

Cricklewood Green

STAGE 2 FIRE STRATEGY

January 2021



510200.000

Issue	Description	Date	Prepared By	Signed Off
1	For review	29/01/2021	DM	MW

Items highlighted with Blue text are requirements for compliance with the Greater London Act New London Plan.

Project Office:

Elementa Consulting
80 Cheapside
London
EC2V 6EE
+44(0)203 697 9300

Project Contact:

Dale McCubbin
Dale.McCubbin@elementaconsulting.com

Disclaimer

The information contained in this report may contain confidential or legally privileged information. It has been prepared for the sole benefit of our client and can only be relied upon only for its intended use. Elementa do not confer or purport to confer on any third party, any benefit or any right to rely upon or use any part of this report. Copyright of this document remains with Elementa Consulting Ltd.

© Elementa Consulting 2021

www.elementaconsulting.com



Table of Contents

1	Introduction	4
1.1	Scope.....	4
1.2	Building Description.....	4
1.3	Fire Strategy Summary	5
2	Legislation	6
2.1	Building Regulations 2010.....	6
2.2	British Standard BS9991	6
2.3	Approved Document B (ADB)	6
2.4	Regulatory Reform (Fire Safety) Order	7
2.5	Construction, Design and Management Regulations	7
2.6	Statutory Consultation.....	7
2.7	New London Plan	7
3	Means of Warning & Escape	9
3.1	Evacuation Strategy.....	9
3.2	Travel Distances.....	9
3.3	Escape within Residential Block	10
3.4	Escape within Commercial Units / Community Space	14
3.5	Escape within Car Parks	16
3.6	Disabled Evacuation.....	17
3.7	Fire Alarm & Detection System.....	17
3.8	Emergency Lighting.....	17
3.9	Emergency Signage	18
3.10	Manual Fire Fighting Equipment / Fire Extinguishers.....	18
4	Internal Fire Spread (Linings)	19
4.1	Surface Linings.....	19
5	Internal Fire Spread (Structure)	20
5.1	Fire Resistance of Elements of Structure	20
5.2	Compartmentation.....	21
5.3	Fire Stopping and Cavity Barriers.....	22
5.4	Sprinklers.....	22
6	External Fire Spread	23
6.1	Unprotected Areas	23
6.2	External Wall Construction.....	23
7	Access & Facilities for the Fire Service	24



7.1 Vehicle Access 24

7.2 Internal Fire Service Access..... 24

7.3 Dry Riser / Wet Riser 25

7.4 Smoke Venting..... 25

7.5 Hydrants 26

7.6 Emergency Power Supplies..... 26

8 Conclusions and Recommendations27



1 Introduction

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 BS9991 for the residential accommodations and Approved Document B for the commercial spaces at the ground floor.

As this document forms a concept approach for fire matters, the client must ensure the contents of the report are incorporated in the building.

[The Greater London Act is to implement a New London Plan. 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 Cricklewood Green development consists of four blocks of residential accommodations with car parking space and commercial units at the ground floor. The blocks vary in height and the development is shown in Figure 1 below.

Block	Core	Number of Storeys
A	A1	Ground + 24
	A2	Ground + 18
	A3	Ground + 11
	A4	Ground + 5
B	B1	Ground + 8
	B2	Ground + 9
	B3	Ground + 11
C	C1	Ground + 10
	C2	Ground + 17
	C3	Ground + 16
	C4	Ground + 11
D	D1	Ground + 15
	D2	Ground + 14
	D3	Ground + 5

