

Brunel Walk, London

Stage 3 – Fire Strategy Report

Project Number: 296

Date: 15/12/2022

Revision: 03



**Fire Safety
Leaders**

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Report Revision

Revision Number	Description	Author	Checker	Approver	Date
Revision 03	Fire Strategy Report	JP	DO	JN	15/12/2022

1. Introduction

1.1 Objective of Report

The purpose of this fire strategy report is to provide the strategic approach to the fire safety design of the proposed Brunel Walk Scheme, located at N15 5HQ, London.

The report is divided into subsections relating to specific areas of fire safety. However, many of these provisions are closely interlinked and have not been considered in isolation. The principal aim of this report is to demonstrate to the Approving Authorities that the Fire Strategy complies with the statutory requirements of Part B (Fire Safety) of the Building Regulations.

It has been assumed that all building work will be carried out in accordance with the Building Regulations (England) 2010 (amendments 2018). Therefore, to ensure that the proposed fire safety systems detailed within this report achieve the appropriate fire performance, it is recommended that all products, components, materials, or structures relating to construction and operation of the building in particular with respect to the fire strategy, are installed using competent companies/persons and, where applicable, adhering to industry recognised third party accreditation/certification.

This report shall be submitted to the Approving Authorities to assist in the process of gaining approval under Part B of the Building Regulations. The aim of the report is to assist in demonstrating compliance with Part B of the Building Regulations (England) 2010; however, it shall not be assumed that following the guidance offered in this report confers approval in respect of any aspect of the design in advance of formal approval being received from the Statutory Authorities.

This report considers life safety through the appropriate Building Regulations (England) 2010. This report does not specifically address business continuity, property protection and insurance issues; these are considered outside the scope of this report. It shall, however, be noted that the life safety provisions will inherently provide a degree of property protection and business continuity benefits.

1.2 Basis of Design

The primary statutory requirement for the proposed works with respect to fire safety complies with Part B fire safety of the Building Regulations. Part B deals with the following aspects of fire safety:

- Regulation B1: Means of warning and escape
- Regulation B2: Internal fire spread (Linings)
- Regulation B3: Internal fire spread (Structure)
- Regulation B4: External fire spread
- Regulation B5: Access and facilities for the fire service

To achieve and demonstrate compliance with the functional requirements (life safety) of Schedule 1, Part B of the Building Regulations 2010 for England and Wales (as amended in 2018), the design of the project will be based on the following main fire safety design guides:

- Design of residential areas in Blocks A, B, C and D2 and design of shared means of escape:

- Approved Document B (fire safety) volume 1: Dwellings, 2020 edition ADBV1
- May 2020 amendments to Approved Document B, volume 1 and volume 2

Due to the presence of extended hose-laying distances within maisonettes of Block D2, BS 9991:2015 has been adopted for the design of the residential areas of the block, in order to develop a code compliant arrangement. It should be noted that the non-residential areas of Block D (throughout) will remain as per the recommendations of ADB.

Additionally, the design will still be conversely checked for compliance with the British standards, specifically:

- BS 9991:2015 Fire safety in the design, management and use of residential buildings. Code of practice

This is primarily because the approved guidance contains elements of guidance which ADBV1/2 does not currently have.

Although the BS9991:2021 is in draft version and subject to change in its final version, it is considered best practice to take the new amendments into account when designing the fire safety strategy.

It is the Clients aim to follow the BS 9991:2021 through the design, therefore, where the new version recommendation differs from the current published, recommendation in the draft version will be followed, and it is subject to confirmation once the final version of the guidance is published.

1.3 Regulatory Reform Fire Safety Order

The Regulatory Reform (Fire Safety) Order 2005 imposes a general duty to take precautions that may be reasonably required to ensure that premises are safe for the occupants and those in the immediate vicinity.

To comply with the above noted Regulatory Reform Order, the upkeep of safety systems is necessary. This requires routine maintenance, testing, and inspections.

London Fire Brigade (LFB) are responsible for enforcing these Regulations.

1.4 Construction Design Management Regulations (England) 2015

Projects undertaken in England are subject to the requirements of the Construction, Design and Management Regulations (England) 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 Principal Designer. 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, Principal Designer, Designers, Contractors and Building Occupier of issues arising under the CDM Regulations.

1.5 Fire Safety During Building Operations

A significant number of fires occur during construction and building activity. Therefore, adequate supervision and control of contractors' activities are essential during this period. It must be ensured that adequate precautions against fire are in place during the construction phase. Guidance on fire safety on construction sites is provided in Fire Prevention on Construction Sites (Joint Code of Practice by Building Employers Confederation, Loss Prevention Council and National Contractors Group).

1.6 Reference

This document is based on the drawings as listed in Table 1 below.

