Bath Road – Block B

DETAILED FIRE STRATEGY

21st August 2023

KF-DFS-5063-01

KNOW FIRE

QUALITY ASSURANCE

Revision	Date	Prepared By	Reviewed by	Reason
-	21/08/23	Mike Gilmartin	Kevin Parsons	Design team for comment

CONTENTS

1 INTRODUCTION

Know Fire Limited have been commissioned by Nine Group to produce a fire strategy report for the extension of an Aparthotel at Block B, Bath Road, Heathrow. The purpose of this Fire Strategy is to provide strategic design and performance criteria which, when met by the design of the development, are proposed to meet the functional requirements of Part B of Schedule 1 to the Building Regulations, and any other relevant stakeholder requirements.

Determination of compliance with the requirements of the Building Regulations is under the jurisdiction of the Building Control Body who should consult with the Enforcing Authority, and all design guidance or performance criteria set out within this report are at approvals risk until agreed with the authority.

For the purpose of this report and in line with the Building Regulations, the report makes recommendations for life safety only; property protection is not an objective of the Building Regulations and has not been specifically identified as one of the project design objectives by the client.

1.1 Drawing Information

Table 1 highlights the information that has been used to develop the detailed fire strategy.

Table 1 – Drawing Reference

Architect	Description	Drawing Number	Date	Revision
Denner Ellis Boddington	Basement	23/465 008	20-04-23	K
Denner Ellis Boddington	Ground Floor Plan	23/465 001	20-04-23	K
Denner Ellis Boddington	1st Floor Plan	23/465 002	20-04-23	G
Denner Ellis Boddington	2nd Floor Plan	23/465 003	20-04-23	H
Denner Ellis Boddington	3rd Floor Plan	23/465 007	20-04-23	E
Denner Ellis Boddington	North / South Elevation	23/465 006	20-04-23	B
Denner Ellis Boddington	East Elevation	23/465 004	20-04-23	E
Denner Ellis Boddington	West Elevation	23/465 005	20-04-23	C

1.2 Building Description

The proposed development is a 4 storey (Basement, Ground, 1st and 2nd) aparthotel. Figure 1 highlights the East Elevation of the building. An existing Apart Hotel currently operates on the site and will connect into the new block at the 2nd level via a glazed link bridge (see Figure 2). The height of the top storey is 11.8m from the lowest external ground level.

The building will be designed with two available protected stairs from all levels.

