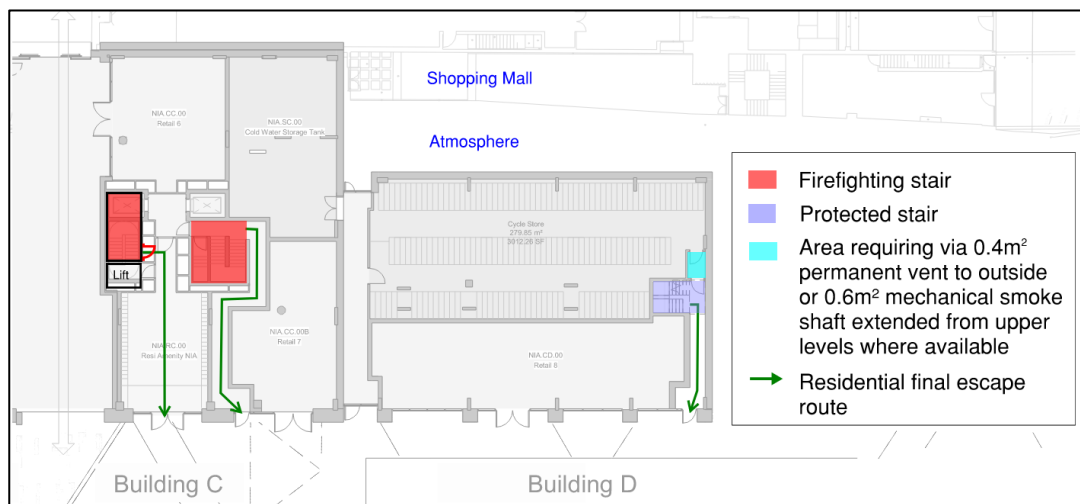


Figure 10 – Final exits of Building C/D at Ground

3.4 Escape within Residential Amenity

Residential facilities are provided in the buildings as below.

Building	Location	Residential facilities
A	Level 27	Roof terrace
B	Ground	Management staff room and BOH
	Ground + Level 1	Residential amenity lounge
	Level 1	Residential amenity rooms
	Level 24	Residential amenity rooms
		Roof terrace
C	Level 8	Roof terrace
	Level 17	Roof terrace

Building	Location	Residential facilities
A and B	Level 1	Podium
B and C	Level 1	Podium
D	Level 1	Podium

Table 3 – Location of residential facilities

The travel distances for amenity and management facilities should be limited to 18m where escape is in a single direction and 45m where escape is possible in more than one direction. Where fit out has not been confirmed travel distances should be taken as two-thirds of the permitted distance.

For the podiums and roof terraces, there are no travel distance limits for open spaces. However, they should be directly accessed from a protected corridor / staircase.

Where the amenity facilities are accessed from the residential escape route, a protected vented lobby should be provided as discussed in Section 3.3.4.

At Ground level, the travel distances of the residential offices and residential amenity lounge Building B are acceptable as shown in the following figure.

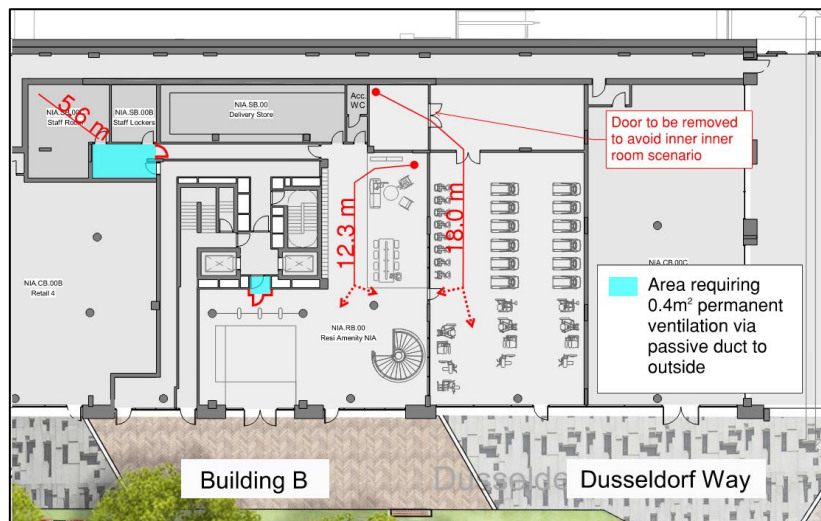


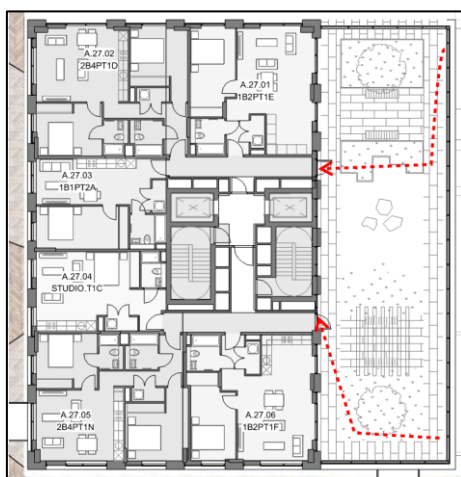
Figure 11 – Travel distances of residential facilities at Ground

At Level 1, the residential amenity lounge is provided with a void connecting the ground level, therefore within 4.5m of the opening will not be used for means of escape and the exit opening into the lift lobby should be removed, resulting in the upper level of the lounge being provided in two exits into other amenity spaces and two exits into the podium that lead to protected corridors, with acceptable travel distances.

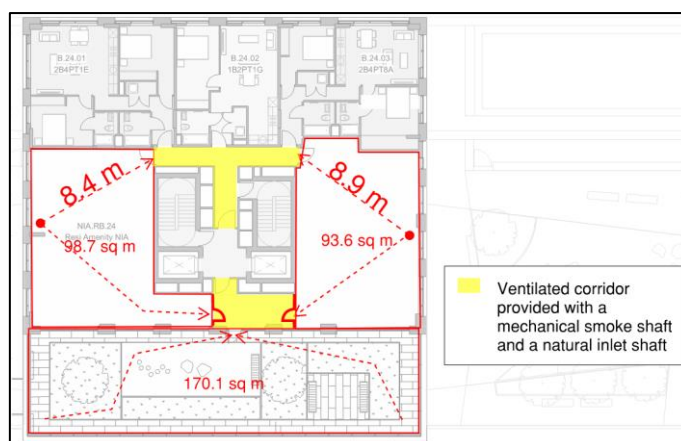
The three other amenity spaces provided at Level 1 of Building B will be accessed from the residential stairs via a vented corridor.

The podiums connecting Buildings A and B and connecting Buildings C and D will exit into a protected corridor and then into the protected stairs. Additionally, alternative escape routes are available via the adjacent amenity spaces, therefore the means of escape is acceptable.

