

Fire safety strategy

Barnes Hospital Site Residential Development

66200502/KP/221017
Revision 04

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1. Scope

Introduction

This report outlines the RIBA Stage 2 fire safety strategy (FSS) for the Barnes Hospital site residential redevelopment. The site comprises three residential blocks over a basement level. Two blocks will be three storeys high (9m) and one block will be two storeys high (6m). Two additional small buildings also located on the site (Barnes cottages containing two duplex apartments and Entrance Lodge containing one apartment and residential amenity). The basement is approximately 1700m² in area comprising of plant, cycle storage and carparking spanning under two of the residential blocks (A and B). The scheme provides a total of 109 residential units.

This FSS has been developed in conjunction with the project stakeholders (client, advisors, and professional design team) to satisfy the aims of the brief, which is to address the functional requirements of the Building Regulations, as detailed below.

The figures/drawings included within this strategy are for illustrative purposes only, intended to convey the key features and objectives of the fire strategy. Reference is to be made to the detailed architectural layouts.

Consultation

At the time of writing there has been no consultation with the Building Control Authority. The relevant consultations will commence during the next stages of design. This document will therefore continue to evolve as the design develops. Further consultation with all project stakeholders will continue throughout the design and construction phases of the works.

The Building Regulations

The information contained in this document is intended to address the functional requirements of Parts B1 – B5 of the Building Regulations 2010 only, as outlined below:

B1 – Means of escape and warning

B2 – Internal fire spread (linings)

B3 – Internal fire spread (structure)

B4 – External fire spread

B5 – Access and facilities for fire fighting

Approval will be sought under the Building Regulations application, at which point the London Fire Brigade will also be consulted.

Basis of design

With respect to addressing the functional requirements of Parts B1-B5, the FSS draws on the framework from BS 7974 to establish a disciplined approach to the fire safety design. BS 7974 provides the framework for a flexible but formalised methodology that can be

readily assessed by the statutory authorities. In doing so, it provides a means of establishing acceptable levels of fire safety without imposing unnecessary constraints on other aspects of building design and recognises that a range of alternative and complimentary fire protection strategies can achieve the design brief.

To this end, the FSS is based primarily upon the recommendations of BS 9991 for the residential areas and BS 9999 for non-residential areas. The FSS will address the areas that have a significant influence on the design of the building; however, where the FSS is silent on an issue, it is expected that the design guidance of BS 9991/BS 9999 be implemented. Where the FSS or associated British Standard references other documentation, design guidance or British Standards, it's expected that these documents are incorporated appropriately.

Fire engineering

Where a feature, arrangement or area of the project lies outside the recommendations of the guidance, a fire-engineered solution will be produced. This solution will be based upon current guidance, good engineering practice and information available at the time of writing.

It should be noted that any fire engineered solution may not be valid if the design criteria etc. on which it is based are altered. The scope and objectives of the fire safety design will be defined, performance criteria established, and the design solutions made clear. Engineering methods used to evaluate the intended solutions will be supported with sensitivity analyses where relevant. This is intended to highlight which systems and processes are critical to the design and the level of redundancy that should be in place to safeguard them.

Future fire safety management

This FSS is not a fire safety management document. The eventual management strategy for the building will need to be developed and should incorporate the key recommendations of this document. In developing the FSS, it has been assumed that a reasonable level of fire safety management will be adopted once the building is occupied. This should reflect level "M2" as defined under BS 9999. It is important that management are aware of their roles and responsibilities in the day to day running of the site as required by law. Further guidance for the development of a robust, sensible management procedure may be sought in the appendix to BS 9999.

The Regulatory Reform (Fire Safety) Order 2005

On occupation of the building, the 'responsible person' as defined in the Regulatory Reform (Fire Safety) Order 2005 (RR(FS)O) is required by law to undertake a fire risk assessment. This FSS will not satisfy this obligation; instead it may be used as a basis for the risk assessment.

01

Scope

Key stakeholders

Role	Organisation
Developer	TBC
Architects	Scott Brownrigg
Fire Engineers	Sweco
Building Control Authority	TBC
Fire Authority	London Fire and Rescue Service
Insurer	TBC
Stakeholder/freeholder	TBC

Limitations

This FSS has been produced for the Barnes Hospital Site Residential Development. The information contained within this report is for use solely in relation to that project and should not be used in relation to any other project. Sweco does not accept responsibility for the use of the FSS for any other purpose or by other parties without their express written agreement.

The London Plan 2021

The London Plan 2021 is the statutory spatial development strategy for the Greater London area in the United Kingdom that is written by the Mayor of London and published by the Greater London Authority. The regional planning document was first published in final form on 10 February 2004. On 13 August 2018 the Mayor published a version of the draft Plan that includes his suggested changes. These suggested changes have been prepared following a review of consultation responses, and consist of clarifications, corrections, and factual updates to the draft Plan.

- Policy D12 Fire Safety

The building should achieve the highest standards of fire safety and ensure that Part B of Building Regulations (Part B1-B5) is satisfied.

- Policy D5 Inclusive Design

The building should be designed to allow a safe emergency evacuation for all building users. In developments where lifts are provided at least one lift per core should be designed as an evacuation lift conforming BS EN 81-70:2018 to be used by people who require level access.

2. Outline description

This report outlines the RIBA Stage 2 fire safety strategy (FSS) for the Barnes Hospital site residential redevelopment. The site comprises three residential blocks over a basement level. Two blocks will be three storeys high (9m) and one block will be two storeys high (6m). Two additional small buildings also located on the site (Barnes cottages containing two duplex apartments and Entrance Lodge containing one apartment and residential amenity). The basement is approximately 1700m² in area comprising of plant, cycle storage and carparking spanning under two of the residential blocks (A and B). The scheme provides a total of 109 residential units.



Figure 1 - Site plan illustration.