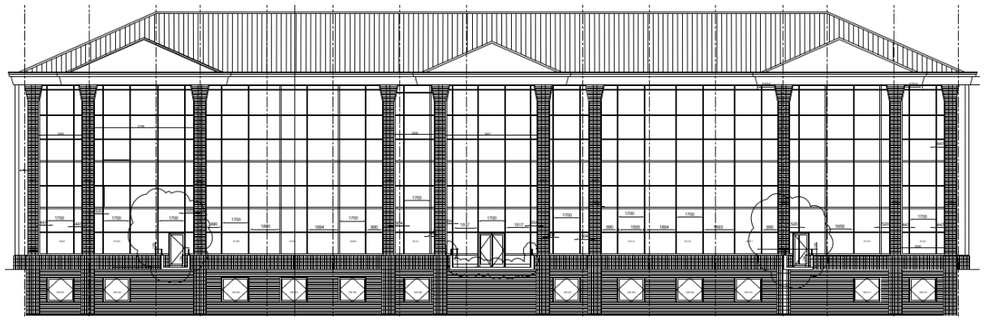

Figure 1 – East Elevation

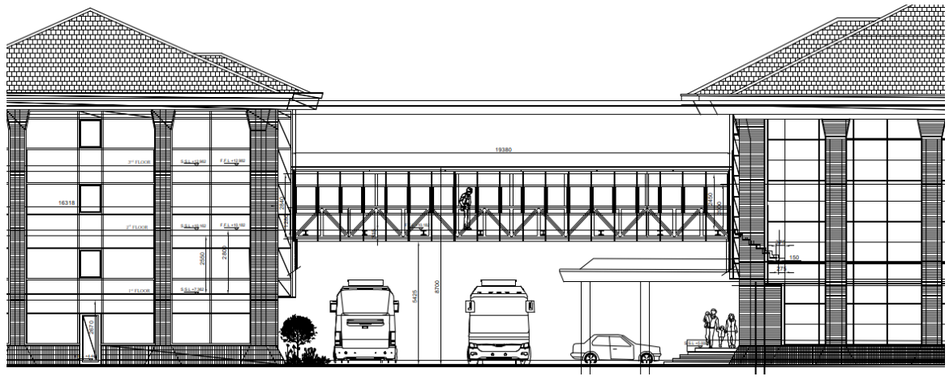

Figure 2 – South Elevation

1.3 Legislation

The Building Act 1984 is the primary legislation under which the Building Regulations and other legislation are made. The Building Regulations 2010 is the Statutory Instrument which seeks to ensure that the policies set out in the Act are implemented.

Part B of Schedule 1 to the Building Regulations includes functional requirements that need to be met with regards to fire safety. Under Part B a building owner is required to provide an adequate level of life safety to the building by providing suitable means of escape, means of warning occupants of a fire, limiting internal fire spread, protecting adjacent property from fire, and facilitating Fire Service operations. This is considered under the requirements of B1 to B5 of Schedule 1 of the Regulations.

Compliance with the functional requirements B1 to B5 may be demonstrated by meeting a suitable guidance document. As no specific purpose is designated group for aparthotel the building will be considered as a residential apartment block with certain enhancements.

The principal guidance document used for the evaluation of fire safety precautions for the dwellinghouse is Approved Document B Volume 2: Buildings other than Dwellings - 2019 Edition (incorporating 2020 & 2022 amendments).

Unless explicitly stated otherwise in this report, all aspects of the building are to be in full accordance with ADB and/or the relevant British Standards.

2 MEANS OF WARNING AND ESCAPE

2.1 Introduction

Part B1 of the Building Regulations state:

> *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.*

2.2 Evacuation Principle

As the building provides sleeping accommodation the evacuation will operate on a simultaneous evacuation.

2.3 Automatic Fire Detection and Alarm (AFDA)

As sleeping accommodation is provided and in accordance with BS 5839-1 an L2 fire alarm system will be provided in the building.

The position of the fire alarm panel is to be determined by the design team. However, it is recommended that it is located in such a place that it can be monitored constantly by management and is visible from the exterior, such that the Fire Service can assess the panel before entering the building.

While not a specific requirement under the Building Regulations it is recommended that the fire alarm system is interfaced with the connected exiting apart hotel.

2.4 Building Population

Table 2 provides a summary of the anticipated occupancies within the building.

Table 2 - Building Occupancy

Floor	Use	Floor Area (m^2) / No of Room	Floor Space Factor (m^2/person) / No of persons per Room	Occupancy
Basement	Plant	57m^2	30m^2	2
	House Keeping	17m^2	30m^2	1
	House Keeping	19m^2	30m^2	1
	Bedrooms	11	2	22
Ground	Bedrooms	23	2	46
	House Keeping	8	30m^2	1
First	Bedrooms	23	2	46
	House Keeping	22m^2	30m^2	1
	House Keeping	19m^2	30m^2	1
Second	Bedrooms	23	2	46
	House Keeping	22m^2	30m^2	1
	House Keeping	19m^2	30m^2	1
Third	Bedrooms	23	2	46
	House Keeping	22m^2	30m^2	1
	House Keeping	19m^2	30m^2	1
		Total Occupancy		217

2.5 Horizontal Means of Escape

Table 3 highlights the recommendations in ADB for travel distances within anticipated uses. These travel distances are generally complied with unless highlighted in the report.

Table 3 - Travel Distance Limitations

Location	One Direction	More than One Direction
Hotel Bedrooms	9m	NA
Hotel Corridors	9m	35m
Housekeeping	18m	NA
Plant Rooms	9m	35m

Figure 3 indicates the available escape routes on a typical upper level.