Table 1 - Number of floors



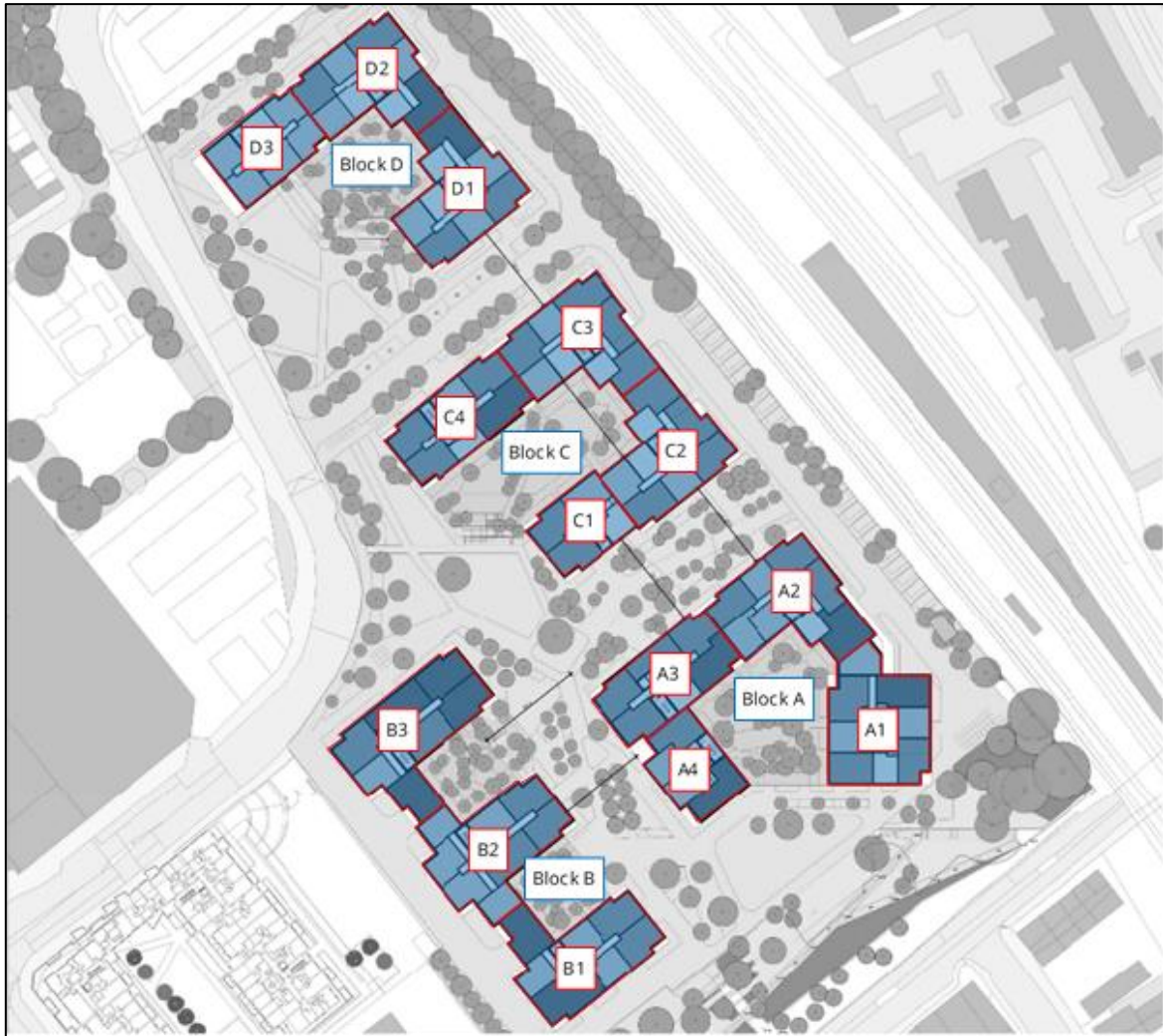


Figure 1 - Cricklewood Green Development

1.3 Fire Strategy Summary

The proposals outlined in this document demonstrate a level of fire safety equal to or greater than the general standard as required by compliance with the recommendations in BS9991.

In general, the residential blocks have been designed using the guidance detailed within BS9991 and the commercial units and community space have been designed in accordance with Approved Document B. The residential and commercial occupancies have been separated with fire resisting construction, equal to the structural fire resistance required for the residential block. Other elements of the fire strategy are summarised below:

- Both occupancies will evacuate independently of one another. The commercial units and community space will adopt a simultaneous evacuation approach, whilst the residential accommodation will implement a stay-put policy.
- Structural fire protection will be provided in accordance with Table 4 of BS9991. Each floor will be designed as a compartment floor.
- Cores over 18m in height will be provided with a firefighting shaft. The cores under 18m do not require a firefighting shaft but shall be provided with a dry riser to provide adequate hose coverage.
- Sprinkler coverage is provided to the residential apartments and continued to cover the amenity areas. Sprinkler coverage is required for the commercial units and the community spaces as the blocks above contain cores that are over 30m in height.

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
- 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 British Standard BS9991

In both new construction and upgrading existing buildings, the various aspects of fire precautions are interrelated and weaknesses in some areas can be compensated for by strengths in others. A higher standard under one of the areas might be of benefit in respect of one or more of the other areas. BS9991 provides a level of flexibility that allows the fire protection measures and the risks to be assessed to enable reasonable practical solutions to be designed.

BS9991 provides recommendations and guidance on the provision of measures to control or mitigate the effects of fire. The primary objective is to ensure that an adequate standard of life safety can be achieved in the event of fire in the building.

A secondary objective is to provide a level of protection for property and businesses against the impact of fire, e.g. in close proximity to residential buildings or as part of the same building or building complex. These can also have the effect of assisting the fire and rescue service and/or of providing environmental protection.

There are references throughout this British Standard to occupant safety, firefighter safety and property protection, to draw attention to the different issues these could raise. It is, however, important to be aware that provisions solely for life safety are unlikely to provide the full level of protection for buildings and property in a fully developed fire scenario.

2.3 Approved Document B (ADB)

The Department of Communities and Local Government (DCLG) 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 2010 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.

2.4 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.

2.5 Construction, Design and Management Regulations

Projects undertaken in the UK are subject to the requirements of the Construction (Design and Management) Regulations 2015 (CDM) or within the European Union, that particular country's interpretation of the European Union Directive.

This report defines the strategy for meeting the functional and performance requirements for fire safety in the finished building. It is intended to form part of the submission for approval under the Building Regulations, Part B (Fire safety). Where any conclusions or recommendations contained within this report specify particular materials, products or forms of construction these will have been assessed, in accordance with CDM Regulations 11 and 18 (duties for designers).