Block	No. storeys ^[1]	Height (m) ^[1]
A	GF+ 2	6.00
B	GF + 3	8.95
C	GF + 3	9.00
Barnes Cottages	GF + 1	3.00
Entrance Lodge	GF + 1 + loft	3.00

Note [1] measured from ground floor access level to the finished floor level of the uppermost occupied storey.

2.1 Risk profiles

The following table identifies the appropriate risk profiles and associated floor space factors present in the referenced buildings.

Description	Occupancy profile	Fire growth rate ^[2]	Risk profile ^[2]
Flexible use / amenity	Awake and unfamiliar	3	B3
Plant, storage, carpark, cycle store	Awake and familiar	3	A3
Residential	Asleep and familiar	2	N/A ^[1]

Note [1]: Residential accommodation is covered by BS 9991: 2015; therefore, risk profiles do not apply. Nevertheless, the corresponding BS 9999: 2017 risk profiles are included for completeness.

Note [2]: Fire growth rate will be reduced by 1 where sprinkler protection is provided, this includes Blocks A, B and Basement.

2.2 Occupancy density

Description	Occupant density (m ² /person)
Residential	2 per bed
Flexible use / amenity	2
Plant / Carpark / Storage	30

2.3 Fire safety management

In developing the FSS, it has been assumed that a reasonable level of fire safety management will be adopted once the complex is occupied.

3. Package of fire protection measures

3.1 Automatic Fire Detection and alarm system (AFD)

3.1.1 Apartments

The apartments will operate under a 'defend in place' strategy. A BS 5839-6 Category LD1 system will be installed in all apartments. Neither sounders nor manual call points will be located in the common residential lobbies, given the 'defend in place' strategy. Detection will however be provided in the common residential corridors that will activate the smoke control measures in accordance with a Category L5 system.

The fire alarm panels will be in a secure location within the entrance to each stair core, where they can be readily accessed by building management or the attending fire service and receive information on the level and location of a fire.

Fire warning should be provided to private/balconies of individual apartments where the access room is not fully visible from the balcony/terrace.

The evacuation alert system should be in accordance with BS 8629:2019, under this standard, the evacuation alert system for the fire service should be separate from the "defend in place" evacuation system.

3.1.2 Non-residential

A BS 5839-1 Category L2 system will be installed throughout the non-residential areas of the building.

Plant areas open to outside will not be provided with automatic fire detection. Enclosed plant rooms that do not open directly to outside will be provided with AFD that will initiate escape and send an alert signal to management. The provision and location of adequate sounders / beacons in the plant areas, communal terraces and private balconies should be carefully considered by the Building Services Engineers and specialist contractor(s), to ensure adequate distribution and audibility.

All lifts shall return to ground floor level on fire alarm (or alternative designated landing in the event of fire at ground floor).

External communal areas, such as communal terraces, should be provided with audible and visual (on extensive areas) alarms to alert any occupants of a potential fire incident. In the case of fire being detected in the communal areas (e.g. residential corridors or non-residential areas) the fire alarm in the residential amenity and external communal areas of the respective building should activate.

3.2 Suppression system

3.2.1 Residential

The residential accommodation in Blocks A and B, as well as private housing in Block C will be served by sprinkler protection in accordance with BS 9251 – Category 2, including the enhanced minimum discharge density outlined in Table 2 Footnote B) of BS 9251: 2021 for a minimum duration supply of 60 minutes.

The residential sprinkler system could utilise the commercial BS EN 12845 sprinkler system tank (see Section 3.2.2).

Sprinkler protection within apartments will cover the habitable rooms, including living areas, bedrooms and kitchens. Bathrooms less than 5m² in area and cupboards less than 2m² or where the least dimension does not exceed 1m do not require sprinkler protection.

In support of any open plan apartments, the sprinkler head spacing will be configured as if the kitchens were in fact enclosed. Such provision would therefore result to at least one sprinkler head near the cooker hobs and tall white goods in the kitchen area, which are considered to be the highest fire risk origins in an apartment.

Additionally, the sprinkler head layout should be carefully considered to limit any potentially shielded areas arising from the arrangement of kitchen joinery or appliances such as tall white goods.

3.2.2 Non-residential

The non-residential accommodation throughout Blocks A and B as well as areas served by mechanical ventilation at basement level will be provided with a common commercial Ordinary Hazard 3 (OH3) Life Safety sprinkler system which will be installed generally in accordance with the LPC Rules incorporating BS EN 12845. The extent and third-party certification of the installation is subject to consultation with the relevant stakeholders.

3.3 Fire fighter communications

Fire fighter communications will be installed in accordance with BS 5839-9: 2011.

3.4 Smoke control

3.4.1 Escape stairs

A 1.0m² automatic opening vent (AOV) will be provided at the top of each stair. Override controls for the head of stair AOV will be provided at ground/access level.

3.4.2 Common residential corridors

The proprietary mechanical smoke extract system will typically require 0.6m² shafts placed as far as practically possible from the respective stair door. The smoke extract

rate from residential common corridors should be determined by conducting CFD (Computational Fluid Dynamics) analysis modelling.

The replacement air will be provided via the AOV within the stair for Block C. Blocks A and B will be provided with an addressable “push-pull” system, with supply at one end of the corridor and extract at the other. The system shall extract from the shaft nearest to the point of detection.

Figure below shows the two ventilation provisions for the respective blocks:



Figure 2: Ventilation provisions

The above figure shows the ventilation provisions, with blue indicating the mechanical smoke ventilation shafts, blue arrows showing indicative air flow and red highlighting the ventilated portions of the corridors.

The diagram to the left illustrates Blocks A and B in line with figure 6b of BS 9991 and the diagram on the right represents Block C in line with the arrangements of figure 6a of BS 9991:2015. Ground floor of Block C ventilation will operate at the same principles as the upper levels for that block, with exception of the northern stair lobby being ventilated by a high-level extension of the 0.6m² mechanical smoke shaft serving the upper floors. At ground level the replacement air will be provided from the stair AOV.