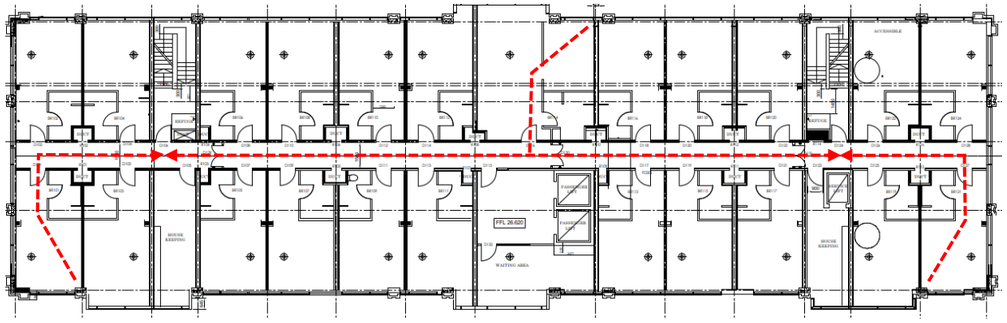

Figure 3 - Available Escape on a Typical Floor

The apartments are designed as studios i.e. no inner rooms accessed by a door. The travel distance will be limited to 9m from anywhere in the studio to the entrance door. If any cooking facilities are provided there will be positioned a minimum of 1.8m from the escape route.

As the occupancy is less than 60 persons per floor all escape doors are to be a minimum of 750mm. This would be sufficient on the discounting of a horizontal exit.

All final exit doors from the escape stairs are to be the same width as the stairs.

2.6 Vertical Means of Escape

Two protected stairs serve the ground to 3rd floor (Stairs A & B) with a further 2 stairs serving the basement level (Stairs C & D). See Figure 4 for Stair locations.

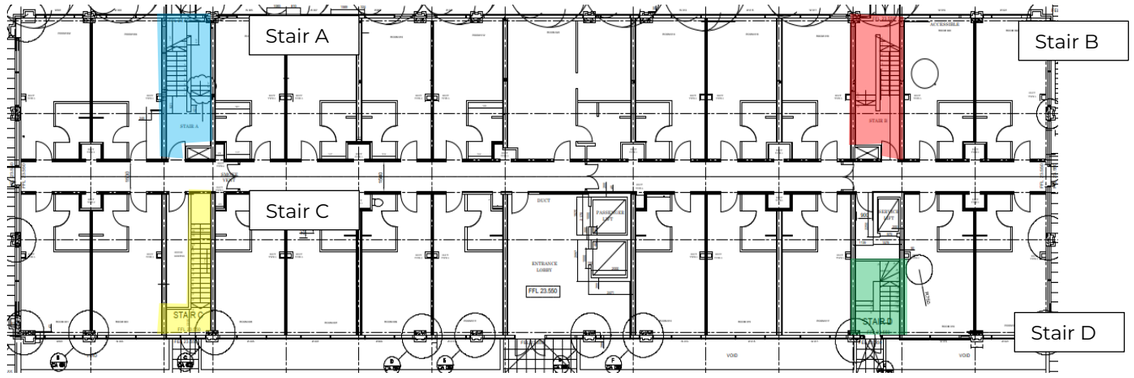

Figure 4 - Protected Stairs on the Ground Floor

Each stair provides a minimum clear width of 1.1m. As they are accessed of a protected corridor they are considered to be served by a protected lobby.

In accordance with ADB, 2 x 1.2m stairs serving 4 storeys (Ground to 3rd) would permit an occupancy a maximum occupancy of 680. This is sufficient for the anticipated occupancy of 191 for the ground and upper levels. The maximum occupancy of the building is only 515 so a full building evacuation would be acceptable.

The 2 basement stairs serve a single floor. On the assumption of discounting an exit the egress capacity is 220. This sufficiently exceeds the anticipated occupancy of 26.

The basement plantroom is provided with a dedicated external stair. As this is not required for the means of escape no additional compartmentation is proposed.

2.7 Disabled Evacuation

Disabled refuges are provided in each stair. Each refuge will be a minimum of 1400mm x 900mm and proved with Emergency Voice Communication (EVC) Type B complying with BS 5839-9.

2.8 Emergency Lighting

Emergency lighting should be provided in accordance with BS 5266-1 'Emergency lighting – Part 1: Code of practice for the emergency lighting of premises and BS EN 1838 'Lighting applications – Emergency lighting'.