In the event that these involve significant residual risks or health and safety critical assumptions, this information will be made available to the CDM Coordinator. Where the architect or other consultants use all or part of this report to specify works, they are understood to be competent in alerting the Client, CDM Coordinator, Designers, Contractors and Building Occupier of issues arising under the CDM Regulations.

2.6 Statutory Consultation

During the Building Regulations application process, the building control body is required to formally consult with the local fire authority. The purpose of this consultation is to give to fire authority the opportunity to make observations with respect to the Building Regulations and to provide an opportunity to make the applicant aware of action that may have to be taken to meet the requirements of the Fire Safety Order.

The consultation should allow both parties to reach mutually compatible views on whether the building meets the requirements of both pieces of legislation. In the exceptional event that the fire authority propose to require physical changes to the building to meet the requirements of the Fire Safety Order, the building control body should make the applicant aware.

2.7 New London Plan

The London Plan is the statutory Spatial Development Strategy for Greater London prepared by the Mayor of London ("the Mayor") in accordance with the Greater London Authority Act 1999 (as amended) ("the GLA Act") and associated regulations.

The legislation requires the London Plan to include the Mayor's general policies in respect of the development and use of land in Greater London and statements dealing with general spatial development aspects of his other strategies. The Mayor is required to have regard to the need to ensure that the London Plan is consistent with national policies. When published in its final form the Plan will comprise part of the statutory development plan for Greater London.



A draft new London Plan was published by the Mayor for consultation in December 2017. The consultation period ended on Friday 2 March. Greater London Authority officers are currently registering all representations received and preparing a report which will summarise the main issues.



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 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 to 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. The Fire Service carries out evacuation of the other apartments if necessary.

The commercial units, community spaces, car parks, stores and plant facilities included 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.

3.2 Travel Distances

The travel distances should follow the recommendations of BS9991 for the residential and ancillary accommodation, which is detailed in Table 2 below with the additional benefit provided by the inclusion of sprinklers given in brackets. The travel distance requirements for the commercial units follow Approved Document B.

Accommodation	Travel within	Maximum travel distance (m)	
		In one direction (with sprinklers)	More than one direction (with sprinklers)
Apartment	Within Apartment / Hallway	9m (20m)	N/A
Common Areas	Within Common Corridor	7.5m (15m)	30m (60m)
Commercial	Commercial Unit	18m	45m
Car Park / Storage	Car park / Storage	25m	45m
Plant Rooms	Escape within room	9m	35m
	Enclosed escape route	18m	45m

Table 2 - Travel Distance Requirements



3.3 Escape within Residential Block

3.3.1 Escape within Apartments

Apartments which are provided with protected entrance hallways should have a maximum travel distance of 9m within the hallway. The protected entrance hallway will be provided as a 30-minute enclosure with FD 20 fire doors.

Within studio apartments the travel distance should be a maximum of 9m from the most remote area of the unit to the apartment entrance door and provided with a LD2 fire alarm and detection system in accordance with BS5839 Part 6.

Where open plan apartments are provided, these are acceptable given 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.

3.3.2 Escape within Common Corridors

When the travel distances within the common corridor are up to 7.5m in a single direction of escape, the common corridor should be provided with automatic smoke venting to assist means of escape. However, Section 11.2 of BS9991 does state that when the building is sprinklered, the travel distances within the common corridors can be extended to up to 15m.

Block A consists of four single stair core buildings where the travel distances do not exceed 15m in a single direction. In this case, the common corridors of each core should be provided with a 0.6m² mechanical smoke shaft or a 1.5m² natural smoke shaft located within the remote end of the common corridor. The travel distances and smoke ventilation requirements for Block A are shown in Figure 2 below.