The ventilated lobbies in Block C should not be directly accessed by accommodation. At ground floor a ventilated refuse/cycle store lobby is accessed via the ventilated lift lobby. This is considered to be acceptable on the basis of the lobby being ventilated and not being a route of general circulation, nor being used for means of escape. Additionally, given the ground floor arrangement the residential areas have the means of escaping via balconies straight to external air. The cycle/refuse stores are also provided with doors directly to external air which could be used for further manual ventilation of those spaces by the fire service in an emergency situation.

3-4-3 Basement smoke ventilation

Basement smoke ventilation is required to assist during firefighting intervention and to allow smoke clearance post fire service intervention. The smoke outlets should be not less than 2.5% of the whole basement floor area.

The vents should be evenly distributed around the perimeter of the building with no less than half of the total vent area being provided on two opposing walls.

Additionally, to satisfy the prescriptive standard of at least half of the area being vented on two opposite walls. Cross-ventilation may be used by opening interconnecting doors to satisfy this requirement.

Any pavement lights utilized for smoke ventilation are not to be placed where they would prevent the use of escape routes from the building.

3-4-3.1 Basement storeroom ventilation

The store in the basement may have its own ventilation in the form of a mechanical extract system. The system should achieve 10 air changes/hour from the largest compartment served. The mechanical smoke ventilation system should be designed to maintain operation at 300°C for a period of one hour. Both the supply and extract ductwork should be fire rated to 120 min. Ductwork that passes through escape routes or breaches compartmentation should be fire rated (integrity and insulation (in escape routes) in accordance with BS 9999, and tested in accordance with EN 1366.

Sprinkler protection in accordance with BS EN 12845 should be incorporated if mechanical smoke ventilation is adopted.

3-4-4 Communicating lobbies

Prescriptively, all refuse store lobbies should be provided with permanent natural ventilation to a minimum 0.2m² free area or mechanical equivalent. Alternatively, the refuse stores may be lobby protected and permanent natural smoke ventilation can be provided direct to outside from the refuse storeroom itself.

Accommodation of the final exit should be accessed via a 0.4m² natural and mechanical equivalent ventilated lobby, such as the Block C ground floor lobby granting access to cycle and bin store of the ground floor common residential corridor.

3.5 Emergency power supplies

Primary power supplies will be protected in accordance with BS 9999, BS 8519 and LPC requirements. The services connected to the life safety system will include any smoke extract fans, sprinkler pumps, emergency lighting, or evacuation lifts.

The scheme will be provided with a secondary power supply utility intake serving the life safety systems. BS 9991 permits the use of a primary power source taken from the public electricity supply and a secondary power being supplied from an alternative utility supply from another substation.

Automatic transfer switches (ATS) should be protected within IP rated protected enclosures that are resistant to tampering. The ATS should not be exposed within corridors, instead being located within risers or separate compartments.

3.6 Emergency lighting and escape signage

Emergency lighting is to be provided complying with the requirements of BS 5266-1:2016. Illuminated escape signage will be provided in accordance with BS 5499-4:2013 and BS ISO 3864-1:2011.

4. Means of escape

4.1 Evacuation strategy

The high degree of compartmentation in the residential accommodation means that the spread of fire from one apartment to another is unlikely. As such a 'defend in place' evacuation strategy will be implemented. In the event of fire, it is only necessary to evacuate the apartment where fire has broken out. Occupants in all other apartments will remain in place.

Residential amenity areas and other non-residential areas will evacuate simultaneously on fire detection within adjacent residential corridors or non-residential areas of their respective block.

4.2 Travel distances

The following table outlines the maximum travel distance limit for each of the respective areas.

Aspect	Distance (m)	
	Single direction	Two directions
Protected internal corridor of apartment/studio	9	-
Open plan Apartment	20	-
Residential Corridor (Block A and B)	15	60
Residential Corridor (Block C)	7.5	30
Carpark (A2)	22	55
Plant, storage, cycle store (A2) – sprinklered	22	55
Plant, storage, cycle store (A3)	18	45
Flexible use / amenity (B2) – sprinklered	20	50
Flexible use / amenity (B3)	16	40

4.3 Storey exit widths

Given the apartment mix, the maximum number of beds per floor is less than 20; therefore, the maximum occupancy may be concluded to be approximately 40 people per floor when accounting for 2 people per bed. The occupancy per floor should be limited to 60 people given the single 850mm exit provided into the respective stairs of Blocks A and B.

The opening of a door should not encroach on the minimum escape width. Door width is measured between the door stop and projecting ironmongery, or from door stop to door leaf, whichever is the lesser.

4.4 Stair widths

Stair width is measured between the walls or balustrades. Handrails may encroach up to 100mm on either side of the stair and be included in the stair width. Should handrails extend further than 100mm then the width should be measured between handrails.

All residential stairs serving above ground shall be a minimum of 1000mm. All stairs serving below ground should be 1200mm.

4.5 Final exits

Final exits from stairs should open in the direction of escape and achieve a clear width equal or greater than the corresponding clear stair width.

4.6 Doors and escape corridors

In general, doors on escape routes (whether the door is a fire door or not) should either not be fitted with a lock, latch or bolt fastening, or be fitted with simple fastenings that can be readily operated from the side approached by people making an escape. The inclusion of panic hardware is recommended where more than 60 people are expected to use a door (i.e. retail units).

Electrically powered locks along escape routes are to return to the unlocked position on operation of the AFD system, loss of power and/or activation of a manual door release unit (Type A – BS EN 54-11).