Roof terraces are provided at Level 27 of Building A, Level 24 of Building B and Levels 8 and 17 of Building C, all of which are directly accessed from a protected corridor and therefore the means of escape is acceptable as shown in the following figures.



At Level 24 of Building B, residential amenity spaces are also provided in addition to the roof terrace.



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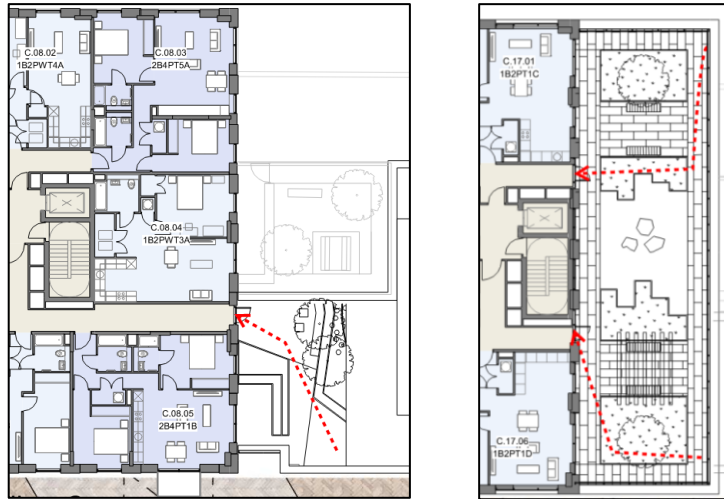


Figure 15 – Escape routes of roof terraces of Building C at L8 (left) and L17 (right)

An adequate number of suitably sized escape routes will be provided from the building to ensure that occupants can escape within an acceptable time. There will be an adequate number of escape routes based on the proposed number of occupants within the building at any one time, whilst making sure travel distances are within those permitted.

To ensure all occupants are able to escape during a fire situation, the largest exit will be discounted. This is to simulate an exit being blocked by fire, the remaining exits will provide sufficient exit capacity for the calculated number of occupants in that space.

In general, the means of escape will comply with the tables below.

Occupancy	Exit Width (mm)
<60	750mm
61-110 people	850mm
111-220 people	1050mm
220+ people	5mm per person (e.g. 300 people = 1500mm)

Table 4 - Minimum Exit widths

Occupancy numbers	Minimum number of exits
60	1
600	2
600+	3

Table 5 - Number of occupants per exit

Based on the above, the residential facilities are expected to have the occupancy loads outlined in the following table.

Building	Location	Residential facilities	Area (m ²)	Floor space factor (m ² / person)	Estimated Occupancy (persons)	Required exit width
A	Level 27	Roof terrace	200	1.0	110 ^{Note 1}	2 x 850mm
B	Ground	Management staff room	36	6.0	6	1 x 750mm
	Ground	Residential amenity lounge	528	1.0	528	4 x 1050mm
	Level 1	Residential amenity lounge	1163	1.0	330 ^{Note 1}	4 x 850mm
		Residential amenity rooms				
		Podiums of Buildings A & B and B&C				
	Level 1	Residential amenity room (north)	43	1.0	43	1 x 750mm
	Level 24	Residential amenity 1 ^{Note 3}	99	1.0	110 ^{Note 1}	2 x 850mm
		Residential amenity 2 ^{Note 3}	94	1.0	110 ^{Note 1}	2 x 850mm
		Roof terrace	170	1.0	60 ^{Note 2}	1 x 750mm
C	Level 8	Roof terrace	62	1.0	60 ^{Note 2}	1 x 750mm
	Level 17	Roof terrace	200	1.0	110 ^{Note 1}	2 x 850mm
D	Level 1	Podium	69	1.0	60 ^{Note 2}	1 x 750mm

Table 6 – Exit requirements of residential facilities

Note 1: Maximum occupancy is calculated on the basis that exits will be provided leading to the protected corridor with storey exits of 850mm wide each.

Note 2: Maximum occupancy shall be limited to 60 people due to single exit provided.

Note 3: The residential amenity space shall be divided into two rooms for the provision of a vented lobby.

Where there are not more than 60 people using the exit door, the door could swing in any direction.

3.4.1 Inner Rooms

Throughout the amenities there are inner rooms, which can be at risk if a fire starts in the access room. These are acceptable subject to the following conditions being met:

- The occupant capacity of the inner room will not exceed 60 people;
- The inner room will be accessed directly off the access room and not via an intermediate corridor;
- The escape route from the inner room will not pass through more than one access room;
- The travel distance from any point in the inner room to the exit from the access room will not exceed the allowable one-way travel distance;
- The access room will not be a place of special fire risk and is in the control of the same occupier as the inner room; and
- The access room will include automatic smoke detection and alarms that either operates an alarm that is immediately audible in the inner room, to a sound pressure level in accordance with

the minimum recommended in BS5839 Part 1, or gives an immediate visual alarm conforming to BS EN 54-23 in the inner room if the ambient noise levels are so great as to make an alarm inaudible.

3.5 Escape within Car Park

The development consists of the demolition and rebuild of car park ramp. Access to the car parking areas is available at Basement level via a protected route, whereby an access ramp passes through Ground Floor to provide further access to car parking areas at Levels 1, 2 and 3 only.

Travel distances within the car park should be limited to 25m where escape is in a single direction or 45m where there are two directions of escape.

However, the renovation work only involves the rebuild of the car park ramp and therefore would not impact the travel distance and exit requirements of the existing car park.

3.6 Escape within Ancillary Accommodations

Travel distances in plant rooms should be limited to 9m where escape is in a single direction and 35m where escape is possible in more than one direction unless they are places of special fire hazard, in which case the travel distances where there is more than one direction of escape should be limited to 18m.

Travel distances within storage rooms (e.g. cycle stores, refuse stores) should be limited to 25m where escape is in a single direction or 45m where there are two directions of escape.

Where fit out has not been confirmed travel distances to be taken as two-thirds of the permitted distance.

Should these rooms be accessed from the residential corridor, a 0.4m² ventilated lobby should be provided. Alternatively, the 0.6m² mechanical smoke extract shaft from upper residential floors could be utilized, and this should also incorporate the 0.6m² natural air supply shaft as part of the mechanical smoke extraction system as discussed in Section 3.3.2.

At basement level and ground level, the LV switch room, ASHP room, commercial sprinkler tank room and cold water tank room should be provided with an alternative exit to satisfy the travel distance requirements.

As discussed in Section 3.3.4, the secondary stairs should not be extended to serve the basement level.