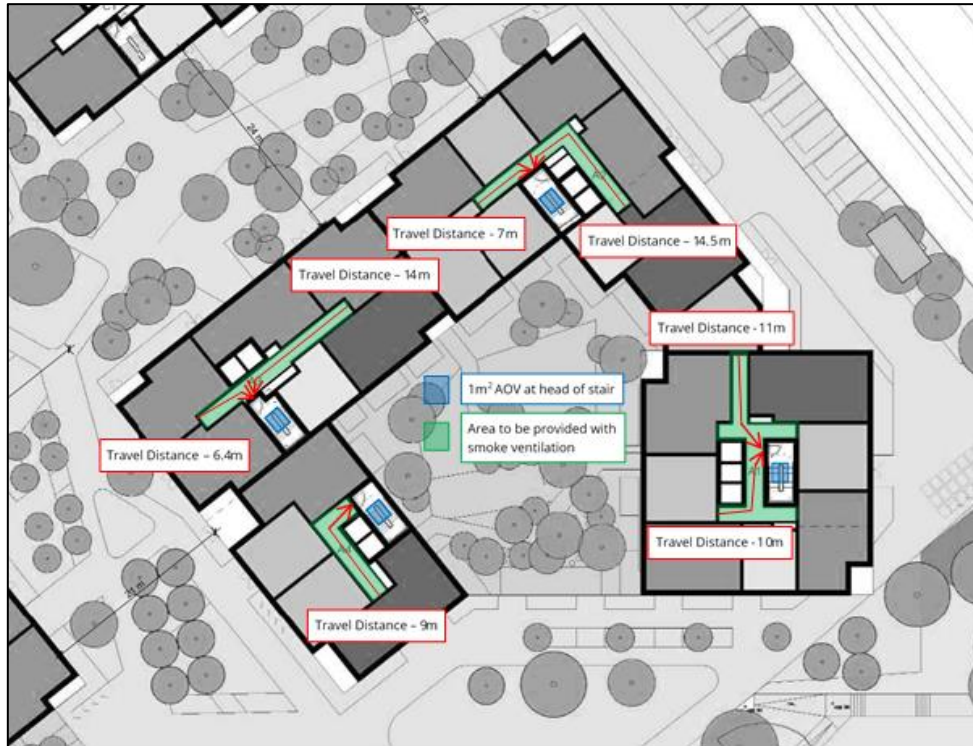


Figure 2 - Travel Distances in Floor Plan of Block A

The common corridors of Cores A2, A3 and A4 are connected at Level 1 of Block A. At this level, cross corridor doors should be provided in the common corridor approximately halfway between each staircase to prevent more than one staircase becoming impacted in the event of a fire. The travel distances are in accordance with BS9991 and the smoke shafts serving the upper levels should also provide smoke ventilation at Level 1.

In Block B, the travel distances at the lower levels of Cores B1, B2 and B3 are extended beyond 15m in all three stair cores. In this case a Mechanical Smoke Ventilation System (MSVS) should be provided within 7.5m of the dead end of the common corridors as shown in Figure 3 below.



Figure 3 - Travel Distances in Floor Plan of Block B



With the current layouts the travel distances at the upper levels of Block B are not extended beyond 15m within some cores of Block B. This would allow greater flexibility in the design similar to Block A, however, based on the extended travel distances at the lower levels, it was proposed the mechanical extract shaft is located as shown in Figure 3.

In Block C, the travel distances are extended beyond the limits of 15m from stair door to the furthest apartment entrance doors in Cores C2, C3 and C4. In these cores it is proposed a Mechanical Smoke Ventilation System (MSVS) should be provided within 7.5m of the dead end of the common corridors as shown in Figure 4 below. In Core C1 as the travel distances do not exceed 15m, smoke ventilation should be provided with a 0.6m² mechanical smoke shaft or a 1.5m² natural smoke shaft located within the remote end of the common corridor.



Figure 4 -Travel Distances in Floor Plan of Block C

Alternatively it is proposed all apartment entrance doors are provided within 15m of the stair door and the common corridors of each core could be provided with a 0.6m² mechanical smoke shaft located or a 1.5m² natural smoke shaft located within the remote end of the common corridor.

In the case of Block D, the travel distances within the common corridors of Cores D1 and D2 are extended beyond 15m as recommended in BS9991. In these cores it is proposed a Mechanical Smoke Ventilation System (MSVS) should be provided within 7.5m of the dead end of the common corridors as shown in Figure 4 below. In Core D3 as the travel distances do not exceed 15m, smoke ventilation should be provided with a 0.6m² mechanical smoke shaft or a 1.5m² natural smoke shaft located within the remote end of the common corridor.



Figure 5 - Travel Distances in Floor Plan of Block D

Where a natural ventilation system is proposed, this should be achieved by a natural smoke shaft that has a cross sectional area of 1.5m^2 with 1.0m^2 vents at each level. The smoke shaft should discharge 2.5m above the floor it serves therefore it would be recommended that the top floor should be ventilated via a 1.5m^2 AOV skylight so that the smoke shaft would only need to discharge 0.5m above any surrounding structures within 2.0m .

In the case that a MSVS is provided, the mechanical smoke shaft should achieve a minimum of 0.6m^2 internal free area with a 0.6m^2 Automatically Opening Vent (AOV) opening into each smoke shaft from each common corridor that it serves.

Ideally the fans should be located on the roof adjacent to the smoke shaft. At this stage, a minimum notional space of $3\text{m} \times 1\text{m} \times 1\text{m}$ should be allowed for the plant installation if the fans are to be used for smoke extraction only. Should they also be used for environmental ventilation, then the plant space will increase to around $6\text{m} \times 1\text{m} \times 1\text{m}$.

A 1.0m^2 AOV is needed at the head of each staircase to open at the same time as the AOV on the affected common corridor.

Staircase doors need to open into the common area on the floors that are ventilated by the mechanical smoke ventilation system (MSVS) to provide the replacement air required for this ventilation system, which shall also protect the staircase from smoke ingress.

3.3.3 Vertical Escape

All cores except Cores A4 and D3 exceed 18m in height and therefore will be provided with a firefighting shaft. The firefighting staircase should 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 final exits doors at ground level should technically have a minimum clear width at least as wide as the associated staircase, i.e. 1100mm , however as the only occupants using the exit should be those in the apartment of fire origin it should be possible to reduce the residential final exit widths down to a clear opening of 850mm .

Due to the fact that this staircase shall be designed for firefighting, no service risers should be accessed from the staircase, or the exit from the staircase at ground floor level.