Emergency escape lighting should be provided in escape routes, open area, high risk area and points of emphasis including:

- At each exit door intended to be used in an emergency
- Near stairs so that each flight of stairs receives direct light
- Near any other change in level
- Mandatory emergency exits and safety signs
- At each change of direction
- At each intersection of corridors
- Outside and near to each final exit
- Near each first aid post

2.9 Emergency Escape Signage

Fire escape signs are to be provided to guide occupants from any point in a building, via a place of relative safety (the escape route) to the place of ultimate safety (outside the building). Exit and directional signage should be provided in accordance with the requirements of BS ISO 3864-1, and BS 5499: Part 4 and 5.

Signage is provided to identify the primary escape route from each location within the building. To achieve this, the following principles have been adopted.

- At least one escape route or doorway leading to an escape route should be visible from any place within every room or enclosure.
- Where direct sight of the escape route is obstructed, additional signage is to be considered.
- Escape route signage is to take precedence over all other signs.
- All changes of direction in corridors, stairways and open spaces forming part of an escape route will be marked with intermediate signs. Each intermediate door or junction will also be similarly signed.
- Signs are not to be fixed to doors or sited where they are obscured by open doors.

Escape route signs are to be sited conspicuously within the normal field of vision. The following principles, which will assist the evacuating occupants to predict the location of successive signs should be applied:

- Signs above doors or open spaces should be mounted between 2m and 2.5m from the floor level, measured to the base of the sign and be sited as close to the centre line of the escape route as practicable.
- Signs sited on walls should be mounted between 1.7m and 2m from the floor level to the base of the sign.
- Signs should be sited at the same height throughout the escape route, so far as is reasonably practicable.

2.10 Escape Doors

Access control measures incorporated into the design of the building which restrict access or egress from the building do not adversely affect the means of escape. If some escape routes are secured outside of normal hours the remaining measures should be sufficient to allow safe egress of any persons remaining within the building.

When the building is occupied, all electrically powered locking mechanisms are to return to the unlocked position on operation of the fire alarm system or loss of power. Any doors also provided with a manual door release unit complying with BS EN 54-11 on the side approached by people making their escape.

Where access to the means of escape is provided via a room, it should be ensured that appropriate measures are in place which would allow for the access doors to be open without the need of a key. Doors should either failsafe open or, be provided with a break glass unit, or other appropriate systems.

Doors at the base of the stair should be as wide as the stair they serve. e.

Doors on escape routes should:

- Be hung to open not less than 90 degrees.
- Should be sufficiently recessed to prevent its swing from encroaching on the required egress route of the escape route or stair.

- Provided with vision panels if they are provided to sub-divide corridors or where doors are hung to swing both ways.
- Only fitted with lock or fastenings which are readily operated, without the use of a key and without having to manipulate more than one mechanism.

3 INTERNAL FIRE SPPREAD (LININGS)

3.1 Introduction

Part B2 of the Building Regulations state:

To inhibit the spread of fire within the building, the internal linings shall—

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

In this paragraph "internal linings" means the materials or products used in lining any partition, wall, ceiling, or other internal structure.

3.2 Linings

The surface finishes of walls and ceilings are to achieve the classification in Table 4 when tested under the relevant standard and classified in accordance with BS EN 13501-1.

Table 4 - Classifications on Internal Linings

Location	European Class
Small room not more than 4m^2 in the residential accommodation	D-s3, d2
Other rooms	D-s3, d2
Other rooms	C-s3, d2
Common Areas	B-s3, d2

Parts of walls in rooms may be of lower performance than specified in Table 4 but not worse than Class D-s3, d2 provided that the total area of those parts in any one room does not exceed half of the floor area of the room, subject to a maximum of 20m^2 in residential accommodation and 60m^2 in non-residential accommodation.

For the purposes of Table 4, the definition of a wall includes glazed screens and the internal surfaces of external glazing, and any part of a ceiling that slopes at an angle greater than 70° to the horizontal. Doors, door frames, frames for glazing (e.g., windows or screens), fitted furniture or narrow members such as architraves, skirtings, coving etc. do not need to achieve the requirements stated in Table 4.