Table 1 - Drawings Schedule

Originator	Drawing Number	Date	Drawing Title	Revision
KC + A	0552_KCA_PL_1200	15/07/2022	Block A – Proposed Ground Floor Plan	H
KC + A	0552_KCA_PL_1201	15/07/2022	Block A – Proposed First & Second Floor Plan	J
KC + A	0552_KCA_PL_1203	23/08/2022	Block A – Proposed Third Floor Plan	K
KC + A	0552_KCA_PL_1204	23/08/2022	Block A – Proposed Roof Plan	E
KC + A	0552_KCA_PL_3200	15/07/2022	Block A – Proposed Elevations	G
KC + A	0552_KCA_PL_6001	15/07/2022	Block A – Axonometric Views	B
KC + A	0552_KCA_PL_SK01	15/07/2022	Block A – Wheelchair Apartment	B
KC + A	0552_KCA_PL_1300	15/07/2022	Block B & C - Proposed Ground Floor Plan	H
KC + A	0552_KCA_PL_1301	15/07/2022	Block B & C - Proposed 1st & 2nd Floor Plans	H
KC + A	0552_KCA_PL_1302	23/08/2022	Block B & C - Proposed 3rd Floor Plan	J
KC + A	0552_KCA_PL_1303	23/08/2022	Block B & C - Proposed Roof Plan	F
KC + A	0552_KCA_PL_3300	15/07/2022	Block B & C - Proposed Elevations	G
KC + A	0552_KCA_PL_6002	15/07/2022	Block B & C – Axonometric Views	A
KC + A	0552_KCA_PL_SK02	15/07/2022	Block B & C – Wheelchair Apartment	B
KC + A	0552_KCA_PL_1500	15/07/2022	Block D1 – Flats – Proposed Ground Floor	E
KC + A	0552_KCA_PL_1501	23/08/2022	Block D1 – Flats – Proposed First Floor	I
KC + A	0552_KCA_PL_1502	23/08/2022	Block D1 – Flats – Proposed Second Floor	I
KC + A	0552_KCA_PL_1503	23/08/2022	Block D1 – Flats – Proposed Roof Plan	C
KC + A	0552_KCA_PL_1504	15/07/2022	Block D1 – Flats – Wheelchair Apartment	C
KC + A	0552_KCA_PL_6003	15/07/2022	Block D - Axonometric Views 01	C
KC + A	0552_KCA_PL_6004	15/07/2022	Block D - Axonometric Views 02	C
KC + A	0552_KCA_PL_3500	15/07/2022	Block D1 & D2 - Elevations	D
KC + A	0552_KCA_PL_1600	15/07/2022	Block D2 – Mews – Proposed Ground Floor	H
KC + A	0552_KCA_PL_1601	15/07/2022	Block D2 – Mews – Proposed First Floor	G
KC + A	0552_KCA_PL_1602	23/08/2022	Block D2 – Mews – Proposed Second Floor	H
KC + A	0552_KCA_PL_1604	23/08/2022	Block D2 – Mews – Proposed Roof Plan	F
KC + A	0552_KCA_PL_1605	15/07/2022	Block D2 – Mews – Proposed Elevations	C
KC + A	0552_KCA_PL_1000	13/09/2022	Proposed Site Plan – Full Site	N
KC + A	0552_KCA_PL_1001	13/09/2022	Proposed Ground Floor Plan – Full Site	Q

KC + A	0552_KCA_PL_1002	13/09/2022	Proposed 1st Floor Plan – Full Site	P
KC + A	0552_KCA_PL_1003	13/09/2022	Proposed 2nd Floor Plan – Full Site	P
KC + A	0552_KCA_PL_1004	13/09/2022	Proposed 3rd Floor Plan – Full Site	N
KC + A	0552_KCA_PL_3100	15/07/2022	Proposed Site Elevations	J
KC + A	0552_KCA_PL_2000	15/07/2022	Proposed Site Sections 1	F
KC + A	0552_KCA_PL_2001	15/07/2022	Proposed Site Sections 2	F
KC + A	0552_KCA_PL_3201	15/07/2022	Proposed Site Elevations – Block A – North & South	H
KC + A	0552_KCA_PL_3202	15/07/2022	Proposed Site Elevations – Block A – East & West	H
KC + A	0552_KCA_PL_3301	15/07/2022	Proposed Site Elevations – Block B – North & South	G
KC + A	0552_KCA_PL_3302	15/07/2022	Proposed Site Elevations – Block B – East & West	G
KC + A	0552_KCA_PL_3401	15/07/2022	Proposed Site Elevations – Block C – North & South	G
KC + A	0552_KCA_PL_3402	15/07/2022	Proposed Site Elevations – Block C – East & West	G
KC + A	0552_KCA_PL_3501	15/07/2022	Proposed Site Elevations – Block D – North & South	H
KC + A	0552_KCA_PL_3502	15/07/2022	Proposed Site Elevations – Block D – East & West	I

2. Project Description

The proposed Brunel walk development will be located at Brunel Walk, N15 5HQ, London. The proposed scheme will consist of four residential blocks. Either Block A or Block B or Block C contains one unit with a maximum of three storey levels above ground, while Block D contains two units (i.e., Units D1 & D2) with two storey levels above ground, it also provides a mixture of maisonettes and apartments. The whole scheme is proposed to construct 36 residential flats varying between 1-bedroom to 3-bedroom flats. Among them, there are 6 maisonettes which house circa 5 people each situated on the East sector of the proposed site in Unit D2 of Block D.

Table 2 – Nos. of Properties for each Block.

Name of Block	Storeys	Nos. of Properties				Total nos. of Properties
		1-bed flat	2-bed flat	3-bed flat	3-bed maisonettes	
Block A	GF-L3	3	1	2	-	6
Block B	GF-L3	1	4	3	-	8
Block C	GF-L3	1	4	3	-	8
Block D1	GF-L2	-	3	2	-	5
Block D2	GF-L2	1	2	-	6	9

The ground floor apartments and two-storey maisonette dwellings will be accessed by means of a ground floor entrance either from directly outside or by means of a lobby/corridor approach. The upper-level apartments will be accessed by a single stair core construction for each block.

Ancillary facilities located at ground floor level of each block include but are not limited to the following:

- Cycle store
- Pram store
- Electric switch room
- Cleaners' WC/store/cupboard
- BT room
- Battery room
- Cold water room
- Bulk store
- Refuse Store
- Mechanical/Electrical/Comms and Fire services.
- LTHW Room



Figure 1 – Aerial View of Brunel Walk Development

3. B1 - Means of Warning and Escape

3.1 Evacuation Strategy

In line with recommendations given by statutory guidance documents for residential accommodation, a stay-put / delayed evacuation strategy will be implemented in the proposed Brunel Walk Scheme, summarised as follows:

- In the event of a fire within a dwelling, only the occupants of that dwelling (the compartment of fire origin) shall evacuate.
- In the event of a fire in another dwelling, it shall not be necessary for occupants in other dwellings to evacuate, though reasonable provision shall be made to allow them to evacuate shall they wish or in the event of their dwelling is affected by the fire – if directly affected by heat and smoke or directed to leave by the fire and rescue service, occupants from other dwellings shall evacuate.
- In the event of a fire in communal or ancillary accommodation or elsewhere in the building, only occupants of the communal or ancillary accommodation shall need to evacuate. It shall not be necessary for occupants in dwellings to evacuate, though reasonable provision shall be made to allow them to evacuate shall they wish or in the event, their dwelling is affected by the fire – if directly affected by heat and smoke or directed to leave by the fire and rescue service, occupants in other dwellings shall evacuate.