Cores A4 and D3 are under 18m in height as mentioned above and shall not be designed for firefighting, and therefore the minimum width (measured between the walls and / or balustrade) should be not less than 750mm.

3.3.4 Final Exit Route

BS9991 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. Cupboards and stores should not be provided in the entrance lobby.

Lobbies at ground level that provide access to ancillary accommodation (i.e. access to refuse stores or car parks) should be provided with 1m² permanent ventilation.

3.3.5 Ancillary Accommodation

Travel distances in the ancillary stores, plant and refuse rooms should be limited to 9m where escape is in a single direction and 35m where escape is possible in more than one direction. Travel distances within the cycle storage should be limited to 25m where escape is in a single direction.

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 require two exits with a clear width of 850mm.

3.4 Escape within Commercial Units / Community Space

The travel distances within the commercial units should be based upon two thirds of the maximum recommended distances as the layout is unknown. The travel distances should therefore be 30m where escape is possible in more than one direction and 12m where only a single direction of escape is available.

When an indicative furniture layout can be provided then it should be possible to utilize the full recommended travel distances of 18m in a single direction and 45m where escape is possible in more than one direction.

It should be noted that the commercial units and community spaces should be completely independent from the residential accommodation and therefore the commercial units at the ground floor of Block A should not have a connection to car park if the car park is for residential use.

The travel distance requirements for the Block A commercial units are in accordance with ADB as shown in Figure 6 below.

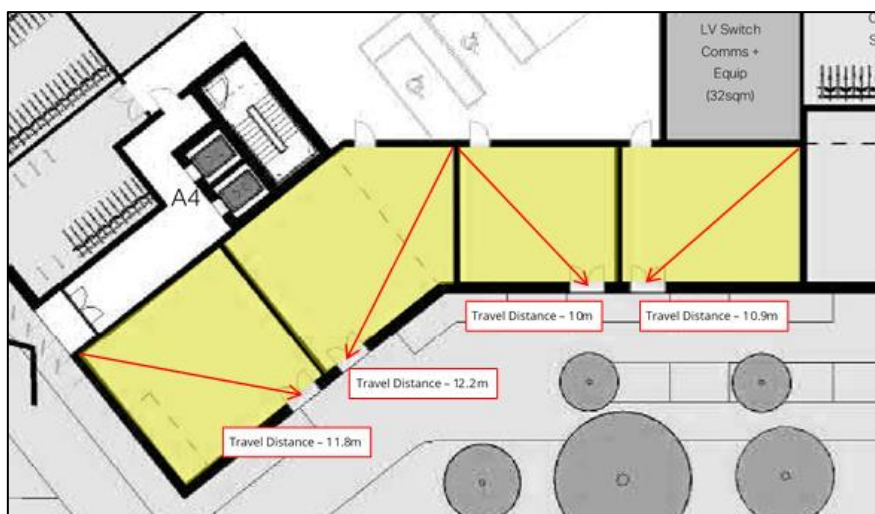


Figure 6 - Block A Ground Floor Commercial Units



The travel distance requirements in two of the three commercial units at the ground floor of Block B are currently extended beyond the recommendations of the ADB. Furthermore, based on the size and expected occupancy of Block B Commercial Unit 2, this unit should be provided with at least two exits with doors opening on the direction of escape. However, it should be noted as the single direction travel distances do not exceed 18m in Commercial Unit 3 this layout may be acceptable providing the travel distances do not exceed 18m when an indicative furniture layout is provided. If the travel distances exceed 18m in a single direction, then an additional exit should also be provided to this unit.

Based on the size and expected occupancy of the community space, this unit should be provided with at least two exits with doors opening on the direction of escape. The travel distances should be in accordance with Table 2 and the required exit widths are shown in Table 4 below.

The Block B ground floor units are shown in Figure 7 below.



Figure 7 - Block B Ground Floor Commercial Units

Based on the shell and core layout, the travel distances in the Block D community space are slightly extended beyond the limits of the ADB. However, providing the travel distances do not exceed 18m once a furniture layout is provided, then the current layout may be acceptable as proposed. The Block D community space is shown in Figure 8 below.