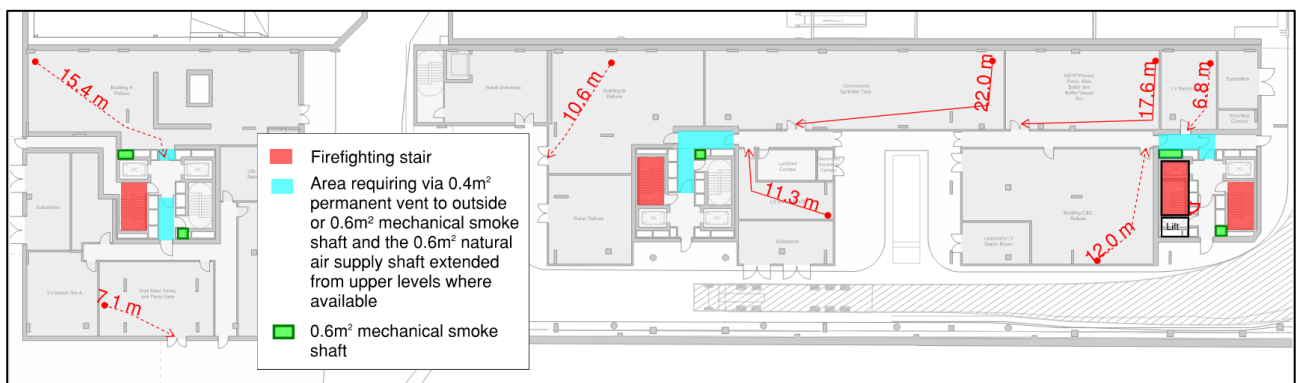


Figure 16 – Travel distances of ancillary accommodations at basement level

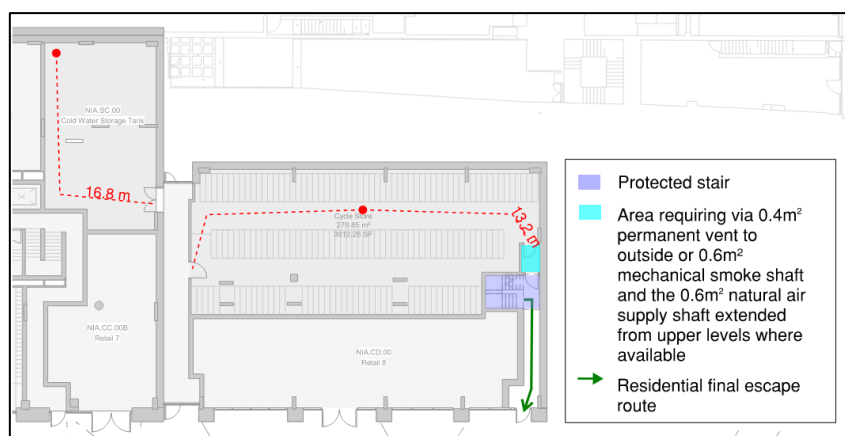


Figure 17 – Travel distances of ancillary space at Ground

Access to the car park will be provided within protected escape routes directly to outside at Basement level and the escape route will be separated from the residential accommodations by 120 minutes fire resistance. The car park ramp will also be separated from the residential accommodations by 120 minutes fire resistance.

A vented lobby will be provided at Level 1 of Building B to separate the car park from the residential accommodations as shown in Figure 18 in Section 3.4.

Ancillary rooms do not tend to have many occupants at any one time due to their use, therefore ADB recommends an occupancy load factor of 30m² per person in each room. Therefore, any ancillary room up to 1800m² in area can be served by a single exit door with a clear width of 750mm (subject to acceptable travel distances being achieved). Rooms larger than this would require two exits with a clear width of 850mm.

3.7 Escape within Commercial Accommodations

Commercial accommodations are provided at ground level separated from the residential accommodations. These commercial units will be provided with independent escape routes directly to outside or via a protected escape route to outside.

Travel distances in a commercial unit should be limited to 18m where escape is in a single direction and 45m where escape is possible in more than one direction.

The travel distances of the commercial units are acceptable as shown in the figure below.

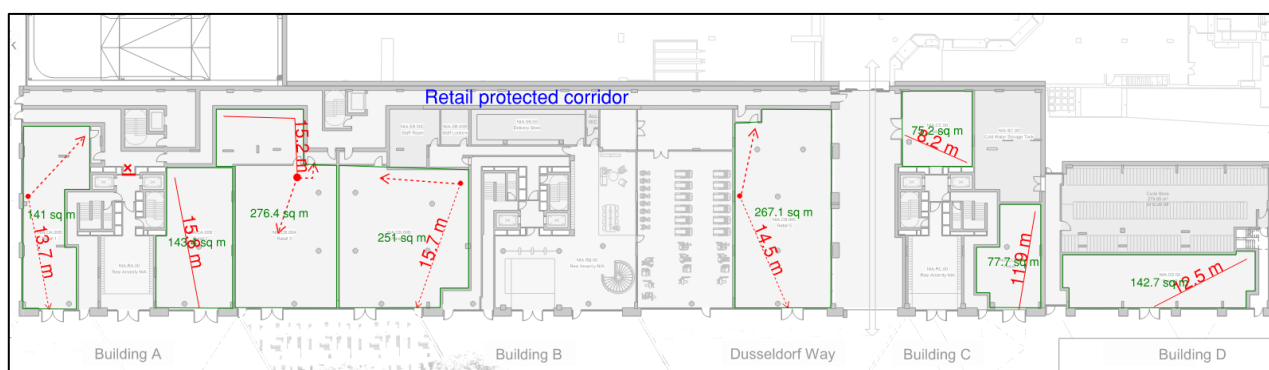


Figure 19 – Travel distances of commercial units at Ground

The commercial units will require the following exit widths.

Commercial unit	Area (m ²)	Occupancy Load Factor (m ² /person)	Occupancy	Minimum Required Exit widths
Retail 1	141	2.0	71	2 x 850mm
Retail 2	143		72	2 x 850mm
Retail 3	276		138	3 x 850mm
Retail 4	251		126	3 x 850mm
Retail 5	267		134	3 x 850mm
Retail 6	75		38	1 x 750mm
Retail 7	78		39	1 x 750mm
Retail 8	143		72	2 x 850mm

Table 7 – Commercial unit exit requirements

3.8 Disabled Evacuation

The residential accommodations on the upper levels do not require disabled refuges to be provided. However, each lift lobby at every level shall serve as a safe waiting space for the disabled occupants to wait for the lift for evacuation in the event of a fire, with the smoke extract system prevent the ingress of smoke into the lift lobby allowing the lift to be utilised.

Since the commercial accommodations operate solely at the access level where escape is provided directly to outside, disable refuges will not be required.

The building management forms an integral part of the design and on-going functionality of the building after occupation. The building will have a management team whose responsibilities will include ensuring the fire safety strategy is adopted and enforced. One of the responsibilities of this team will be to develop a management strategy for the building. This strategy will incorporate details of how the building satisfies the requirements of the Equality Act 2010. The management strategy should include information on staff training, how disabled occupants will be evacuated in the event of a fire and identify key roles in ensuring they are assisted in a fire situation.

3.9 Fire Alarm & Detection System

3.9.1 Residential Accommodation

Open plan apartments should be provided with an LD1 automatic fire detection and alarm system with a minimum Grade D power supply, designed, installed and maintained in accordance with BS5839 Part 6.