4.7 Conventional apartments

Conventional apartments consist of a protected entrance hall serving all habitable rooms. BS 9991: 2015 states that a protected internal hallway, enclosed in 30-minute fire rated construction, should be provided, which leads to all habitable rooms. The travel distance should not exceed 9 m from the flat entrance door to the door of any habitable room.

4.8 Open plan apartments

An open plan apartment is one where escape from the bedrooms is via the main living space, and not via a protected internal corridor. As there is no protected corridor by

which to make escape, certain measures and limitations must be put in place to safeguard occupants, such as:

- A Grade C LD1 fire alarm and fire detection system in accordance with BS 5839-6.
- An automatic water fire suppression system (sprinkler system).
- The overall size of the open plan flat should not exceed 16 m × 12 m (192m²) with a maximum single direction travel distance of 20m.
- Be limited to a single level only, and with ceiling heights of at least 2.25m.
- Cooking facilities should not be located adjacent to the entrance of the apartment and should be kept as remote from escape routes from bedrooms and the front door as possible.
- Where the open plan apartment has an area greater than 8m x 4m (32m²), the kitchen should be enclosed.

With reference to the final point above, the open plan apartments are greater than 32m² without an enclosed kitchen. As such, the sprinkler head spacing will be configured as if the kitchens were in fact enclosed. Such provision would therefore result in at least one sprinkler head near the cooker hobs and tall white goods in the kitchen area, which are the highest fire risk in an apartment. Additionally, the sprinkler head layout should be carefully considered by the specialist trade contractor to limit any shielded areas arising from the arrangement of kitchen joinery or appliances such as tall white goods.

Given the above provisions and when considered in conjunction to the larger room volume for smoke and heat to dissipate through in comparison to the prescriptive open plan apartment layout, the arrangement of the open plan apartments would be considered to offer an equivalent level of safety to the prescriptive recommendations.

This will need to be assessed through CFD modelling, where worse case representative examples should be modelled across the project regarding the exit route position and proximity of cooking appliances.

4.9 Duplex Apartments

Duplex/mezzanine apartments will be provided with a protected internal stair leading to a place of ultimate safety.

Alternatively, a secondary escape on the mezzanine level plus fire rated separation between ground and mezzanine level will be required.

Open-plan arrangement is acceptable with the provision of a sprinkler system, a Grade D LD1 fire detection and alarm system plus escape windows on the mezzanine level

4.10 Means of escape for the disabled

Disabled refuges will be provided within each stair/lobby of non-residential accommodation (basement) only. Disabled refuges should also be provided where step-free access to outside is not possible at ground floor.

Disabled refuges are not required on residential levels.

Each refuge point will be provided with means to alert the concierge desk to the presence of persons requiring assistance. This will be in the form of outstations as recommended under BS 5839-9. Refuges will be 1400mm x 900mm and located clear of the minimum escape width.

A PEEP (personal emergency evacuation plan) is to be developed to consider the evacuation of disabled occupants. The management team should be trained so that they are aware of the facilities and their responsibility to evacuate disabled people.

An evacuation lift will be provided within each residential core in line with London Plan Policy D5. The lift will generally comply with the recommendations of BS 9999 Annex G. It should be designed and installed in accordance with the relevant provisions in BS EN 81-20 and BS EN 81-70.

5. Internal fire spread – structure

5.1 Structural fire protection standard

The term ‘elements of structure’ is applied to the main load bearing elements of structure. Structure includes, but is not limited to:

- Structural frame
- Beams
- Columns
- Load bearing walls (internal and external)
- Floor structures (e.g. galleries and link bridges)
- Party Wall

The following tables provides an overview of the building heights and proposed structural fire protection.

Block	Height (m)	Rating (min)
A	6	60
B	8.95	60
C	9	60
Barnes Cottages	3	30
Entrance Lodge	3	30
Basement	Depth less than 10m	60

Building height is measured from the lowest floor level to the finished floor level of the topmost occupied floor. Floors used exclusively for plant are excluded.

5.2 Door ratings

Door location	Door rating (mins)
Onto protected shaft	Half the period of shaft
Plant rooms	FD60S (FD120S for life safety plant rooms)
Escape stair	FD60S
Sub-dividing a corridor	FD30S
Storerooms	FD30
Refuse Store	FD60S
Apartment doors	FD30S

Lift doors	FD30
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5.3 Compartmentation

The following outlines the compartmentation recommendations. Compartmentation in the following locations should be provided in terms of insulation and integrity on both sides. Where the standards of compartmentation overlap, the higher value should be adopted:

Area	Rating (mins)
Life safety plant rooms	120
Escape stairs and access points	60
Life safety risers	120
Service risers	Refer to table in Section 5.1
Floors above ground	Refer to table in Section 5.1
Ground floor slab	Refer to table in Section 5.1
Compartmentation separating apartments	60
Residential corridors	60
Internal protected apartment corridors and duplex staircase	30

Any external walls of apartments which are arranged at an angle to each other (i.e. overlooking each other) or at an angle to a stair/common corridor, should be fire rated to 60 minutes to at least 1.8m returns from either side. Where glazing is within the 1.8m return it would require fire rating and fixed shut.

5.4 Ductwork

Ductwork that passes through escape routes or breaches compartmentation, including any MVHR systems in residential accommodation, will be fire rated in line with the methods outlined in BS 9999 as follows:

Method 1 – protection using dampers (not appropriate for protecting escape routes unless ES rated)

Method 2 – protection using fire-resisting enclosures

Method 3 – protection using fire-resisting ductwork

Method 4 – automatically actuated fire and smoke dampers triggered by smoke detectors.

In occupancy C buildings (sleeping risk), method 4 should always be used where ducts pass through walls or floors. Methods 1, 2 and 3 can be used in other suitable locations.

Access to services within escape stair lobbies and residential corridors is permissible, subject to well-enforced management procedures.