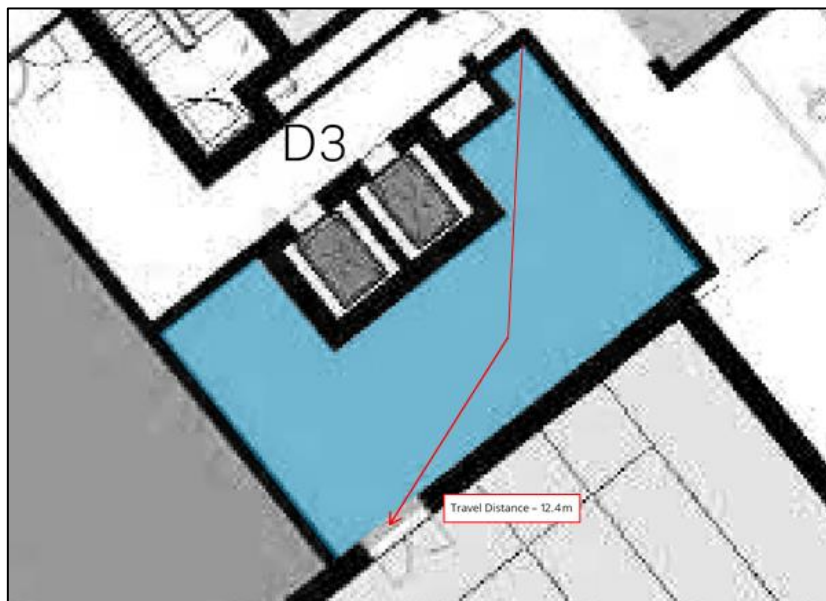


Figure 8 - Block D Ground Floor Community Space



The occupancy loads in individual rooms will vary throughout a day however any room with a single exit should have a maximum occupancy of 60 people. The exit from such rooms can have a minimum clear width of 750mm and also open into the room (open against the direction of escape).

Where any space has an occupancy greater than 60 people (in the supermarket for example) then this space should be provided with at least two exits. Each exit will need to open in the direction of escape and have a minimum clear width as outlined in the table below.

Occupancy	Exit Width (mm)
61-110 people	850mm
112-220 people	1050mm
220+ people	5mm per person (e.g. 300 people =1500mm)

Table 3 – Exit widths

The occupancy load of each unit shall be calculated based on occupancy load factors as recommended in ADB. The resultant occupancy loads are shown in the table below.

Unit	Area (m ²)	Load factor	Occupancy Load	Exit Width Requirements
Block A Commercial Unit 1	76	2m ² /person	38	1x 750mm
Block A Commercial Unit 2	86		43	1x 750mm
Block A Commercial Unit 3	55		28	1x 750mm
Block A Commercial Unit 4	63		32	1x 750mm
Block B Commercial Unit 1	146		73	2x 850mm*
Block B Commercial Unit 2	129		65	2x 850mm*
Block B Commercial Unit 3	89		45	1x 750mm
Block B Community Space	188		94	2x 850mm
Block D Community Space	61		31	1x 750mm

Table 4 – Required exit widths

*Doors should open in the direction of escape.

All commercial units are located on the ground floor and there is no requirement for stairs or vertical escape.

3.5 Escape within Car Parks

Travel distances in the car parks should be limited to 25m where escape is in a single direction and 45m where escape is possible in more than one direction.

Based on an occupancy load factor of 2 people per car, the following occupancy loads have been calculated for the car park based on the car park being fully occupied.

Car Park	Parking Spaces	Occupancy Load factor	Occupancy	Exits Width Requirements
Block A	18	2 people per car	36	1x 750mm
Block B	17		34	1x 750mm
Block C	31		62	2x 850mm
Block D	17		34	1x 750mm

Table 5 - Car Park Exit Widths



3.6 Disabled Evacuation

The residential accommodation on the upper levels do not require disabled refuges to be provided.

Policy D3 Inclusive design requires developments to incorporate safe and dignified emergency evacuation for all building users, by as independent means as possible. Where lifts are installed, Policy D3 Inclusive design requires a minimum of one lift per core to be a fire evacuation lift, which incorporates suitable levels of fire resistance to elements of construction forming refuges, evacuation lift enclosures and lobbies.

As part of the GLA D.3 it is a requirement to provide a dignified means of escape for all occupants. A fully compliant evacuation lift will require a full team of staff to operate. However, this is impractical for a residential scheme where there may not be sufficient permanent staff at all times.

Therefore, it is considered reasonable to provide a single evacuation lift per core, in addition to the firefighting lift, that has dual power supply and allows a disabled occupant to descend to ground floor without assistance. The implication for blocks that do not have firefighting lifts, is that at least one lift in each core should be provided with dual power supply.

As the commercial units and community space operate solely at the access level where escape is provided directly to outside, disable refuges will not be required.

3.7 Fire Alarm & Detection System

3.7.1 Residential Accommodation

Apartments with protected entrance halls should be provided with an LD2 automatic fire detection and alarm system with a minimum grade D power supply, designed, installed and maintained in accordance with BS5839 Part 6.

Where studio apartments are provided, these should also be provided with an LD2 automatic fire detection and alarm system designed in accordance with BS 5839 Part 6.

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.

A smoke detection system should be provided in the common corridors in Block A1. 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.

3.7.2 Ancillary Accommodation

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

3.7.3 Commercial Units / Community Space

The fire alarm and smoke detection within the commercial units and the community space should be designed in accordance with BS 5839 Part 1 and be a minimum of a manual type.

3.7.4 Car Parks

The car parks 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.

3.8 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.



3.9 Emergency Signage

Escape signage should follow the recommendations of BS 5499. Further detail will be provided during the design development.

3.10 Manual Fire Fighting Equipment / Fire Extinguishers

Manual firefighting equipment is not necessary under Building Regulations however the Regulatory Reform (Fire Safety) Order 2005 does request that first aid firefighting facilities should be provided in places of work.

In this case it is proposed that manual firefighting equipment will be provided (by the tenants as a part of the fit out) as part of the commercial unit fit out works with the quantity, location and type of extinguishers identified and agreed with the Fire Service.