4 INTERNAL FIRE SPREAD (STRUCTURE)

4.1 Introduction

Part B3 of the Building Regulations state:

The building shall be designed and constructed so that, in the event of fire, its stability will be maintained for a reasonable period.

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.

Where reasonably necessary to inhibit the spread of fire within the building, measures shall be taken, to an extent appropriate to the size and intended use of the building, comprising either or both of the following—

- *sub-division of the building with fire-resisting construction.*
- *installation of suitable automatic fire suppression systems.*

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.

4.2 Structural Requirements

The purpose of providing the structure with fire resistance is:

- To minimise the risk to occupants
- To reduce the risk to firefighters who may be engaged on search and rescue operations
- To reduce the danger to people in the vicinity of the building

As the height of the topmost occupied storey is less than 18m in height from lowest adjacent ground level, all elements of structure should be provided with 60 minutes applied fire protection throughout the building.

The period of fire resistance refers to the performance achieved by the structural elements when tested in accordance with the appropriate parts of BS 476 for load bearing elements of structure.

4.3 Suppression

No sprinklers are to be provided to the building.

4.4 Compartmentation Requirements

The main objective of compartmentation is to prevent rapid fire spread, which may prevent occupants of the building from escaping safely. Compartmentation reduces the chance of a fire becoming large thereby protecting the means of escape and also reducing the likelihood of fire spread to the neighbouring buildings.

Table 5 provides a summary of the required fire compartmentation.

Table 5 - Fire Compartmentation

Floor / Wall Location	Fire Rating (mins)
Compartment Floors	60
Protected Stairs	60
Protected Corridor	30
Risers	60[a]
Lifts	60
Waiting Area	30
Housekeeping	30
Plant & Refuse Room	30
Entrance Lobby	30

[a] This is on the basis that the risers are not fire stopped at floor level.

All doors are to achieve the rating stated within Table 6.

The doors from the buildings on to the link bridge will be fire rated as the existing and the proposed building will be treated as individual buildings.

Table 6 - Fire Doors

Floor / Wall Location	Fire Rating (mins)	Self Closer
Apartments	FD30s	Yes
Stairs	FD30s	Yes
Cross Corridor	FD20s	Yes
Risers	FD30s	No – to be locked shut
Lifts	FD30	NA
Waiting Area	FD30s	Yes
Housekeeping	FD30s	Yes
Plant Room	FD30	No – to be locked shut
Entrance Lobby	FD30s	Yes
Link Bridge	FD30	Yes

4.5 Cavity Barriers

Cavities in the construction of a building provides a ready route for the spread of smoke and flame, which can present a greater danger as any spread in concealed.

Cavity barriers should be provided at all of the following locations:

- At the edges of cavities, including around openings (such as windows, doors, and exit/entry points of services.
- At the junction between an external cavity wall and every compartment floor and compartment wall.
- At the junction between an internal cavity wall and every compartment floor, compartment wall or other wall or door assembly forming a fire resisting barrier.

Cavity barriers (tested from each side separately) should provide a minimum of both of the following:

- 30 minutes' integrity (E30)
- 15 minutes' insulation (I15)

Cavity barriers in a stud wall or partition or provided around openings only, may be constructed from:

- Steel at least 0.5mm thick
- Timber at least 38m thick
- Polythene sleeved mineral wool slab, in either case under compression when installed in the cavity
- Calcium silicate, cement based or gypsum-based boards at least 12mm thick

It should be noted that the above materials do not necessarily meet the performance specification required for cavity barriers.

Any openings in a cavity barrier should be limited to those for:

- 30-minute fire rated doors
- The passage of pipes which meet the provisions set in this report
- The passage of cables or conduits
- Openings or ducts (unless fire rated) fitted with a suitable automatic fire damper where they pass through the cavity barrier.
- Ducts that are either:
    - Fire Resisting (minimum E30)
    - Fitted with a suitably mounted and appropriate fitted fire damper where they pass through the cavity barrier.

Figure 5 highlights where cavity barriers are to be provided.

4.6 Protection of Openings and Fire Stopping

The performance of a fire separating element should not be impaired. Every joint, imperfect fit and opening for services should be sealed. Fire stopping delays the spread of fire and generally the spread of smoke as well.