5.5 Fire Dampers

Fire dampers should be tested under EN 1366-2 (EI) and classified under EN 13501-3. Smoke control dampers (EIS) should be tested under EN 1366-10 and classified under EN 13501-4.

Dampers should be situated within the fire-separating element. To ensure that the damper will not be displaced by movement or collapse of the duct, dampers should be securely fixed and provided with breakaway joints in accordance with manufacturer’s instructions.

Adequate means of access should be provided to allow inspection, testing and maintenance of both the fire damper and its actuating mechanism.

For ducts and dampers, the junction between the air handling system and the wall or floor should be sealed to maintain the fire resistance of the element in which the system is installed. To ensure that systems are compatible, only penetration seals that have been tested or assessed in conjunction with the duct or damper should be used.

5.6 Concealed cavities

Where concealed cavities are incorporated, the following provisions will be made:

- Fire stops to be provided at the junction of compartment walls or floors and the external wall construction, maintaining the relevant standard of compartmentation;
- Cavity barriers (30 minutes integrity, 15 minutes insulation) to be provided within the external wall construction cavities at the junction of compartment walls or floors, around any openings and edges within the voids of external cavities;
- Any extensive cavity should be provided with cavity barriers (30 minutes integrity, 15 minutes insulation) such that the maximum dimension does not exceed 20m in any direction. If the cavity surfaces are lined with any product other than Class 0 or Class 1, cavity barriers should be provided such that the maximum dimension does not exceed 10m in any direction.

5.7 Protected lobbies / corridors

Protected lobbies will be provided in the following locations:

- Escape stairs (at every storey)
- Communication with refuse areas
- Rooms accessed off final escape routes
- Plant rooms / storerooms accessed off common residential corridors

Prescriptively, all refuse store lobbies should be provided with permanent natural ventilation to a minimum 0.2m² free area or mechanical equivalent. Alternatively, the

refuse stores may be lobby protected and permanent natural smoke ventilation can be provided direct to outside from the refuse storeroom itself. Note that this approach would need to be agreed with the approving authorities.

Accommodation of the final exit should be accessed via a 0.4m² natural and mechanical equivalent ventilated lobby, such as the Block C ground floor lobby granting access to cycle and bin store of the ground floor common residential corridor.

5.8 Openings for pipes

All fire stopping should be in accordance with the ASFP Red Book. Pipes which pass through a fire separating element (unless within a protected shaft) should meet the following provisions:

Option 1 - proprietary seals (any pipe diameter)

Provide a proprietary sealing system which has been shown through test evidence to maintain the fire resistance of the compartmentation.

Option 2 – pipes with a restricted diameter

When a proprietary sealing system is not used, fire stopping may be used around the pipe, where every effort is made to keep the opening as small as possible. The nominal internal diameter of the pipe should not be greater than of the following table:

Maximum nominal internal diameter of pipes passing through a compartment wall / floor			
Situation	Pipe material and maximum nominal internal diameter (mm)		
	(a) non-combustible material ⁽¹⁾	(b) lead, aluminum, aluminum alloy, uPVC ⁽²⁾ , fibre cement	(c) any other material
Structure (but not a wall separating buildings) enclosing a protected shaft which is not a stairway or lift shaft	160	110	40
Compartment wall or compartment floor	160	160 (stack pipe) ⁽³⁾ 110 (branch pipe) ⁽³⁾	40
Any other situation	160	40	40

[1] Any non-combustible material (such as cast iron, copper or steel) which, if exposed to a temperature of 800°C, 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 4514:2001 and UPVC pipes complying with BS 5255:1989.

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Internal fire spread – structure

[3] These diameters are only in relation to pipes forming part of an above-ground drainage system and enclosed as per diagram 30 of BS 9999. In other cases, the maximum diameters against situation 3 apply.

Option 3 – sleeving

A pipe of lead, aluminum, aluminum alloy, fibre-cement or uPVC, with a maximum nominal internal diameter of 160mm, may be used with a sleeving of non-combustible pipe as per diagram 31 of BS 9999.

6. Internal fire spread – linings

6.1 Linings

The classification of the surfaces of walls and ceilings will comply with the following:

Location	National Class	European Class
Small rooms not more than 4m ² in residential accommodation and 30m ² in non-residential accommodation	3	D-s3, d2
Other rooms, not used as circulation space	1	C-s3, d2
Circulation spaces	0	B-s3, d2

6.2 Examples of materials

Rating ^[1] ^[2] ^[3]	Typical performance ratings of some generic materials and products
Class 0	Any non-combustible material or material of limited combustibility
	Brickwork, blockwork, concrete and ceramic tiles
	Plasterboard (painted or not with a PVC facing not more than 0.5 mm thick) with or without an air gap or fibrous or cellular insulating behind
	Wood wool cement slabs
	Mineral fibre tiles or sheets with cement or resin binding
Class 3	Timber or plywood with a density more than 400 kg/m ³ , painted or unpainted
	Wood particle board or hardboard, either untreated or painted
	Standard glass reinforced polyesters

Notes:

[1] For details of European class ratings consult BS EN 13501.

[2] Materials and products listed under the above class 0 also meet class 1.

[3] Timber products listed under class 3

7. External fire spread

External elements within 1m of the title boundary should be provided with fire resisting construction equivalent to the block structural fire protecting rating (see Section 5.1) from both sides (integrity & insulation).

Where facades face onto roadways, the relevant boundary may be extended to the centerline of the road, as future development is considered unlikely. Boundary lines can be seen in Figure 63 shown in dashed red line.

7.1 Boundary Calculations

For facades more than 1m from the relevant boundary, space separation will be calculated in accordance with BRE Report 187 "Building separation and boundary distances" (2014). This method draws on tabulated data based on the percentage of unprotected area of a notional rectangle radiating towards the boundary. The tabulated data is based on arbitrary compartment heights and can be interpolated to reflect the arrangements more accurately. An allowance is made for different groups (risk profiles) and whether (or not) sprinkler protection is provided. This guidance recommends that where sprinklers are provided, the required separation distance may be halved.