The high degree of compartmentation and passive fire protection measures proposed in accordance with the guidance given by ADBV1 and the provision of stand-alone automatic fire detection and alarm system will support the adoption of the stay-put / delayed evacuation strategy.

Note, recommendations have been made within the fire safety systems section to provide the capability for fire service to extend the evacuation alarm to full-floor levels or full building evacuation shall they deem this necessary during a fire scenario. However, this does not mean that the buildings shall be designed for a simultaneous evacuation. The evacuation alarm system could be referred to BS 8629, but it is not required by legislation as the top storey of each building is less than 18m in height when measured to the nearest adjacent ground level.

3.2 Automatic Fire Detection System (AFDS)

3.2.1 Residential areas

Automatic Fire Detection System (AFDS) to the residential areas to be designed and installed in accordance with BS 5839-6:2019+A1:

- All owner-occupied flats or other single-storey apartments shall be provided with AFDS to a minimum of Grade D2 and Category LD2 standards.
- Any owner occupied two-storey house shall be provided with AFDS to a minimum Grade D2 and Category LD2 standard.

In addition to the provision of detection and sounders within the apartments, a sounder linked to the detector within the apartment shall also be provided to the balcony to alert occupants who may be present on the balcony that a fire may exist along their escape route. The sounder should be linked to the detector within the room serving as the access room to the balcony.

3.2.2 Other than residential

AFDS to the areas of the buildings other than individual dwellings shall be provided in accordance with BS5839-1:2017 and as following:

- Common areas, as well as stair cores, should be fitted with smoke detectors (with no sounders) in the common corridors on each floor to operate smoke control provision provided within the common areas. This should be at least a category L4 system in accordance with BS 5839-1:2017. Additionally, automatic detection is required to the common areas to actuate the stair AOVs.
- Ancillary areas on the ground floor shall be fitted with a minimum fire detection in accordance with their risk profiles:
 - Storage - Category 'L3'
 - Other non-residential - Category 'L3'
 - MEP Room – Category L2

Note: Storage and other non-residential areas are proposed to be provided with Category 'L3' detection on the basis that many of the areas are accessed from the external which could result in a fire going undetected due to the transitional nature of the occupancy.

- Accessible roof areas shall be provided with flashing beacons and sounders to alert occupants of a fire along the escape route.

The fire alarm panel for the fire detection and alarm system for each building shall be located at the fire service access location (e.g., entrance halls).

3.3 Automatic Water Fire Suppression Systems (AWFSS)

As per the amendments to Approved Document B published in May 2020 all new residential buildings > 11 m in height will require sprinklers to be provided.

In the case of the proposed scheme, there are currently no blocks with the topmost storey level in excess of 11m in height. However, it has been confirmed by the design team that all Building Blocks proposed for this development will be provided with sprinkler provisions as an added measure of protection and to permit the extended hose laying distances from the fire appliance parking position to the maisonettes in Block D2 in accordance with the recommendations of BS 9991. The residential blocks will be provided with sprinkler systems throughout in accordance with BS 9251:2021.

Each block shall be provided with the sprinkler categories stipulated in Table 3 below in correspondence with its height and in accordance with Table 1 of BS 9251:2021.

Table 3 - Sprinklers Category Required for each Block.

Blocks	Building Height	Sprinklers Category
A, B, C and D1/2	<18m	Category 2 using the density in BS 9251:2021 with a minimum water duration of 30 minutes. ⁽¹⁾⁽²⁾

Note:

(1) Any non-fire sterile communal building parts should be protected with a Category 3 sprinkler system

(2) Where a higher fire safety risk applies such as the need to permit extended hose laying distances in Block D2, a minimum discharge density of 4mm/min for single head operation and 2.8mm/min for each sprinkler operating in a single area of operation (up to 2 sprinkler heads).

If the block does not have any ancillary area >100m², all non-residential areas may be covered by the extension of the BS 9251:2021 sprinkler system. This shall be designed in accordance with BS 9251:2021 recommendations for the protection of ancillary areas including any associated performance uplifts. It can be confirmed that the non-residential areas throughout the scheme are within the 100m² limit.

Note, there are no current building requirements for the provision of sprinkler protection to residential buildings with a top storey level less than 11m above ground level. Therefore, it would not be necessary to provide sprinkler protection to non-residential areas or communal corridors in this development. If sprinkler protection is proposed to the ancillary areas, this could be achieved without the performance specification uplift required to the BS 9251 system. However, this proposal should be discussed with a certified sprinkler contractor as there may be a risk of sign off involved.

3.4 Internal Means of Escape from Maisonettes

Two-storey maisonettes located at Ground and First floor levels of Unit D2 of Block D shall be designed as per Clause 6 in BS 9991 as each maisonette is accessed from the external at the Ground Floor level, therefore should be considered as per the provisions for means of escape outlined for houses. Each maisonette is to be provided with Grade D2 Category LD2 detection and alarm systems in conjunction with the provision of a Category 2 sprinkler suppression system. The discharge density of the sprinkler suppression system will be increased in accordance with the higher risk requirements as outlined in BS 9251:2021 – this is required due to the extended hose-laying distances, but it is expected to offer additional suppressive benefit.

Egress windows are not proposed within the maisonettes; therefore, it is required that a protected egress route is provided. The stair should be constructed to achieve 30-minutes fire resistance (REI 30), this should be provided at both floors within each maisonette. Where doors give access to each of the rooms accessed via the stair (hall and landing) FD30 fire doors in accordance with BS 476-22 should be provided.

Note, where bathrooms open directly into the protected stair enclosure, the ventilation ductwork serving the bathrooms that connect with the entrance hall would either need to only ventilate the bathroom and not any other spaces within the apartment. Or alternatively, the bathroom would need to be fire separated from the protected hall and the ventilation ductwork could then serve both the bathroom and other spaces outside the protected entrance hall within the apartment. This clause shall be met by flats mentioned in Section 3.5 as well.