The system should be of Grade D1 if the apartments are to be rented accommodation and Grade D2 if they are to be owner occupied.

It is not considered that the private balconies will be required to have an additional sounder as even though they are accessed from one access room the sounder in the apartment will be able to alert the occupants in the balcony to a fire. This is on the basis that anybody in the balcony area will be able to see if a fire occurs in the kitchen / living area. Additionally, it is proposed the sounders in the room that provides access to the balcony should be located such that occupants on the balcony will be able to adequately hear the alarm in the apartment.

An L5 smoke detection system smoke detection system should be provided in the common corridors on each floor. The sole purpose of the detection system is to activate the smoke ventilation system. No sounders or manual call points will be provided in the common areas.

All buildings are over 18m, therefore they will be provided with a communal fire detection and alarm system for use by the fire and rescue service designed in accordance with BS8629, which will require an alarm sounder in each flat as the control panel shall be capable of triggering evacuation alerts for specific areas within a building.

3.9.2 Residential Amenity Facilities

The fire detection and alarm system should be designed in accordance with BS5839 Part 1 and be at least of type L3.

3.9.3 Car Park

The car park should be provided with an automatic fire detection and alarm system. This system should be designed and installed in accordance with BS5839 Part 1 and be a minimum of L5 standard.

Manual call points will be positioned by all exits and escape routes directly to the outside.

3.9.4 Ancillary Accommodation

The fire alarm and smoke detection within the cycle stores, bin stores and plant rooms should be designed in accordance with BS5839 Part 1 and be of type L3.

Manual call points will be positioned by all exits and escape routes directly to the outside.

3.9.5 Commercial Accommodation

The fire alarm and smoke detection within the commercial units should be designed in accordance with BS5839 Part 1 and be a minimum of a manual type.

However, the fire detection and alarm system will be designed based on the known tenant fit out requirements and therefore at completion of the base works the units will be unoccupied and will not include a fire alarm system.

3.9.6 Access Control Measures

Measures to restrict access the buildings should not adversely affect fire safety provisions. Measures should remain for occupants to safely evacuate the building in the event of a fire.

Electrically powered locks should return to the unlocked position in all of the following situations:

- a) if the fire detection and alarm system operates;
- b) if there is loss of power or system error; and
- c) if the security mechanism override is activated.

On activation of the fire alarm and detection system the electromagnetic locks will need release allowing all occupants of the building.

3.10 Emergency lighting

Emergency lighting as backup lighting should meet the recommendations of BS5266 Parts 1 and 7.

Final locations and routes shall be agreed during the design development.

3.11 Signage

Escape signage should follow the recommendations of BS5499. Further details will be provided during the design development.

Wayfinding signage will also be required for the fire service and will be detailed as the design develops.

4 Internal Fire Spread (Linings)

Schedule 1 of the Building Regulations requires the following functional requirements to be met in respect of B2, Internal fire spread (linings):

“To inhibit the spread of fire within the building the internal linings shall:

- a) adequately resist the spread of flame over their surfaces; and*
- b) have, if ignited, a rate of heat release which is reasonable in the circumstances.*

In this paragraph “internal linings” mean material lining any partition, wall, ceiling or other internal structure.”

4.1 Surface Linings

The interior wall and ceiling surfaces in buildings can have a significant influence on how fast a fire may develop. It is particularly important that in circulation spaces including staircases, where the rapid spread of fire is most likely to prevent occupants from escaping, surface linings are restricted by making provision for them to have low rates of heat release and surface spread of flame.

The wall and ceilings linings within the building should meet the recommendations outlined in the table below.

Location	Class of Lining
	European Class*
Small Rooms of area less than: • 4m² in residential accommodation • 30m² in non-residential accommodation	D-s3,d2
Other Rooms	C-s3,d2
Circulations spaces within dwellings	C-s3,d2
Other circulation spaces including the common areas of block of flats, residential amenity facilities and commercial units	B-s3,d2
Note: * The European classifications are described in BS EN 13501-1.	

Table 8 – Surface Lining Requirements

For the purpose of these requirements, a wall includes the internal surfaces of internal and external glazing as well as any part of a ceiling which slopes at an angle greater than 70 degrees to the horizontal. Doors, door frames, window frames and frames in which the glazing is fitted, architraves and skirting are also exempt from these limitations.

The class of linings can be downgraded (but not less than Class D-s3,d2) in walls of rooms providing the total area of those parts in any one room does not exceed one half of the floor area of the room and subject to a maximum of 20m² in residential accommodation and 60m² in non-residential accommodation.

5 Internal Fire Spread (Structure)

Schedule 1 of the Building Regulations requires the following functional requirements to be met in respect of B3, Internal fire spread (structure):

1. *The building shall be designed and constructed so that, in event of fire, its stability will be maintained for a reasonable period.*
2. *A wall common to two or more buildings shall be designed and constructed so that it adequately resists the spread of fire between those buildings.*
3. *To inhibit the spread of fire within the building, it shall be sub-divided with fire resisting construction to an extent appropriate to the size and intended use of the building.*
4. *The building shall be designed and constructed so that the unseen spread of fire and smoke within concealed spaces in its structure and fabric is inhibited.*

The requirements will be met;

- If the loadbearing elements of structure of the building are capable of withstanding the effects of fire for an appropriate period without loss of stability;
- If the building is sub-divided by elements of fire-resisting construction into compartments;
- If any openings in fire-separating elements are suitably protected in order to maintain the integrity of the element; and
- If any hidden voids in the construction are sealed and sub-divided to inhibit the unseen spread of fire and products of combustion, in order to reduce the risk of structural failure and the spread of fire, in so far as they pose a threat to the safety of people in and around the building.

The extent to which these measures are necessary is dependent on the use of the building, its size and on the location of the element of construction.

5.1 Fire Resistance of Elements of Structure

Premature failure of the structure can be prevented by provisions for loadbearing elements of structure to have a minimum standard of fire resistance, in terms of resistance to collapse or failure of load bearing capacity.

The period of fire resistance required in accordance with ADB is linked to the risk profile of the building taking into account the height of the top floor and whether the building is sprinklered or not. Where any element supports another the supporting element should possess at least the resistance of the other. Approved Document B defines an element of structure as:

- a member forming part of the structural frame of a building or any other beam or column;
- a loadbearing wall or loadbearing part of a wall;
- a floor;
- a galley;
- an external wall; and
- a compartment wall.

The following are excluded from definition of an element of structure:

- Structure that supports only the roof, unless:
 - the roof performs the function of a floor, such as for parking vehicles, or as a means of escape, or
 - the structure is essential for the stability of an external wall which needs to have fire resistance.

The following table shows the required fire resistance periods for each core.

Building	Top Storey Height (m)	Fire resistance periods
A	89.3m	120 minutes
B	77.3m	120 minutes
C/D	56.3m	120 minutes

Table 9 – Fire resistance periods

Where elements of structure support a building above, they should be provided with the structural fire resistance to at least that required for the building they support.