Using the described method, a minimum boundary distance is evaluated for the worse-case scenario (i.e. the largest compartment) of each boundary and for each different use, this then being compared against the current distance to relevant boundary. Relevant boundaries of each façade are taken at the title boundary, at the midpoint of a road/pathway or the neighboring building boundary. Since all building on site are part of the same development and will be managed as one large site the boundary will be measured to the building's façade. Recess (where more than 1.8m) of the façade is also considered for the calculations.

Multiple calculations were completed for each façade, however only the worse-case scenario will be shown in the following sections for the façade areas that will require additional fire rating.



Figure 3: Illustration showing boundary line (red) in relation to Block C. The calculations and compartment areas have been measured of drawing revision R09 dated 23.07.2021. It is our understanding these remain unchanged.

7.1.1 Assessment

The boundary distances have been informed to be increased from the date of the last revision of the Fire Strategy. It has been instructed that there has been an increase in the distances to the boundary line. Hence the study and illustrations below will remain the same given the changes are very minimal and don't affect the enclosed rectangle measurements.

The figure below shows the fire rated portions of the façade:

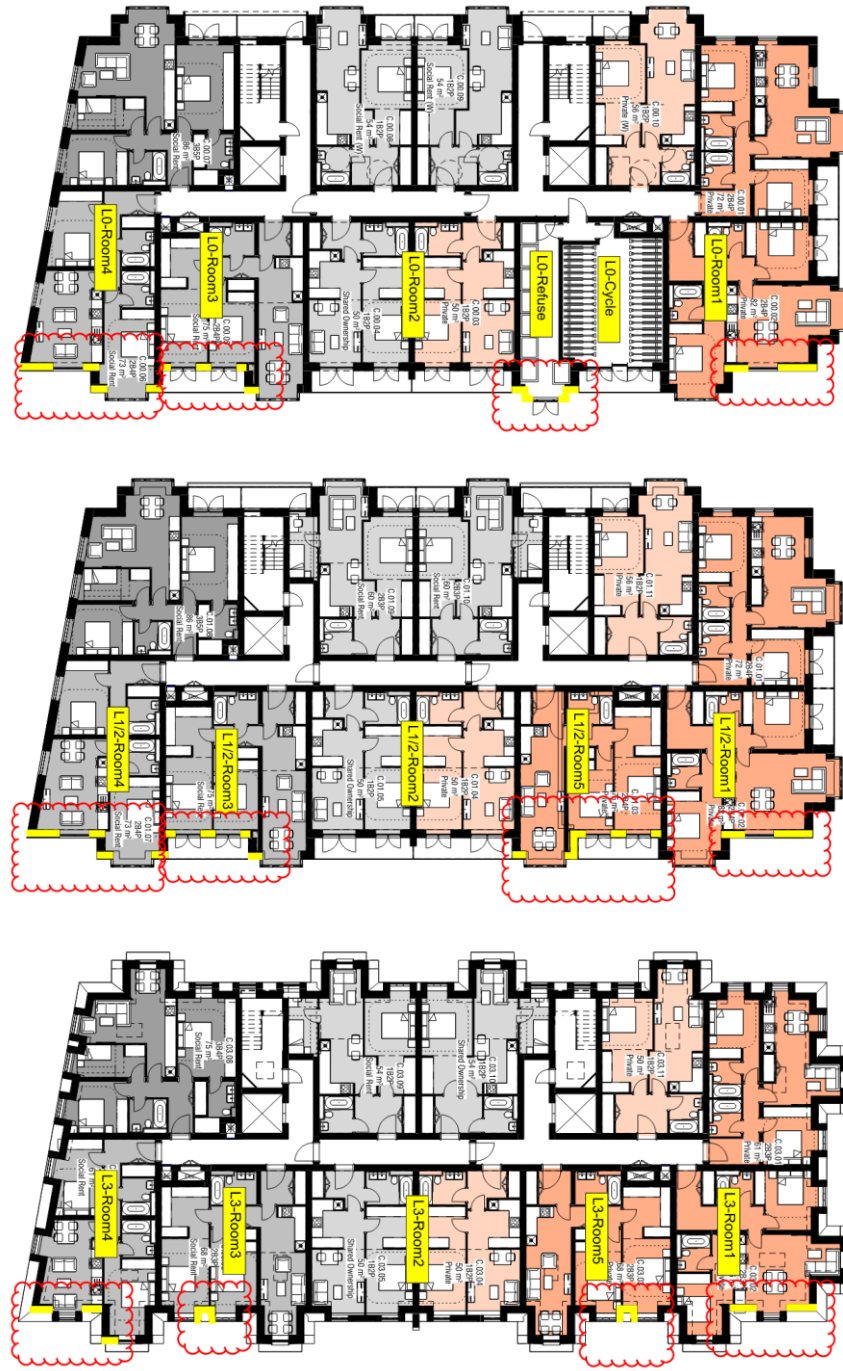


Figure 4: Indicative areas requiring fire rating of Block C East façade. Please read in conjunction with the table below.

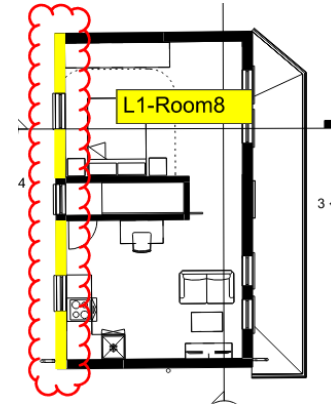


Figure 5: Indicative areas requiring fire rating of Entrance Lodge west façade. Please read in conjunction with the table below.

The table below states the permissible unprotected area of each room/area evaluated as well as the additional FR required. The table and the above figures should be read in conjunction with the cross-referenced compartments in the illustrations above (for instance L1-Room8).