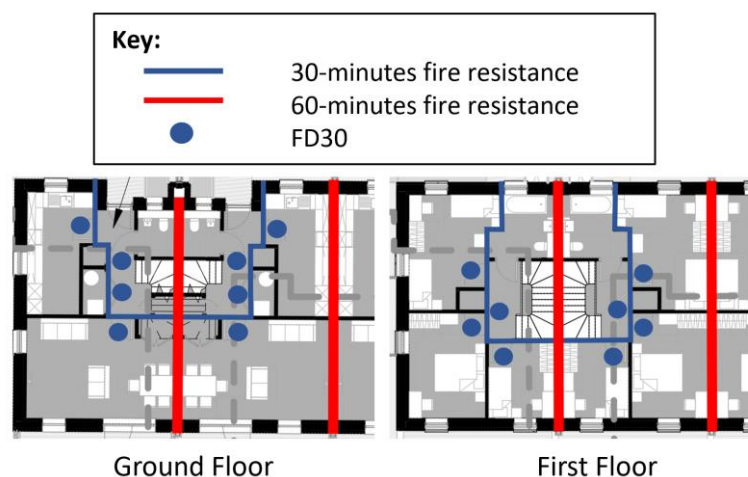


Figure 2 - Maisonette Means of Escape Block D

3.5 Internal Means of Escape from other Flats

Each layout of the residential apartments proposed within the Brunel Walk scheme in Blocks A, B and C shall be designed in accordance with paragraph 3.18 and diagram 3.2 of ADBV1:2020. The flats will be provided with a protected internal entrance hall to enable safe escape for occupants.

ADBV1 recommends that a maximum limit of 9m distance from the most remote part of the protected entrance hall to the exit/entrance of the flat and will be achieved throughout the scheme. All entrance halls within the Brunel Walk development shall be constructed within these limits as demonstrated in Figure 3 below.

The protected entrance halls in each apartment will consist of a 30-minute REI fire resisting enclosure. Table C1 of ADBV1 recommends “any door that forms part of the enclosure to a protected entrance hall or protected landing in a flat” should be provided with a minimum “FD 20” fire door tested to BS 476-22. It is proposed to incorporate FD 30 fire doors within all protected entrance hall arrangements of this scheme to provide an additional layer of protection. Bathroom areas are included within this enclosure (i.e., no fire door is required to separate the bathroom and the protected hall) as it is reasonable to assume they have a limited fire load only.

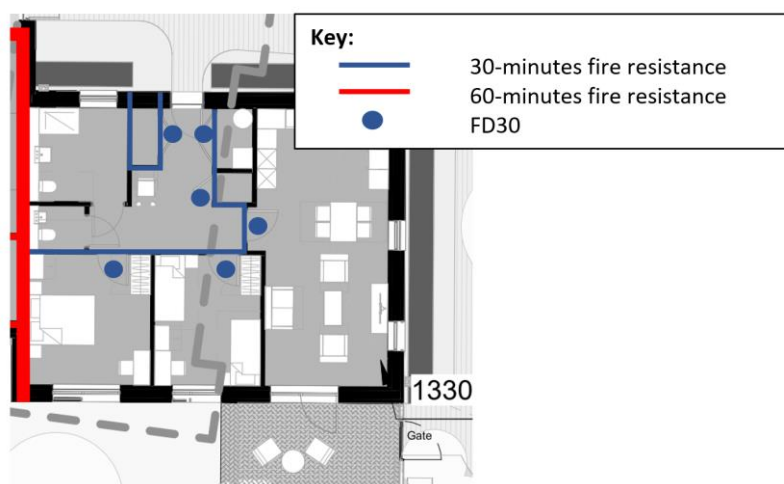


Figure 3- Example Protected Entrance Hall Arrangement, GF, Block A, A00.01

The residential apartments in Block D will be designed in accordance with the recommendations of BS 9991:2015.

All residential apartments throughout Block D are of a traditional layout whereby an entrance hall is provided. BS 9991 requires that the maximum travel distance from the furthest most part of the apartment to the access door should be no greater than 9m, at present all apartments have an internal travel distance in excess of this limitation with a maximum travel distance of c.14.7m. It is therefore proposed to provide a protected entrance hall to all apartments throughout Block D, BS 9991 permits a maximum travel distance of 9m from the flat entrance door to the access door of the furthest most habitable room off the entrance hall. It can be confirmed that this travel distance limitation is satisfied within all apartments throughout the block.

Similarly, to the provisions as outlined for the remaining Blocks across the site, the protected entrance hall should be constructed to achieve at least 30-minutes fire resistance. All doors that give access to rooms within the apartment via the entrance hall and sited within the REI 30 construction are to achieve at least FD30 specification when tested in accordance with BS 476-22.

3.6 Means of Escape from Ancillary Accommodations

3.6.1 Number of People

The ancillary accommodations present within the Brunel Walk site is namely, LTHW, Electrical/Comms rooms, Refuse, Cleaners, Plant, Pram Store, and cold-water stores, etc. These areas will have a transient low occupancy of less than 60 persons. The cycle stores in each block will accommodate approx. 11~16 bikes and 1~2 prams each as illustrated by the latest GA layouts.

Ancillary areas which exceed an occupancy of 60 persons will be provided with an alternative exit. The clear door width to be maintained shall be not less than 850mm. If Approved Document M (ADM) recommends more onerous requirements, these should be adhered to.

3.6.2 Travel Distance

All ancillary accommodation with an occupancy of less than 60ppl will be provided with a single exit route. The following single direction travel distances apply:

- Plant rooms (Mechanical, BT, Comms, Electrical Switch room) – 9m
- Battery room – 9m
- Refuse Store – 9m
- Cycle/Pram store – 18m
- Cleaner WC/store/Cupboard – 9m
- Cold water/LTHW room – 9m

These travel distances will not be exceeded.

The limits above have been extracted from Table 17 of Draft BS9991:2021.

3.6.3 Ancillary Accommodations

Any ancillary accommodations should be separated from the protected escape stair and passageways via a protected lobby with permanent ventilation of not less than 0.4m² free area in all Blocks.

High-risk areas such as refuse rooms, electrical switchgear rooms, etc, should not be connected to the escape route.

Block A, B and C

The ancillary areas situated at ground floor level in Block A, B and C will be separated from the protected escape stair by a protected lobby with 0.4m² of permanent ventilation. This will be achieved by incorporating a door/window actuator to the East elevation activating in conjunction with the fire detection and alarm system at this level. The validity of this approach should be coordinated with the M&E Engineers and the Principal Designer.