Any elements which only support themselves and or a roof can be non-fire rated.

5.2 Compartmentation

5.2.1 Residential Accommodation

All apartments should have 60-minute fire resistant compartment walls with FD30S self-closing front doors.

All floors should be compartment floors with a fire resistance equal to the structure.

For all cores, the fire sterile lift lobby shall be enclosed with 30 minute fire resistance with FD30S self-closing doors.

Building A and Building B will be provided with a firefighting shaft each whereas Building C/D is provided with two firefighting shafts. The firefighting staircases should be enclosed in 120 minutes fire resistance with FD60S self-closing doors. The firefighting lift shafts should have a fire resistance of 120 minutes with FD60 landing doors. In this case, the secondary lift shafts within the cores will be designed for evacuation purposes to provide dignified escape for disabled occupants within the building, hence will also be enclosed in 120 minutes fire resistance with FD60 doors.

The secondary stair will be enclosed in the same fire resistance as the elements of structure with FD60S self-closing doors.

Risers should have fire ratings equal to the structure with FD60 doors. If provided in the lift lobby, the riser doors should be provided with smoke seals. On the fire access level, the final exit route from the stairs / lifts to outside should achieve 120 minutes fire resistance. Any risers accessed from this route will need to be provided with the same fire resistance as the stair, with FD120S doors.

It should be noted that ADB requires that any discharge paths from the staircase must be along a protected route with any accommodation being accessed via protected lobby (that will also need to be ventilated). The protected lobbies should achieve 120 minutes fire resistance with FD60S doors.

Openings in compartment walls should be limited to the passage of service ducts and access doors fitted with smoke seals. Where service ducts pass through compartment walls these will be provided with a fire barrier. All openings will be provided with a similar period of fire resistance to the wall they are provided within and the fire doors are to be locked closed.

In order to protect the final exit routes from the building all wall construction within 1.8m of the final exit points will be fire rated to 30 minutes. In general, most final exits are acceptable providing there are two directions of discharge from the exit, however where escape is only possible in a single direction and the exit route in the open air is within 1.8m of the building then any glazing present should be fire rated glazing to 30 minutes (integrity only).

5.2.2 Residential Amenity

Residential amenity facilities on the Ground floor shall be separated from the other residential areas by 60 minutes fire resisting construction with FD30S self-closing doors.

Should the facilities be accessed from the final exit route from the stair, this should be via a 0.4m² ventilated lobby. The lobby can alternatively be ventilated by the mechanical smoke shafts from upper levels.

5.2.3 Ancillary Accommodation

The residential cycle stores and plant rooms should be enclosed in 30 minutes fire resistance with FD30 doors, whilst the bin stores should be enclosed in 60 minutes fire resistance with FD30 doors.

Should the facilities be accessed from the final exit route from the stair, this should be via a 0.4m² ventilated lobby. The lobby can alternatively be ventilated by the mechanical smoke shafts from upper levels.

Any electrical sub-stations should be fully separated from the adjacent accommodation spaces by at least 30 minutes fire resisting construction, although these requirements are likely to be superseded by the electricity supplier's requirements, which are typical based on 4 hours fire separation.

Any rooms housing life safety equipment should be enclosed in 120 minutes fire resistance in accordance with BS8519.

5.2.4 Car Park

All car park areas, including the ramp and the protected route to the basement, will achieve 120 minutes fire resistance to separate from residential accommodations.

The car park shall be separated from the residential accommodations via a protected lobby with 0.4m² natural ventilation duct connected directly to outside.

5.2.5 Commercial Accommodation

For the commercial units, they should be separated from the rest of the building the fire resistance similar to the elements of structure (including walls and floors). There should be no connection to the residential areas.

5.3 Fire Stopping

Fire stopping should be provided as per the guidance in ADB.

5.4 Cavity barriers

Cavity barriers should be provided as per the guidance in ADB.

5.5 Sprinklers

5.5.1 Residential Accommodation

Sprinklers will be provided to all residential accommodation as per the May 2020 amendment to ADB, which requires sprinklers for all residential apartments over 11m in height. Additionally, since the buildings contain a floor over 18m in height, the residential sprinkler system should be designed to a Category 4 in accordance with BS9251.

5.5.2 Residential Amenity Facilities

The residential amenity facilities that are ancillary to the residential accommodation could be served by the residential sprinkler as long as the rooms are not larger than outlined in Table 4 of BS9251 as shown below. Rooms larger than this should be served by a commercial sprinkler system in accordance with BS EN 12845.

5.5.3 Ancillary Accommodation

The stores and plant rooms that are ancillary to the residential accommodation could be served by the residential sprinkler as long as the rooms are not larger than outlined in Table 4 of BS9251 as shown below. Rooms larger than this should be served by a commercial sprinkler system in accordance with BS EN 12845.

Table 4 — Examples of classification of areas and design criteria for areas to be protected with BS EN 12259-1 sprinkler heads

Occupancy	Minimum density mm/min	Area of operation ^{A)}
Car parking ^{B)} within or beneath a block of flats	5.00	100 m ²
Bin store ^{B), C)} within or beneath the flats		72 m ²
Limited office areas (e.g. concierge or site management) ^{B)}		72 m ²
Residents' storage sheds/tenant stores ^{B)}		4 heads
PTSN/CCTV/electrical rooms		72 m ²
Plant rooms		100 m ²
Laundry (with storage and processing of linen, e.g. institutional, care home)		100 m ²
Laundry (communal facility)		72 m ²
Hairdressing room		72 m ²
Retail (e.g. shop)		100 m ²
Bar/restaurant/cafe		72 m ²
Kitchens in student hub accommodation (e.g. self-catering)		72 m ²
Kitchens ^{E)} in residential care or similar premises (e.g. care home) ≤50 m ²		72 m ²
Kitchens ^{E)} in residential care or similar premises (e.g. care home) >50 m ²		72 m ²

^{A)} If the compartment (fire) area is less than 50 m², a maximum of four heads is required as the area of operation. Where greater than 50 m², refer to area of operation or compartment (fire) area, whichever is the lesser.

^{B)} Attention is drawn to the need to consider protection from frost damage.

^{C)} On the basis of the bin store building or compartment (fire) being of at least a minimum of 1 h fire resisting construction from the rest of the buildings.

^{D)} See also [Table 3](#). Conduct a hazard evaluation to determine which option is most appropriate.

^{E)} Kitchens with deep oil cookers should be fitted with an appropriate local application system in addition to the sprinkler protection identified in this table (e.g. LPS1223, see [BS 5306-0](#)).

Figure 20 - Table 4 of BS9251:2021

5.5.4 Car Park

As a standalone building, the car park would not require provision of sprinklers due to only having a topmost occupied floor height of 10.5m.

5.5.5 Commercial Accommodation

All commercial accommodations will be provided with sprinklers in accordance with BS EN 12845.