At this stage a general guide for the extent of fire extinguisher provisions would be typically one extinguisher per 200m² of floor area with the type appropriate for the risk (i.e. Liquid fires – Powder or CO₂, General fires – Water etc.). They are generally to be located by the exits.

Manual firefighting equipment will not be installed within the residential accommodation.



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: <ul style="list-style-type: none"> • 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, commercial units and car park	B-s3,d2
Note: * The European classifications are described in BS EN 13501-1.	

Table 6 – Surface lining requirements

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.

For the purpose of this document the internal surfaces and linings includes only the floors within stair cores, the upper surface of all other floors are not subject to these limitations. Doors, door frames, window frames and frames in which the glazing is fitted, architraves and skirting are also exempt from these limitations.



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;

- a) 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;
- b) If the building is sub-divided by elements of fire-resisting construction into compartments;
- c) If any openings in fire-separating elements are suitably protected in order to maintain the integrity of the element; and
- d) 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.

In accordance with BS9991, where a residential building is provided with sprinklers throughout, the minimum level of structural fire resistance is 60 minutes where the top storey height is greater than 18m but less than 30m.



The minimum level of structural fire resistance for each block is defined in the following. Where cores share elements of structure, depending on the structural design, the period of fire resistance should be the more onerous of the two.

Block	Core	Number of Floors	Approximate Height (m)*	Structural Fire Resistance
A	A1	Ground + 24	72m	120 mins
	A2	Ground + 18	54m	120 mins
	A3	Ground + 11	33m	120 mins
	A4	Ground + 5	15m	60 mins
B	B1	Ground + 8	24m	60 mins
	B2	Ground + 9	27m	60 mins
	B3	Ground + 11	33m	120 mins
C	C1	Ground + 10	30m	120 mins
	C2	Ground + 17	51m	120 mins
	C3	Ground + 16	48m	120 mins
	C4	Ground + 11	33m	120 mins
D	D1	Ground + 15	45m	120 mins
	D2	Ground + 14	42m	120 mins
	D3	Ground + 5	15m	60 mins

Table 7 - Structural Fire Resistance

*Top storey heights to be confirmed.

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. Where an internal corridor is provided it should be 30-minutes fire resisting with FD20 doors.

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

Where a firefighting core is provided, it should be enclosed in 120 minutes fire resistance with FD60S self-closing doors. The firefighting lift shaft should have a fire resistance of 120 minutes with FD60 landing doors. Non-firefighting lift shafts and risers should have fire ratings equal to the structure with FD60 doors.

The staircase and lifts in cores not designed as firefighting shafts should be enclosed in 60 minutes fire resistance with FD30S self-closing doors and FD30 doors respectively. The risers should also be enclosed in 60 minutes fire resistance and FD30 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 Commercial Units / Community Space

These units shall be separated by all other accommodations by the same period of fire resistance as the elements of structure and should achieve 120 minutes fire resistance.

5.2.3 Car Parks

The car parks should be separated from the rest of the accommodations by a minimum of 120 minutes fire resistance (including walls and floors).

The car parks shall be approached through a protected and ventilated lobby. Where a firefighting shaft is provided, these lobbies will afford 120 minutes fire resistance with FD60S doors.

These lobbies should be provided with a 1.0m² permanently open vent that leads directly to outside as discussed in Section 7.4.3.

5.2.4 Ancillary Accommodation

Plant and refuse rooms should achieve 60 minutes fire resistance with FD30 doors. If the plant rooms and refuse rooms are accessed from the staircase lobby, this should be via a protected lobby that is ventilated via a 1.0m² passive vent connected directly to outside.

Cleaner cupboards, stores and utility rooms should be enclosed in 30 minutes fire resistance with FD30 doors. If these rooms are accessed from the staircase lobby, this should be via a protected lobby that is ventilated via a 1.0m² passive vent connected directly to outside.

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.

5.3 Fire Stopping and Cavity Barriers

Fire stopping and cavity barriers should be provided as recommended in BS9991.

5.4 Sprinklers

5.4.1 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.

5.4.2 Commercial Units / Community Space

Within Blocks A, B and D there are cores that exceed 30m in height and subsequently the commercial units and community spaces provided at the ground floor of these blocks should be provided with sprinklers in accordance with BS EN 12845.

5.4.3 Car Park

The car parks should be provided with a commercial sprinkler system designed in accordance with BS EN 12845.

5.4.4 Ancillary Accommodation

The stores and plant rooms should also be provided with a commercial sprinkler system 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:

- a) *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.*
- b) *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.

An external wall assessment shall 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.

For all cores which are over 18m 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 13501-1:2007+A1:2009. 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.

For cores that are under 18m in height, the relevant provisions are as follows:

- For areas less than 1000mm from the relevant boundary: B-s3, d2 or better.
- For areas more than 1000mm from the relevant boundary: no provisions.

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 should be fire rated equal to that of the fire protection to the stairs

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. 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 (which is taken from London Fire Brigade – Guidance Note 29).

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	14.0t

Table 8 – Vehicle Access Requirements

Fire service access to the commercial units and community spaces should be provided via external perimeter access to 15% of its periphery.

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.