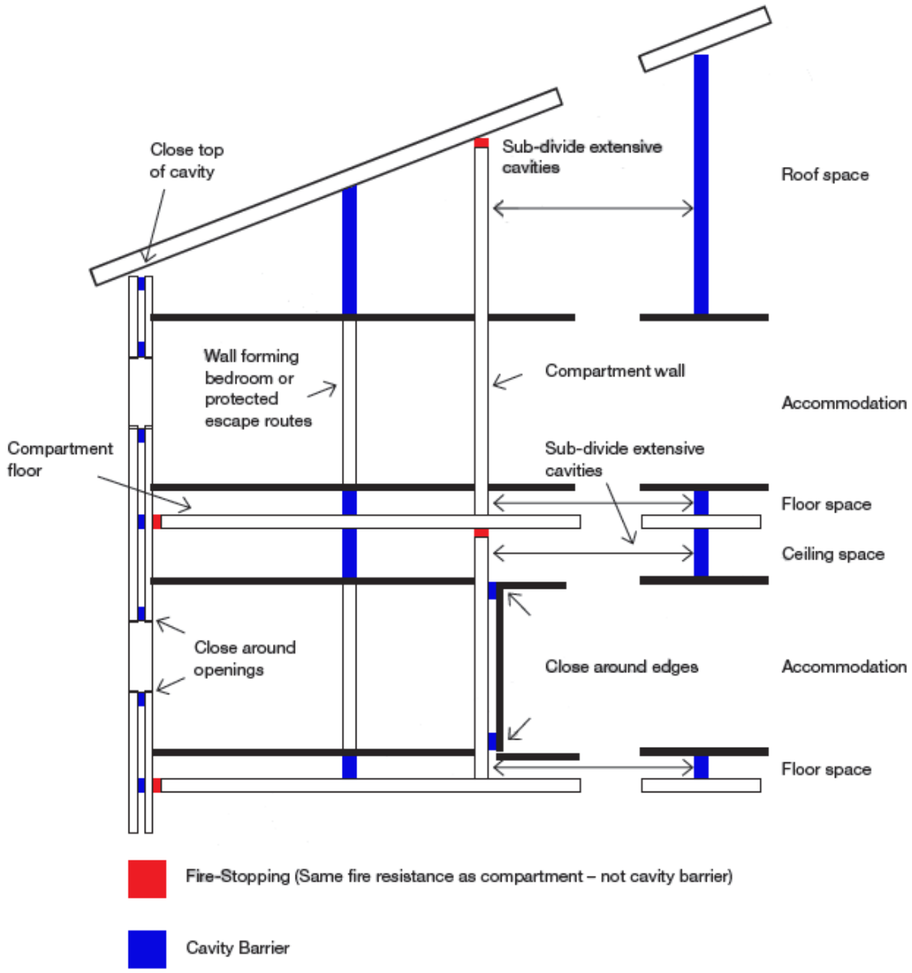

Figure 5 - Provision for Cavity Barriers

Openings of Pipes

Where services pass through a fire separating element, the following three fire stopping measures will need to be considered to evaluate the most appropriate fire protection measure.

Method 1 – Proprietary Seals

Provide a proprietary tested sealing system e.g., intumescent collar that will maintain the fire resistance of the walls, floor, or cavity barrier for a pipe of any diameter.

Method 2 – Pipes with a restricted diameter

Where a proprietary sealing system is not used, firestop around the pipe, keeping the opening for the pipe as small as possible. The nominal internal diameter of the pipe should not exceed the relevant dimensions given in Table 7

Method 3 – Sleeving

A pipe of lead, aluminium, aluminium alloy, fibre cement or uPVC with a maximum nominal internal diameter of 160mm may be used with sleeving of non-combustible pipes. The specification for non-combustible and uPVC are given in Table 7.