Boundary	Permissible Unprotected compartment area [1]	Enclosing Rectangle (H x W) – (Compartment size)	Percentage	Relevant boundary distance (Minimum required boundary Distance)	Check (Additional fire rating required) ^[2]
L0-Refuse	4.35 ² = 3m x 1.45m	3m x 3m (3m x 3m = 9m ²)	48.3%	2m (2.61m)	✓ (4.65m ²)
L0-Room1 and L1/2-Room1	19.3 m ² = 3m x (2.55m + 2m (1.55m x 0.13772 (recess)))	3m x 12m (3m x 10.5m = 31.5m ²)	53.6%	2.18m (2.26)	✓ (12.2m ²)
L0-Room3 and L1/2-Room3	19.2m ² = 3m x 6.4m	3m x 9m (3m x 8.4m = 25.2m ²)	71.1%	2.56m (2.65m)	✓ (6m ²)
L0-Room4 and L1/2-Room4	9.9m ² = 3m x 3.3m	3m x 9m (3m x 7.45m = 22.35m ²)	36.7%	1.33m (1.43m)	✓ (12.45m ²)
L1/2-Room 5	18.9m ² = 3m x 6.3m	3m x 9m (3m x 8.5m = 25.5m ²)	70%	2.5m (2.6m)	✓ (6.6m ²)
L3-Room5	22.5m ² = 3m x 7.5m	3m x 9m (3m x 8.5 = 25.5m ²)	90%	3m (3.1m)	✓ (3m ²)
L3-Room1	22.5m ² = 3m x 7.5m	3m x 12m (3m x 9.6m = 28.8m ²)	62.5%	2.63m (2.75m)	✓ (6.3m ²)
L3-Room3	24.3m ² = 3m x 8.1m	3m x 9m (3m x 8.5m = 25.5m ²)	90%	3m (3.15m)	✓ (1.2m ²)
L3-Room4	12.6m ² = 3m x 4.2m	3m x 9m (3m x 6.85m = 20.55m ²)	46.7%	1.83m (1.93m)	✓ (7.95m ²)
L1-Room8	26.6m ² = (2.93m x 2.5m)	6m x 9m ((2.93m x 7.4m) +	47.2%	2.86m (3.05m)	✓ (14.35m ²)

Boundary	Permissible Unprotected compartment area [1]	Enclosing Rectangle (H x W) – (Compartment size)	Percentage	Relevant boundary distance (Minimum required boundary Distance)	Check (Additional fire rating required) ^[2]
	+ (2.35m x 8.2m)	(2.35m x 8.2m) = 40.95m ²)			

[1] This area shown is the permissible unprotected area to meet the minimum distance to the relevant boundary and not the original area prior to any additional fire rating.

[2] The area indicated in brackets is the additional are to be fire rated (original façade area – the permissible unprotected area)

The above calculations have not considered sprinkler protection and the associated reduction benefit.

The table above outlines the permissible unprotected area for each of the rooms/areas examined. Indicative areas requiring to be fire rated.

Most rooms/areas will not require glazing to be fire rated as the area of the glazing appears within the permissible unprotected areas stated above. The following area appear to be needed some of the glazing fire rated depending on the area of glazing proposed (TBC):

- L1/2-Room5 – Permissible unprotected area of 18.9m²
- L0-Room 4 and L1/2-Room4 - Permissible unprotected area of 9.9m²

7.2 External wall construction

There are no restrictions to the external wall build-up under the prescriptive standards, but it is recommended to adopt Class B-s3, d2 under EN 13501. Similarly, there is no limitation on insulation, but it is recommended that any insulation products used in the external wall construction should be of Class A2-s1, d0 or better.

While the buildings proposed on site do not classify as ‘relevant buildings’ under Regulation 7 (2), it is recommended for the requirement that the external walls or specified attachments achieve European Classification A1 or A2-s1, d0.

7.3 Roof

Roof coverings should be of classification B_{ROOF}(t4) European class in accordance with BS EN 13501-5. The classification of B_{ROOF}(t4) may be relaxed to C_{ROOF}(t4) or lower for any

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External fire spread

areas of the roof that are sited more than 6m away from the site boundary as seen in the table below.

European Class Classification	Distance of roof from any point of the relevant boundary			
	Less than 6m	At least 6m	At least 12m	At least 20m
B _{ROOF} (t4)	Acceptable	Acceptable	Acceptable	Acceptable
C _{ROOF} (t4)	Not Acceptable	Acceptable	Acceptable	Acceptable
D _{ROOF} (t4)	Not Acceptable	Not Acceptable	Acceptable	Acceptable
E _{ROOF} (t4)	Not Acceptable	Not Acceptable	Not Acceptable	Acceptable