3.6.4 Refuse Storage

All refuse storage proposed to the development shall be accessed by the outer air or via a protected lobby provided with 0.2m² permanent ventilation or equivalent mechanical ventilation.

3.7 Means of Escape from Common Areas

3.7.1 Protected Stair

Each of the residential apartment blocks located within the Brunel Walk scheme are proposed to be constructed with a single protected escape stair as a means of escape from the upper floor levels.

The following recommendations shall be met for all single protected escape stairs:

- The minimum width required for day-to-day circulation shall be sufficient for means of escape. The stair will achieve at least a minimum width of 750mm, which will be sufficient for vertical escape from this building.
- All Blocks are provided with a 1.0m² AOV at the head of each stair, measured in accordance with BS EN 12101-2 – that can be remotely operated at fire and rescue services level. This exceeds the minimum requirements of ADBV1.
- The common lobby/corridor arrangements serving the escape stair shall remain free from potential sources of fire.
- The single residential escape stair in all Blocks will discharge directly to the outside by a final exit or a protected egress route offering the equivalent protection as the stair.
- The escape stair will provide a fire resisting enclosure achieving REI 60 as the protected shafts breaches multiple compartment floors in each Block.

3.7.2 Common Corridor/lobby Arrangement

Block A

The flats within Block A shall access the protected common stair via a common lobby approach. The common lobby shall maintain an internal travel distance within 4.5m of the flat entrance to the storey exit. In accordance with Diagram 3.9a for a small single stair building no smoke ventilation is required.

Block B & C

The flats within Blocks B and C are accessed via a common lobby approach at ground and upper floor levels. Diagram 3.9a ADB recommends the provision of 1.5m² of permanent ventilation to common lobby areas in excess of 4.5m up to a maximum of 7.5m. This can be achieved via a 1.5m² smoke shaft or alternatively, a 1.5m² automatic opening vent.

Block D1: 3-Storey Block of Flats

The proposed configuration within the 3-storey Block of flats in Block D shall maintain an arrangement in line with Figure 8 of BS 9991. There shall be a maximum of two flats at each floor level directly accessing the common protected escape stair or common protected lobby via protected entrance hall provisions. The common lobby shall maintain an internal travel distance within 4.5m of the flat entrance to the storey exit, it can be confirmed that this is achieved. To prevent the containment of services within the stair, the service riser provisions are separated from the stair, as such only a single apartment on the upper floors directly accesses the stair.

The common protected stair shall incorporate an AOV with a minimum free area of 1m² in line with recommended guidance. Note a manual override switch should be incorporated at Ground floor level and the topmost habitable storey level for firefighting operations.

Block D2: 2nd floor level flats situated above two-storey maisonettes

Figure 8 of BS 9991 recommends a flat may open directly into a common stair in a small single stair building (<11m/4-storeys) provided there is no more than two flats at each floor level (up to 8 dwellings over 4 storeys). These flats are recommended to be provided with protected entrance halls and additionally, an AOV with a minimum free area of 1m² should be incorporated to the head of the stair.

The current arrangement of the three apartments situated above the two-storey dwelling houses in Block D 2nd means that each apartment is accessed via a lobby that then gives access into the stair. This is considered an acceptable arrangement as per the criteria set by BS 9991.

The proposed configuration is a single floor level served by an independent protected stair which provides access and egress directly to the outside via a protected passageway. This arrangement shall incorporate sprinkler protection with the addition of protected entrance hall provisions to all flats. In addition to this, an AOV with a minimum free area of 1m² shall be implemented at the head of the stair as a supplementary provision of safety.

Note, this arrangement is still considered an approvals risk until reviewed by the approving authorities.

3.7.3 Escape of Occupants with Restricted Mobility

There will be no lift facilities incorporated in the Brunel Walk scheme. Therefore, no PRM occupants have been proposed to the upper floor levels. It is confirmed from previous email correspondence (29/04/2022) that an accessible flat with level egress is proposed from the Ground floor of Block D, APT D00.01. It could also be found another accessible flat with level egress is proposed from the Ground floor of Block A, APT A00.01.

The arrangement of APT D00.01 shall provide level egress to the outside via the common escape stair enclosure and the apartment shall be accessed directly off the stair by a protected entrance hall. The arrangement of APT A00.01 shall provide level egress to the outside via the flat entrance door directly. Additionally, it is proposed to incorporate level threshold final exit doors from all habitable rooms directly to the outside. These final exits shall discharge onto a paved pathway which provides a ready route to the front of the building. Occupants of this apartment will be capable of independent evacuation.

3.7.4 Exit Passageway

The final exit shall:

- Be sited to facilitate rapid dispersal of persons from the vicinity of the building so that they are no longer in danger from fire and smoke. Direct access to a street, passageway, walkway or open space shall be available. The route clear of the building shall be well defined, and if necessary (e.g., potential traffic hazard), suitably guarded.
- Final exits shall be apparent to persons who might need to use them.
- Wherever possible, final exits shall provide a level or ramped route away from the building. Where a final exit leads to steps outside the building, there shall be space for wheelchair users to move so they do not obstruct the flow of other people leaving the building.

- Gated access throughout the Brunel Walk development should not impede fire-fighting operations. It should be ensured that these gates are readily accessible i.e. no locks or fob access.

3.7.5 Assembly Points

It is the responsibility of the building management to identify the location of assembly points for occupants who exit the building. When locating assembly points, the following shall be taken into consideration:

- Assembly points shall be located at a safe distance from the building to ensure falling debris cannot affect the gathering occupants.
- Assembly points shall be located to ensure radiation effects from the fire cannot affect gathering occupants.
- Assembly points shall be located to ensure they do not interfere with firefighting operations.
- External routes to assembly points shall be provided with adequate lighting as per BS 5266:2016

3.8 Active Fire Safety System

3.8.1 Smoke Control Systems

Block A

The protected stair of Building Block A will be provided with a 1.0m² AOV. This exceeds the minimum requirements of ADBV1.