6 External Fire Spread

Schedule 1 of the Building Regulations requires the following functional requirements to be met in respect of B4, External fire spread:

1. *The external walls of the building shall adequately resist the spread of fire over the walls and from one building to another, having regard to the height, use and position of building.*
2. *The roof of the building shall adequately resist the spread of fire over the roof and from one building to another, having regard to the use and position of the building.*

The objective of this requirement is to ensure that there is sufficient separation between buildings to prevent fire spread and to ensure that fire does not spread up the building façade.

6.1 Unprotected Areas

The unprotected areas are the areas of the façade that are not fire rated (i.e. glazing, etc.), which should be sized so that fire spread is unlikely to occur to buildings on the adjacent site or to separate fire compartments on the same site.

The following calculations have followed the guidance provided in BRE Guide BR187 – ‘External fire spread: building separation and boundary distances’. The following calculations have been carried out for the required boundary distance based on the height of each floor with their biggest elevation available.

Looking at the worst-case scenario for the residential amenity, the residential amenity lounge at Ground and Level 1 of Building B with an elevation of 26.3m x 9.9m high has the largest residential elevation. considering that the accommodation shall be provided with an automatic sprinkler system (as mentioned in Section 5.5), which allows for the boundary distances can be halved, the required boundary distance is 5.75m. Since the distance from the notional boundary is 5.75m, there are no limits to the amenity area of unprotected openings.

Looking at the worst-case scenario for the residential apartment, the apartment to the east of Building C/D has an elevation of 5.9m x 3.0m high has the closest distance from the site boundary. considering that the accommodation shall be provided with an automatic sprinkler system (as mentioned in Section 5.5), which allows for the boundary distances can be halved, the required boundary distance is 1.5m. Since the distance from the notional boundary is 1.5m, there are no limits to the amenity area of unprotected openings.

For the ancillary accommodation, the substation of Building B at basement level with an elevation of 8.8m long x 4.1m high has the closest distance from the notional boundary. Considering that the accommodation shall be provided with an automatic sprinkler system (as mentioned in Section 5.5), which allows for the boundary distances can be halved, the required boundary distance is 3.75m. Since the average distance from the notional boundary is 3.0m, this substation can have 70% unprotected area of the enclosing rectangle of the compartment (which is 95% of the actual compartment).

For the largest commercial accommodation, Retail Unit 8 has the largest elevation of 20.4m long x 4.9m high and closest distance from the notional boundary. Considering that the accommodation shall be provided with an automatic sprinkler system (as mentioned in Section 5.5), which allows for the boundary distances can be halved, the required boundary distance is 5.25m. Since the shortest distance from the boundary is 5.6m, there are no limits to the area of unprotected openings.

More detailed calculations of each elevation will be undertaken at the detailed design stage.

6.2 External Wall Construction

The external envelope of the building should not be a medium for fire spread.

Since all buildings are over 11m in height, all of the materials which become part of an external wall, should achieve European Classification A2-s1, d0 or Class A1, classified in accordance with BS EN 13501-1. This does however not apply to the following:

- cavity trays when used between two leaves of masonry;
- any part of a roof if that part is connected to an external wall;
- door frames and doors;
- electrical installations;
- insulation and water proofing materials used below ground level;
- intumescent and fire stopping materials where the inclusion of the materials is necessary to meet the requirements of Part B of Schedule 1;
- membranes;
- seals, gaskets, fixings, sealants and backer rods;
- thermal break materials where the inclusion of the materials is necessary to meet the thermal bridging requirements of Part L of Schedule 1; or
- window frames and glass.

Membranes above ground level, although exempt, should achieve a minimum of Class B-s3,d0.

In order to protect the staircases from a fire on the floor plate any wall construction perpendicular to the stair core within 1.8m of the staircase or any escape route should be fire rated equal to that of the fire protection to the stairs.

6.3 Roofs

Roof coverings for all blocks should be designed in accordance with BS EN 13501-5 as highlighted in Table 12.1 of ADB as shown in the figure below.

Designation ⁽¹⁾ of covering of roof or part of roof	Distance from any point on relevant boundary			
	Less than 6m	At least 6m	At least 12m	At least 20m
B _{ROOF} (t4)	●	●	●	●
C _{ROOF} (t4)	○	●	●	●
D _{ROOF} (t4)	○	● ⁽²⁾⁽³⁾	● ⁽²⁾	●
E _{ROOF} (t4)	○	● ⁽²⁾⁽³⁾	● ⁽²⁾	● ⁽²⁾
F _{ROOF} (t4)	○	○	○	● ⁽²⁾⁽³⁾

● Acceptable.
○ Not acceptable.

NOTES:

Separation distances do not apply to the boundary between roofs of a pair of semi-detached dwellinghouses and to enclosed/covered walkways. However, see Diagram 5.2 if the roof passes over the top of a compartment wall.

Polycarbonate and uPVC rooflights that achieve a class C-s3, d2 rating by test may be regarded as having a B_{ROOF}(t4) designation.

1. The designation of external roof surfaces is explained in Appendix B.
2. Not acceptable on any of the following buildings.
 - a. Dwellinghouses in terraces of three or more dwellinghouses.
 - b. Any other buildings with a cubic capacity of more than 1500m³.
3. Acceptable on buildings not listed in (1) if both of the following apply.
 - a. Part of the roof has a maximum area of 3m² and is a minimum of 1500mm from any similar part.
 - b. The roof between the parts is covered with a material rated class A2-s3, d2 or better.

Figure 21 - Limitations on Roof Coverings

7 Access & Facilities for the Fire Service

Schedule 1 of the Building Regulations requires the following functional requirement to be met in respect of B5, Access and facilities for the fire service:

1. The building shall be designed and constructed so as to provide reasonable facilities to assist fire fighters in the protection of life.
2. Reasonable provisions shall be made within the site of the building to enable fire appliances to gain access to the building.

The following discusses the implications of these requirements on the proposed design with regard to access and facilities for the Fire Service within and around the building.

7.1 Vehicle Access

Fire Service access is required to provide access for fire personnel and a water supply to within a reasonable distance of the building entrances. Where there are dead end routes within the site, these should either be limited to 20m or a turnaround (turning circle or hammerhead) facility will be provided.

Due care should be given to ensure that the vehicle access route meets the requirements for a pump appliance as shown in the table below.

Appliance Type	Minimum width of road between kerbs	Minimum width of gateways	Minimum turning circle between kerbs	Minimum turning circle between walls	Minimum clearance height	Minimum carrying capacity
Pump	3.7m	3.1m	16.8m	19.2m	3.7m	12.5t

Table 10 – Vehicle Access Requirements

The fire service access route throughout the site is shown in the figure below.