Situation	Pipe material and maximum nominal internal diameter		
	Non-combustible material[1]	Lead, aluminium, aluminium alloy, uPVC[2], fibre cement	Any other material
Structure enclosing a protected shaft which is not a stairway or lift shaft	160	110	40
Wall separating dwellinghouses	160	160 (stack pipe)[3] 110 (branch pipe)[3]	40
Compartment wall or compartment floor between apartments	160	160 (stack pipe)[3] 110 (branch pipe)[3]	40
Any other situation	160	40	40

Table 7 - Maximum nominal internal diameter of pipes passing through a wall/floor.

[1] Any non-combustible material (such as iron, copper, or steel) which if exposed to a temperature of 800 degrees will not soften or fracture to the extent that flame or hot gas will pass through the wall of the pipe.

[2] uPVC pipes complying with BS 4514 and uPVC pipes complying with BS 5255.

[3] These diameters are only in relation to pipes forming part of an above ground floor drainage system and enclosed in Method 3. In other cases, the maximum diameters against situation 3 apply.

4.7 Fire & Smoke Dampers

Ductwork should not provide a passage for fire and smoke to bypass compartment boundaries. Wherever ductwork passes through a fire-separating element it should be provided with a fire damper or fire and smoke damper. Any ductwork passing through a fire-rated wall within the scheme should be provided with a fusible link fire damper. Any ductwork passing through an escape route/compartment within the scheme (such as an apartment/corridor/ stair/ riser etc) should be provided with an automatic smoke damper linked to automatic fire detection or should be fully enclosed in fire-resisting ductwork such that there is no passage for fire-spread from one compartment to another.

Thermally actuated fire dampers as well as automatic smoke dampers should confirm to BS EN 15650, be tested in accordance with BS EN 1366-2 and classified in accordance with BS EN 13501-3. Thermally actuated fire dampers will need to achieve the same fire resistance as the fire resisting element they are fixed in, subject to a minimum classification of E (integrity) of 60 minutes. Automatic smoke dampers will need to achieve the same fire resistance as the fire resisting element they sit in, subject to a minimum integrity and smoke rating (ES) of 60 minutes with detection in accordance with BS 5839-1.

Smoke detectors and automatic release mechanisms used for activation of fire damper and/or automatic smoke damper, should conform to BS EN 54-7 and BS 5839-3 respectively.

5 EXTERNAL FIRE SPREAD

5.1 Introduction

Part B4 of the Building Regulations state:

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

5.2 Site Boundary

The relevant external fire spread boundary has been highlighted in Figure 6. A notional boundary can be taken on the site boundary or in the centre the road.