Fire and Rescue Service manual override controls shall be provided at the entrance of the access level and the topmost habitable storey level for firefighting operations. All connections between the override control and actuator mechanisms shall be within an environment that provides protection from expected fire conditions. Where any part of the override-control mechanism is powered by electricity, a secondary supply shall be provided.

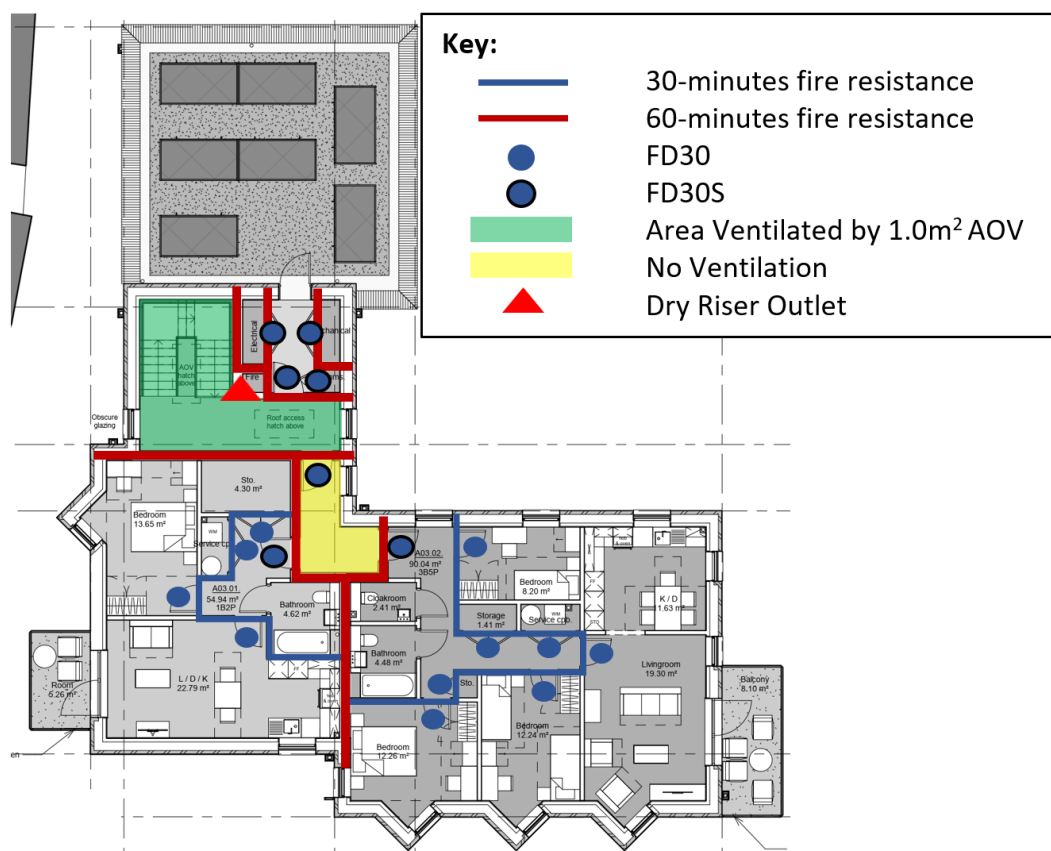


Figure 4 - Example Smoke Control Arrangement within Building Block A, 3rd Floor Level

Block B&C

Tenancies located within Building Block B&C are accessed by a protected entrance hall from a protected lobby arrangement similar to that of Building Block A. This lobby is recommended to be provided with a natural smoke shaft with a free area of 1.5m² in accordance with Diagram 3.9a of ADB.

Smoke Shaft should be constructed to the following parameters:

- 1.5m² cross section (minimum 0.85m dimension in any direction)
- Activate in conjunction with detection in the common areas
- A minimum free area maintained in the following areas:

- Automatic opening vent from the lobby into the shaft
- Automatic opening vent at the head of the shaft
- Internal locations within the shaft
- Manual override at each level. All connections between the control and actuator mechanisms shall be within an environment that provides protection from expected fire conditions. Where any part of the override-control mechanism is powered by electricity, a secondary supply shall be provided.
- Should be constructed from a class A1 material.
- Shafts serving the topmost habitable storey level should either:
 - Discharge 2.5m above the ceiling of the highest storey
 - Be provided with an increased vent size from the lobby into the shaft at the head of the shaft to 1.5m².
 - Be blocked off at this level and provide a 1.5m² AOV in the soffit or an external wall.
- The smoke shaft should terminate at least 0.5m above any permanent structure within 2m of the smoke shaft exhaust vent.

Note, the shaft will not serve the uppermost floor (i.e., Third Floor). Instead, ventilation to the uppermost level will be provided by a 1.5m² AOV in the ceiling. This is in accordance with BCA Technical Guidance Note 8.

The protected stair of Building Block B&C will be provided with a 1.0m² AOV. This exceeds the minimum requirements of ADBV1. Fire and Rescue Service manual override controls shall be provided at the entrance of the access level and the topmost habitable storey level for firefighting operations. All connections between the override control and actuator mechanisms shall be within an environment that provides protection from expected fire conditions. Where any part of the override-control mechanism is powered by electricity, a secondary supply shall be provided.



Figure 5 - Example Smoke Control Arrangement within Building Block B&C, 3rd Floor Level

Block D

The residential apartments located with Building Block D1 are based on the provision of a protected lobby and a protected stair together forming the common escape route. Since the maximum travel distance in the protected lobby is no more than 4.5m, no ventilation is required in the protected lobby (Figure 8b of BS 9991). The protected stair will be provided with an AOV of 1.0m² which shall be located at the head of the stair and actuated by activation of smoke detectors anywhere in the staircase enclosure. Due to the provision of protected entrance hall with the apartments, the lobby between the stair and flat entrance is not essential and is only provided in instances where there is a need to separate the service risers from the stair enclosure. Therefore, some apartments open into the protected stair directly.

The residential apartments located within Building Block D2 are based on the provision of a protected lobby separating both access points into the stair. The protected stair will be provided with an AOV at the head with a free area of 1.0m² and shall actuated by activation of smoke detectors anywhere in the staircase enclosure. The lobby serving 2X apartments will be provided 1.5m² permanent ventilation to allow the travel distance to be increased to between 4.5m and 7.5m, whilst the lobby separating the single apartment unit the right of plan will be provided with no ventilation as the internal travel distance is less than 4.5m and therefore compliant with the recommendations of BS 9991.