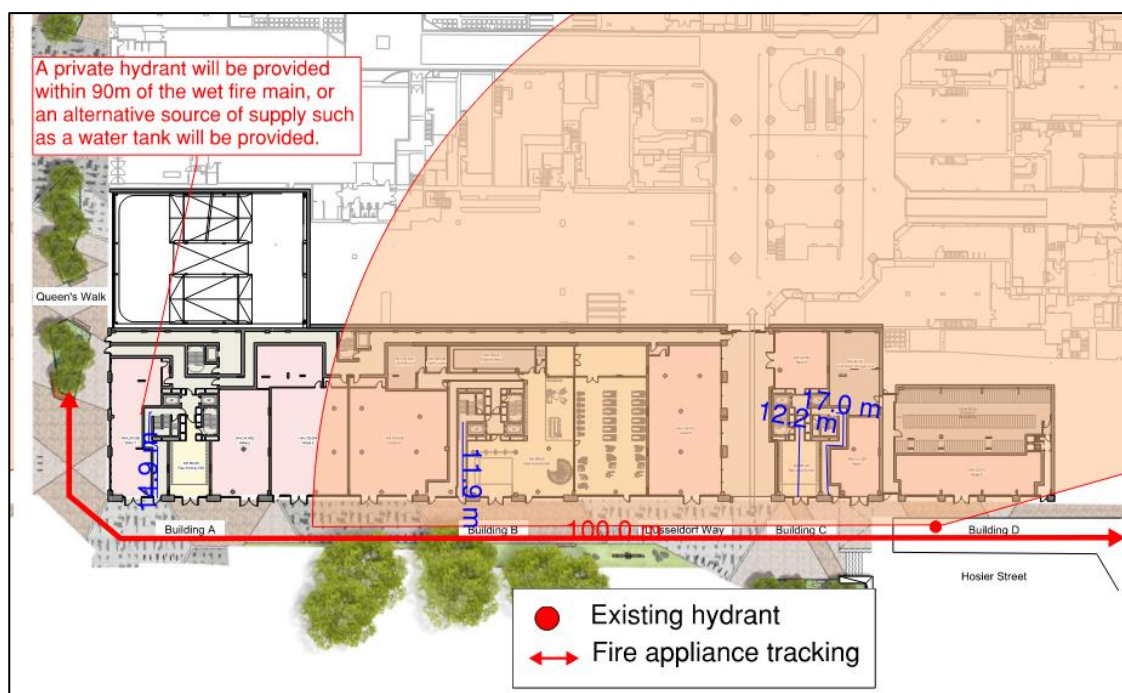


Figure 22 - Fire service site plan

Any access / security measures in and around the site (especially any bollards preventing vehicle access) should be bypass-able by the fire service. The details of the bypass arrangements should be developed and agreed with the fire service as applicable.

The commercial units are less than 2000m² and therefore it should be ensured that there is vehicle access for a pump appliance to 15% of the perimeter.

7.2 Internal Fire Service Access

All cores contain a top floor in excess of 18m in height from the access level and therefore Building A and Building B will be provided with a firefighting shaft each whereas Building C/D is provided with two firefighting shafts as discussed in Section 3.3.3. In this case, the firefighting shaft should serve every upper floor level and be designed in accordance with ADB as listed below.

- Be constructed within 120 minutes of fire resisting construction;
- Include firefighting staircase (at least 1100mm wide);
- Include firefighting lift (provided with dual power supply, water protection etc.);
- Ventilated firefighting lobby;
- Outlet from the fire main at each storey that the firefighting shaft serves (within the staircase);
- Protected access (at least 120 minutes) onto firefighting shaft at access level; and
- A 1.0m² vent on the top of the staircase.

In the residential accommodation, where the common corridor is to be utilized as the firefighting lobby, the entrance to the stair and lift should not be separated by more than 7.5m. The separation between the common corridor and the apartments must provide a fire resistance of at least 60 minutes as shown in the following figure.

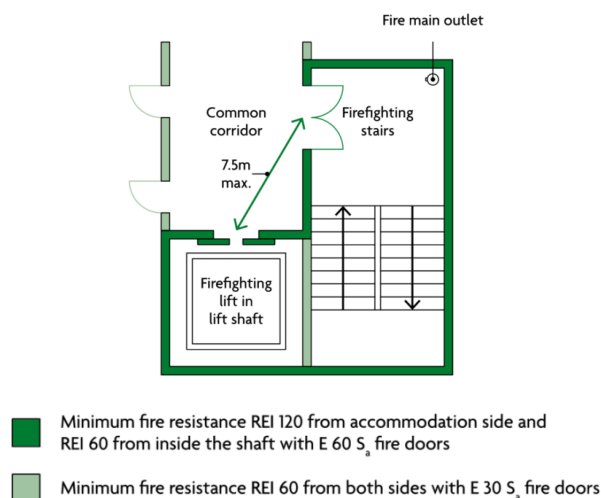


Figure 23 – Internal Firefighting Shaft

Entry to a firefighting shaft at fire and rescue service access level should be via a protected corridor not exceeding 18m in length.

The firefighting stair will be provided with a level of lighting recommended in BS5266 Part 1 and will have a backup power supply capable of maintaining the lighting and other operations in the firefighting shaft for at least 3 hours.

7.3 Wet Risers

Buildings A, B and C/D contain a floor over 50m in height, therefore all required firefighting shafts shall be provided with wet risers for all stair cores.

The wet riser inlets should be within sight of the fire service appliance parking location to replenish the suction tank for the fire main, and should be within 18m, and within sight, of the building entrance providing access for the fire appliance.

All parts of the floor plates should be covered within 60m when measured along a route suitable for laying a hose from a wet riser outlet within a firefighting shaft.

7.4 Smoke Venting

7.4.1 Residential Accommodations

The smoke venting requirements for the residential areas and residential amenity are discussed in detail as part of the common areas means of escape section earlier. No further provisions beyond this are needed for firefighting.

At the later stages of design, a CFD study will be undertaken to validate the system.

7.4.2 Ancillary Accommodation

All ancillary accommodation accessed from the stair lobbies should be accessed via a protected lobby that is ventilated via a 0.4m² natural ventilation duct connected directly to outside.

Should the mechanical smoke vent system be extended to the ground floor to vent these lobbies, this is deemed to be acceptable and exceed the lobby venting requirements.

7.4.3 Car Park

The car park is required to be provided with smoke ventilation.

Natural ventilation can be provided for smoke venting purposes only by providing openings equating to 2.5% of the car park area, with at least half of them located on opposing walls. The openings can be at ceiling level. Then for environmental ventilation, impulse/induction fans would be provided, which could switch off in the case of fire.

Alternatively, a mechanical ventilation system could be provided to give 6 air changes per hour under normal operation. Under fire conditions the system will be ramped up to provide a minimum of 10 air changes per hour.

In this case, the existing mechanical extract fans at Level 3 will be utilised and will be connected to Levels 1 and 2 via extract plenum openings. Inlet air for the system will be supplied at each level via openings in the external walls at available locations (i.e. the car park ramps at Levels 1 and 2) and openings in external walls.