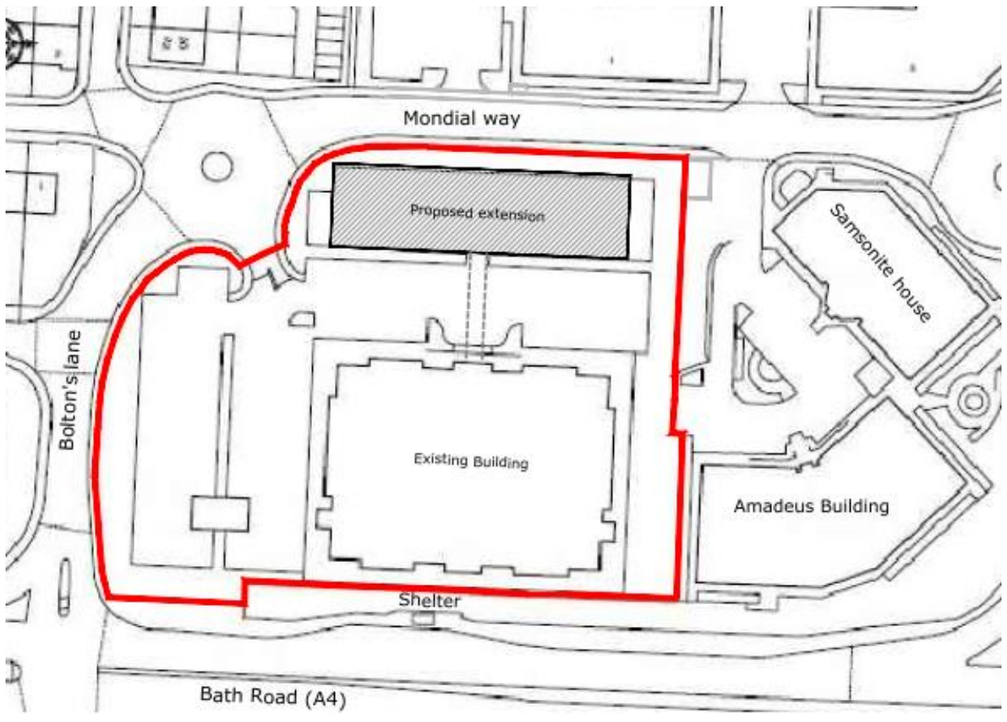

Figure 6 - Site Boundary

5.3 Assessment Methodology

As part of External Fire Spread assessment, space separation between the building and its relevant boundaries has been evaluated to minimise the risk significant radiation affecting buildings on neighbouring sites. The main aspect of the assessment is calculating the required protected areas, to limit non-fire rated elements on the external envelope of the building. The external fire spread assessment is benchmarked against minimum requirements stated in BR 187 – External Fire Spread, Building Separation and Boundary Distances, using calculation methods outlined in Annex A of the document. An example of the calculation performed for each compartment can be seen below.

$$u = \frac{\left(\frac{d}{f}\right)^2}{(wh)}$$

Where:

d = distance to boundary

h= height of compartment

w = width of compartment

f = factor from Table 3 (in BR 187)

Due to the distance of the site/notional boundary no additional protection is required,

5.4 External Wall Construction

As the building height exceeds 11m, the external surface of any external walls is to achieve Class A2-s1, d0.

5.5 Roof Coverings

The roof coverings for the development will meet the recommendation in Table 8.

Table 8 - Limitations on Roof Coverings

Designation of roof covering	Distance from any point on the relevant boundary			
	Less than 6m	At least 6m	At least 12m	At least 20m
B_{ROOF}(t4)	◆	◆	◆	◆
C_{ROOF}(t4)	◇	◆	◆	◆
D_{ROOF}(t4)	◇	◆[(1)(2)]	◆[(1)]	◆
E_{ROOF}(t4)	◇	◆[(1)(2)]	◆[(1)]	◆
F_{ROOF}(t4)	◇	◇	◇	◆[(1)(2)]

[1]Not acceptable on dwellinghouses in terraces of 3 or more dwellinghouses or any other building with a cubic capacity of 1500m^3.

[2]Accetpable on buildings listed in [1] if both the part of the roof has a maximum area of 3m^2 & is a minimum of 1500mm from any similar part and that the roof between parts is covered with a material rated class of A2-s3, d2 or better.

6 FIREFIGHTING ACCESS AND PROVISIONS

6.1 Introduction

Part 5 of the Building Regulations state:

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

6.2 Fire Fighting Access

As the building has an overall compartment size between 2000m^2 – 8000m^2 and the height of the top storey is less than 11m from the ground level 15% permitter access is to be provided for a fire pump appliance.

Access to the site should be designed in such way that the fire service can easily access the site upon fire situation.

Any works to existing or new roads needs to be constructed in accordance with Table 9. It should be ensured that all access roads around the site will be adequate to accommodate the local fire service pump appliance.

Table 9 - Fire Appliance Route Specification

Appliance Type	Minimum widths of road between kerbs(m)	Minimum widths of gateways (m)	Minimum turning circle between kerbs (m)	Minimum turning circle between walls (m)	Minimum clearance height (m)	Minimum carrying capacity (tonnes)
Pump	3.7	3.1	16.8	19.2	3.7	12.5

6.3 Basement Ventilation

As each basement bedroom has a window and the protected corridor is sterile no smoke outlets will be provided.

6.4 Firefighting Hydrants

As the building has a compartment exceeding 280m^2 it will need to be confirmed an existing fire hydrant is within 100m. if it exceeds 100m a new fire hydrant will need to be provided within 90m of the entrance of the building and no more than 90m apart.

7 CONCLUSION

The layout of the building is considered sufficient to meet the functional requirements of the Building Regulations, provided that the recommendations made throughout this report are incorporated in full.

This Detailed Fire Strategy is to be submitted for formal approval to both Building Control and the Fire Authority. Until this report has been approved by the AHJ's this should not be relied on for construction.