An example arrangement of the smoke control arrangement within Building Block D is illustrated in Figure 7 and Figure 7 below.

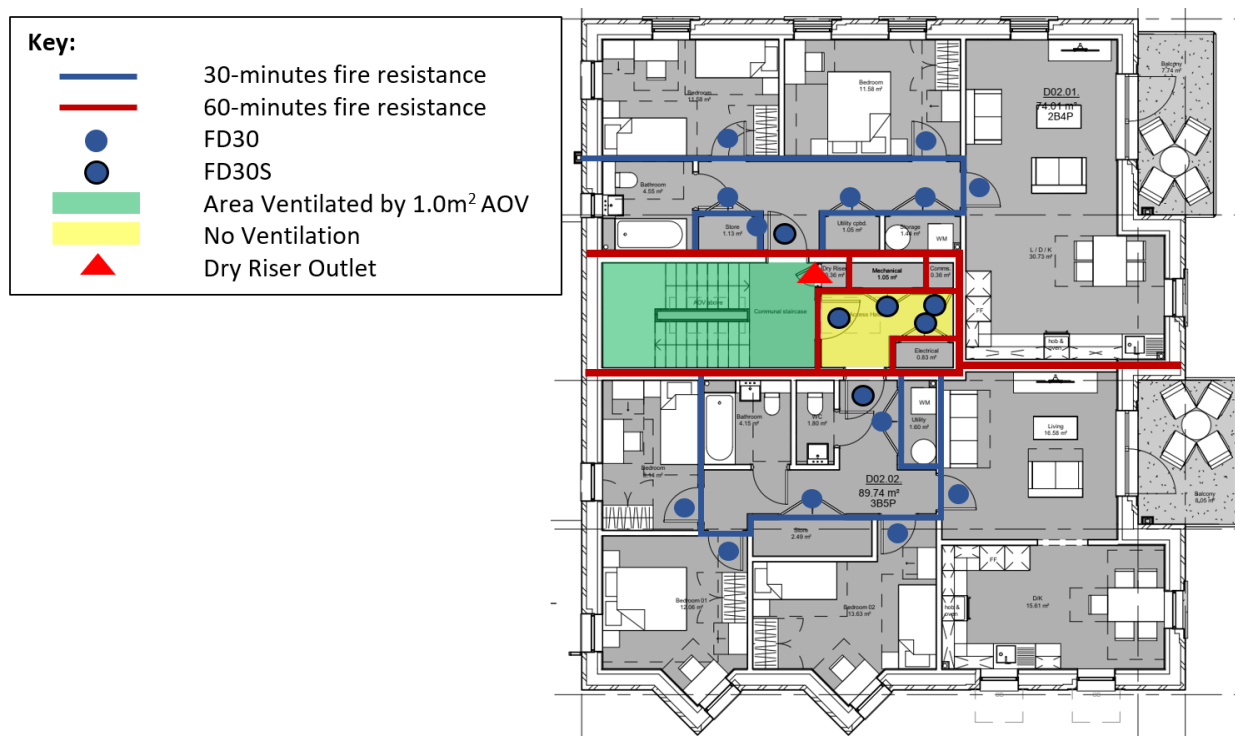


Figure 6 - Example Smoke Control Arrangement within Building Block D1, 2nd Floor Level

Fire and Rescue Service manual override controls shall be provided at the entrance of the access level and the topmost habitable storey level for firefighting operations. All connections between the override control and actuator mechanisms shall be within an environment that provides protection from expected fire conditions. Where any part of the override-control mechanism is powered by electricity, a secondary supply shall be provided.

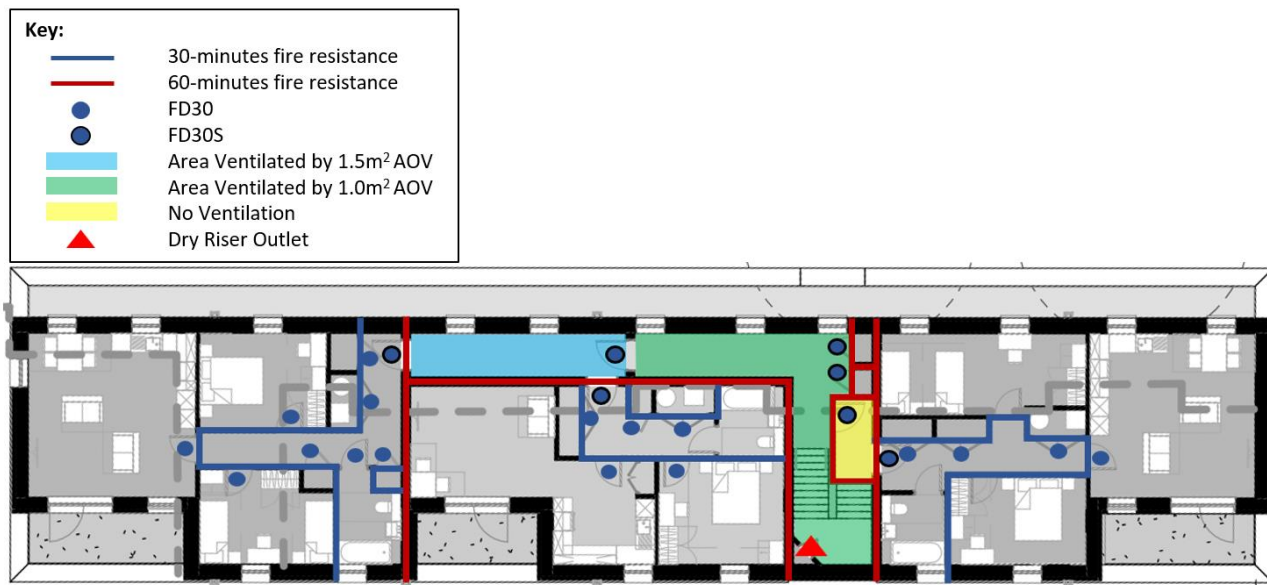


Figure 7 - Example Smoke Control Arrangement within Building Block D2, 2nd Floor Level

3.9 Protected Stair

Protected stair enclosures shall be constructed as either REI 30 when contained within the maisonettes or REI 60 where serving the blocks of flats, this is the equivalent protection as the fire resisting element they penetrate e.g., compartment floors.