7.4.4 Commercial Accommodation

Due to the fact that the simultaneous evacuation strategy shall be adopted for these units and they do not require to be provided with firefighting shafts, it is not deemed necessary to provide any smoke venting.

7.5 Hydrants

ADB requires that buildings with wet fire mains should be within 100m from an existing fire hydrant. Where the existing hydrants cannot achieve this, then a private hydrant should be provided.

The coverage of the existing hydrants is as shown in Figure 24 in Section 7.1 and an additional fire hydrant would be required. Alternatively, a source of supply such as a water tank will be provided.

7.6 Emergency Power Supplies

Each life safety system provided within the building will have an independent power supply which would operate in the event of a failure of the main supply.

Secondary power supply should be provided to the following life safety systems:

- Automatic opening vents;
- Mechanical Smoke Venting system;
- Fire Alarm System;
- Emergency lights and signs;

- Residential sprinkler system;
- Commercial sprinkler system;
- Wet risers;
- Firefighting lifts; and
- Lifts for evacuation.

7.7 Firefighting Lifts

Each firefighting lift within the firefighting shaft will be designed and installed in accordance with BS9999 and BS EN 81-72. The summary of the some of these measures are listed below.

- Dual Power Supply (i.e. emergency, stand-by or alternative power supply);
- Size of the lift should be at least 1100mm wide x 1400mm deep with a rated load of 630kg as described in ISO 4190-1;
- Fire lift switch at access level;
- Fire Service Communication System:
 - Built-in microphone and speaker.
- Provision to prevent water penetration into the firefighting lift via;
 - Drainage grid to the lift entrance; or
 - A floor sloped away from the lift entrance; or
 - A raised threshold to the lift entrance (at least 25mm high).
- Water protection to the electronic equipment / control within the firefighting lift well / car;
- Means to prevent water level in a lift pit from reaching equipment; and
- Suitable means to prevent water rise above the level of fully compressed car buffer.

7.8 Evacuation Alert System

Since all buildings exceed 18m in height, therefore they will be provided with an evacuation alert system to allow the fire service to undertake the evacuation of part or the whole building if necessary.

It is recommended that the evacuation alert control and indicating equipment (EACIE) should be designed and installed in accordance with BS8629.

7.9 Secure Information Boxes

Since all buildings are over 11m in height, they are required to be provided with a secure facility to store information about the building for use by the fire service during an incident.

The box should meet all the conditions listed below.

- Sized to accommodate all necessary information;
- Easily located and identified by firefighters;
- Secured to resist unauthorised access but readily accessible by firefighters; and
- Protected from the weather.

Best practice guidance can be found in Sections 2 to 4 of the *Code of Practice for the Provision of Premises Information Boxes in Residential Buildings* published by the Fire Industry Association (FIA).

8 Fire Safety Management

8.1 General

Given the use and likely occupancy of the building, management procedures will assist in the prevention and control of fires and the evacuation of occupants.

Good housekeeping standards will be enforced to ensure that the effectiveness of the fire safety provisions is not affected.

Maintenance procedures will be developed to ensure that all equipment and services within the building are able to operate effectively.

A full Fire Risk Assessment should be carried out by the occupier of the building nearer to the development completion and be in place on occupation to meet the Regulatory Reform Order (RRO). The assessment should be maintained and act as a record of the provision and measures, passive and active, used to minimize fire risk within and around the building.

8.2 Key Management Issues

This section describes each of the key management areas that will need to be implemented and maintained during the lifetime of the building:

- All necessary fire safety systems must be regularly maintained and tested;
- The building management will regularly monitor and control the specification and use of combustibles within the escape routes and circulation areas. These areas will generally be maintained free of all combustibles and the escape routes will be unobstructed at all times;
- A full Fire Risk Assessment will be developed for the building; and
- All building staff will receive regular training including roles and responsibilities for key members of staff.

8.2.1 Control of Evacuation and Fire Safety Planning / Implementation

A detailed fire safety plan will be drawn up by the building management, which will provide clear simple advice for the occupants in the event of an emergency.

The fire safety plan will be prepared, maintained and implemented by the fire personnel responsible for the building in question and will include:

- The procedures to be adopted in the event of a fire signal being given;
- Procedures for evacuation of occupants (including disabled occupants);
- Procedures for equipment maintenance;
- Frequency and nature of fire drills;
- Staff training; and
- Procedures for recording and monitoring equipment maintenance and any fire incidents.

Expanding on the information given above the fire strategy includes a number of risk critical areas resulting in the need to formalize the fire safety management in the building. In order to develop and maintain the safety of the building, the building management should formulate a policy statement appropriate to the building configuration, location, occupation, and if relevant, to the building users. The policy statement should include:

- General safety issues related to the use of the building;
- Possible fire scenarios; and
- Aims and objectives of the proposed management system and its methodology.

This policy should be endorsed by the highest level of management.

8.3 Regulation 38

To satisfy Regulation 38 to the Building Regulations it is proposed that a full package of building design information is passed to the end users. It is therefore proposed that the following information is provided to the end users:

- The fire strategy report;
- Any management information proposed in addition to that contained in this strategy;
- Details of all passive fire safety measures (including compartmentation, cavity barriers, fire doors, self-closers and duct dampers);
- Details of the fire alarm and detection systems, emergency lighting, emergency signage, access controls, door hold open devices;
- Details of all active fire safety measures;
- Details of the wet risers, fire hydrants;
- Any high risk rooms and equipment present;
- As built plans for the building;
- O&M Manuals for the building systems, including commissioning information and certification; and
- Any provision incorporated into the building to facilitate the evacuation of disabled people.

This information will be transferred as a package of information by the main contractor at handover of the building.

9 Conclusions and Recommendations

This report outlines the fire safety strategy proposals for Broad Street Mall development and seeks to demonstrate compliance with the Building Regulations (generally in the form of the recommendations of Approved Document B).

The design of the residential blocks, such as travel distances etc., are extended beyond the recommendations of ADB and fire engineered solutions are required as part of the justification. The enclosed corridors to either side of the staircase shall be vented via a 0.6m² mechanical smoke shaft as part of the justification, validated using CFD at a later design stage. An automatic opening vent will be provided at the head of each staircase to provide make-up air to the system.

The elements of structure for all buildings must achieve 120 minutes fire resistance in accordance with ADB.

All the residential buildings are over 11m in height and therefore all apartments will be sprinklered in accordance with BS9251. The ancillary accommodation shall either be sprinklered with the residential or commercial sprinkler system depending on the size of the rooms.

All buildings are over 50m and therefore Building A and Building B will be provided with a single firefighting shaft each whereas Building C/D is provided with two firefighting shafts, due to exceeding 900m². Each shaft will incorporate a firefighting stair, smoke clearance and a wet fire main. The commercial units will be provided with vehicle access for a pump appliance to 15% of the perimeter.

Based upon the above proposals it is considered that adequate measures are provided to meet the functional requirements of the Building Regulations.