7.2 Internal Fire Service Access

All cores except Cores A4 and D3 contains a top floor in excess of 18m from the access level and shall be provided with a firefighting shaft. In this case, the firefighting shaft should serve every upper floor level and be designed in accordance with BS9991 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 Fire Fighting 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.
- A 1.0m² vent on the top of the staircase.

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 Figure 9 below.



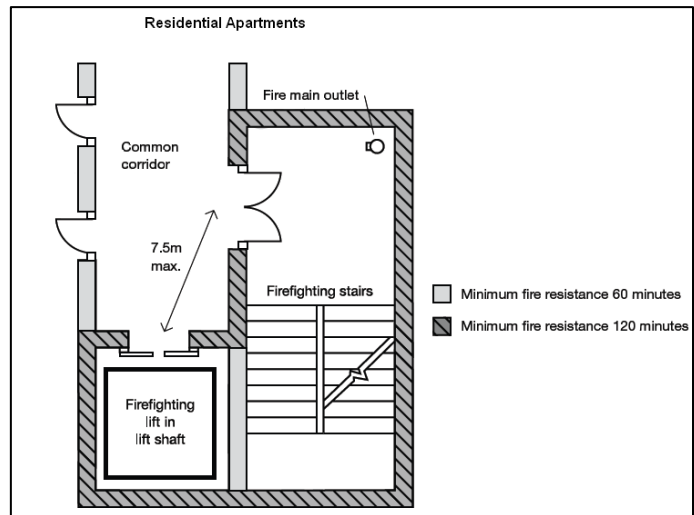


Figure 9 - Internal firefighting shaft

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.

In the case of Cores A4 and D3, they are not required to be provided with a firefighting shaft however all parts of the floor plates should be within 45m of the fire service appliance. As this cannot be achieved a dry riser shall be incorporated into the staircase of each of these blocks.

7.3 Dry Riser / Wet Riser

The inlets for all cores should ideally be adjacent to the building entrances and be visible from the fire appliance (plus accessible within 18m of the fire appliance parking location).

Cores A2 and C2 are expected to contain a floor that is over 50m in height and should be provided with a wet fire main. However, once top storey heights can be confirmed this will need to be reviewed as other cores may also require to be provided with wet fire mains.

All parts of the floor plates should be covered within 60m (when measured along a route suitable for laying hose) from a dry / wet riser outlet provided within the firefighting staircase.

7.4 Smoke Venting

7.4.1 Residential Accommodation

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

7.4.2 Commercial Units / Community Space

Since the commercial units and community space will undertake individual simultaneous evacuation and do not have a floor over 18m in height, they will not require to be provided with any smoke venting.

7.4.3 Car Parks

Ventilation will be provided within the car park for two purposes. The first purpose is to provide a suitable environment for the daily use of the car park. The second is to provide protection to the building and the fire fighters in the event of a fire. It is normal practice for both purposes to be satisfied by a single unified system operating in two modes.

If natural ventilation is to be provided for both environmental and smoke ventilation purposes, then openings equating to 5% of the car park area will need to be provided, with at least half of them located on opposing walls.

If this cannot be achieved, then 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. Then for environmental ventilation, impulse/induction fans would be provided, which could switch off in the case of fire.

Otherwise, a mechanical ventilation system utilizing impulse ventilation 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.

The smoke outputs and ventilation requirements would be assessed in accordance with BS7346 Part 7.

The stair lobbies connecting to the car park should be provided with 1.0m² permanently open vents that lead directly to outside.

7.4.4 Ancillary Accommodation

All ancillary accommodation accessed from the stair lobbies should be accessed via a protected lobby that is ventilated via a 1.0m² natural ventilation duct connected directly to outside.

7.5 Hydrants

BS9991 and ADB recommend that hydrants should be provided as necessary to ensure that all dry riser inlets / buildings entrances are within 90m of a fire hydrant. They should not be more than 90m apart.

It is proposed that a site survey confirms whether the above criteria is achieved based on any existing hydrant provisions. If this survey establishes that the existing hydrants are inadequate it is recommended that an additional private hydrant(s) is included on the site.

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,
- Smoke Venting system,
- Fire Alarm System,
- Emergency lights and signs,
- Firefighting lifts
- Wet Riser



8 Conclusions and Recommendations

This report outlines the fire safety strategy proposals for the Cricklewood Green development and seeks to demonstrate compliance with the Building Regulations (generally in the form of the recommendations of BS9991).

The designs of the residential cores, such as travel distances etc., are compliant within some of the cores and are in accordance with BS9991. For these cores a system of smoke clearance via a natural smoke shaft or a mechanical smoke ventilation system (MSVS) is proposed.

In cores where the travel distances are extended beyond the requirements of BS9991, it is proposed a mechanical extract shaft is provided within the dead end of the common corridor to protect the escape route and assist with means of escape.

Elements of structure will vary between 60 and 120 minutes, however where cores share elements of structure (as expected in this case) then the period of fire resistance most onerous of the two should be provided. However, confirmation of the FFL of all blocks is required to confirm the periods of fire resistance in all blocks.

Where a firefighting shaft is provided it will be enclosed in 120 minutes fire resistance.

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