8. **Access and facilities for fire fighting**

8.1 **Vehicle & fire fighter access**

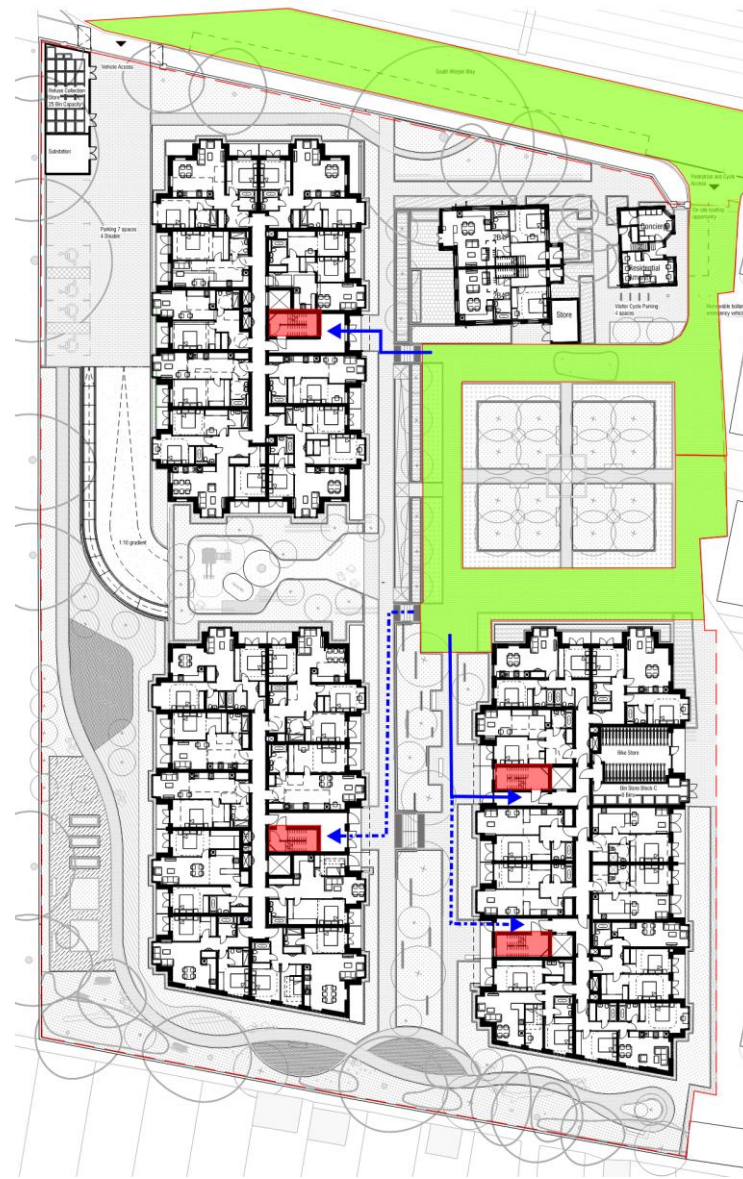


Figure 6 - Site plan illustrating fire service vehicle access routes in green. Escape stairs are indicated in red, and firefighting access within 18m of dry riser indicatively shown blue, dashed line for blue indicated extended firefighter access of more than 18m. See section below.

Vehicle access will be provided to within 18m of the entrances to each block. Vehicle access and parking should be within sight of the dry rising main inlet breaching point. The riser inlet should be provided at the ground floor entrance to each block.

The following table sets down the vehicle access recommendations to the site. The provisions below should be observed under the temporary and permanent works.

Criteria	Pump	High reach	Special appliance
Width of road between kerbs	3.7m	3.7m	4.0m
Width of gateway	3.1m	3.1m	3.1m
Turning circle between kerbs	16.8m	26.0m	26.0m
Turning circle between walls	19.2m	29.0m	29.0m
Clearance height	3.7m	4.0m	4.27m
Carrying capacity	14 tonnes	23 tonnes	32 tonnes

Some of the firefighting access points are more than 18m from the stair entrance. The stair entrance to Block B is c.28m away and the south stair of Block C is c.35m away from the vehicle parking. In both cases the dry rising main inlet will be extended horizontally to be within 18m of the fire service vehicle parking. This is considered acceptable given the site limitations, sprinkler protection provided within Block B, and Block C having a secondary stair as well as sufficient floor hose coverage from within the closest (northern) stair to the entirety of Block C on the basis of which the southern dry riser is purely an enhancement for the utility of firefighting operations. Nevertheless, it remains subject to agreement with building control.

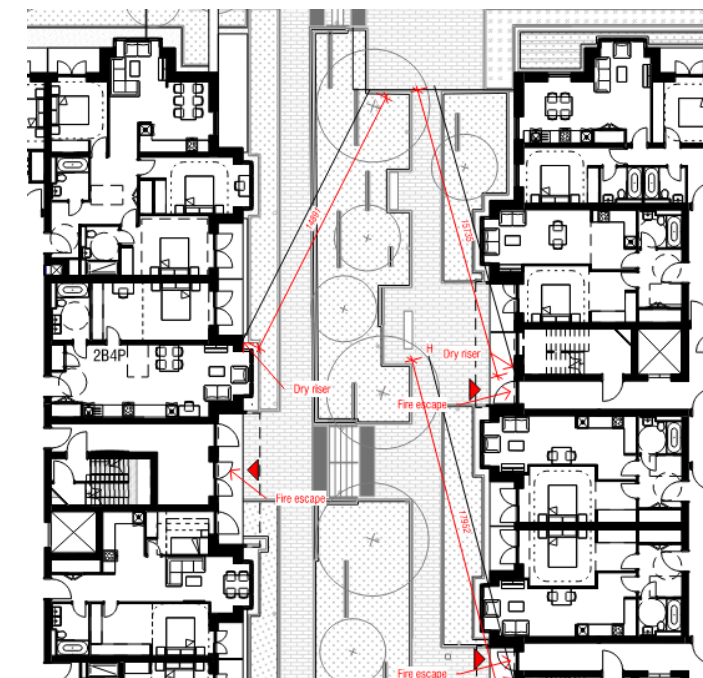


Figure 7: Illustration showing the distances from the fire vehicle parking to the dry riser inlet locations.

8.2 Fire fighter facilities

Due to the buildings being under 18m in height, no firefighting shafts will be provided and the access for the fire service will be facilitated by:

- Escape stairs (ventilated by a 1.0m² AOV)
- A dry rising main in every stair
- Ventilated residential corridors
- An evacuation lift within every core

8.3 Hose coverage

Dry risers will be provided within every stair. The hose coverage should be within 45m of the dry riser outlets in all blocks.

8.4 Fire hydrants

Fire hydrants will be provided throughout the site in line with BS 9990 to assist firefighting operations.

Fire hydrants should be provided within 90m of all dry rising main inlet points and not more than 90m apart.