3.10 Doors with Hold-Open Devices

If a hold-open device is used, it shall be an automatic release mechanism actuated by the automatic fire detection and alarm system, designed in accordance with BS 7273-4.

The automatic release mechanism will allow the door closing device to resume its self-closing function in the following circumstances:

- The detection of smoke by suitable automatic apparatus.
- The detection of heat or smoke by any in-built sensing device.
- Failure of the power supply.
- Operation of the fire detection and alarm system.
- Local manual operation.
- If the facility is provided, a manual operation at a central control point.

3.11 Lighting of Escape Routes

3.11.1 Normal Artificial Lighting

Normal artificial lighting shall be provided throughout the building, and lighting levels will be maintained for all internal and external escape routes.

3.11.2 Lighting of Common Escape Routes

Emergency escape lighting shall be designed, installed, and maintained in accordance with the appropriate recommendations of BS 5266-1 and BS EN 1838.

In accordance with ADBV1, emergency lighting shall be provided in the following areas:

- All escape routes (including external escape routes)
- Ancillary accommodation normally accessible to the occupants.
- Toilet accommodation with a minimum floor area of 8m²
- Electricity and generator rooms
- Switch/batter room for emergency lighting system

Escape stair lighting should be on a separate circuit from the electricity supply to any other part of the escape route.

Adequate emergency lighting provisions shall also be made for:

- Points of emphasis shall be noted as follows:
 - Outside each final exit,
 - At each fire alarm call point
 - At each piece of firefighting equipment
 - Above the fire alarm panel; and
 - Routes leading to muster points.

3.12 Fire Safety Signs

Fire safety signs shall be provided where necessary to identify evacuation lifts, firefighting equipment, fire alarm call points and disabled refuges along escape routes, and on fire doors conforming to BS ISO 3864-1.

In accordance with BS ISO 3864-1 the fire doors shall be marked whether it is:

- to be kept closed when not in use; or
- to be kept locked when not in use; or
- held open by an automatic release mechanism.

All fire safety signs that indicate escape routes shall be illuminated by natural lighting or artificial lighting. To cater for power failure, emergency lighting will be located to provide sufficient illumination to these signs such that they are clearly distinguishable by occupants.

3.13 Protected Circuits

A protected circuit shall:

- have the appropriate category of cable as recommended in BS 5266-1; and
- be easily identifiable and spatially separated from non-protected circuits.

3.14 Power Supplies

Where dual power supplies are recommended by the relevant British Standard or industry guide to any life safety system, the primary power source shall generally be taken from the public electricity supply, with secondary power being supplied from an alternative utility supply from a generator or an uninterruptable power supply (UPS) such as batteries.

A secondary power supply shall be required to:

- Sprinklers systems and
- Smoke ventilation systems
- Emergency lighting
- Fire Detection and Alarm systems

3.15 First Aid Firefighting Equipment

First aid firefighting consists of hand-held extinguishers. While not a requirement under the Building Regulations, it is recommended that portable fire extinguishers be installed and maintained in accordance with BS 5306-3:2009.

All equipment shall be located to be readily available in all areas and strategically located in areas not likely to be involved in the early stages of a fire (adjacent to storey exits or by fire alarm points). Extinguishers shall be mounted so that the carrying handle of larger heavier extinguishers is about 1m from the floor, but smaller extinguishers shall be mounted so that the handle is about 1.5m from the floor.

4. B2 - Internal Fire Spread – Linings

4.1 General Provisions

Internal linings can contribute significantly to the rate of fire growth and must be carefully chosen to minimise their contribution to flame spread.

European classification for products for reaction to fire is defined in BS EN 13501-1:2018. Classes are defined for walls and ceilings using one or more tests from a combination of three defined EN ISO test methods and the EN single burning item test.

4.2 Performance of Wall and Ceiling Linings

The surface lining of walls and ceilings in the subject areas will have a classification not lower than the relevant class recommended in ADBV1:2020, as given in the following table.

Table 4: Surface Classification of Wall and Ceiling Linings

Location	Surface Classification
	European Class
Small Rooms $\leq 4\text{m}^2$	D-s3, d2
Circulation spaces within dwellings	C-s3, d2
Circulation spaces within common areas	B-s3, d2

In addition to the table above, non-combustible materials (Class A1) shall be used in the following situations:

- ladders forming part of an escape route in ancillary accommodation identified as a higher fire risk.
- refuse chutes.
- suspended ceilings and their supports where the undivided cavity exceeds 40m in extent.
- as a sleeving where a pipe penetrates a compartment wall or floor.
- walls of a flue that penetrates a compartment floor or wall.
- construction of an open-sided car park.

4.3 Suspended or stretched-skin ceilings

The ceiling of a room shall be constructed as either a suspended or a stretched skin membrane from panels of a thermoplastic material of the TP(a) flexible classification unless it is part of a fire-resisting ceiling. Each panel shall not exceed 5m^2 in the area and shall be supported on all its sides.

5. B3 - Internal Fire Spread – Structure

The following sub-sections do not exhaustively detail the passive fire protection to be provided throughout the Brunel Walk development; the following sub-sections are included within this Fire Statement to demonstrate that provisions for passive fire safety measures have been considered at the early design stage, as required by the London Plan.

European Classification per BS EN 13501 (**R, E, I**) has been used to determine the fire resistance of an element. Where:

R - Resistance to collapse (loadbearing capacity);

E - Resistance to fire penetration (integrity);

I - Resistance to the transfer of excessive heat (insulation).

5.1 Structural Fire Resistance

Elements of structure, such as loadbearing walls, columns, and floors, shall provide fire resistance (load-bearing capacity, integrity and insulation) shall provide a minimum of fire resistance as per the table below:

Table 5 – Structural Fire Resistance

Location	Fire Resistance Required	Blocks
Blocks <11m	60-minutes	A, B, C, D

If roof gardens and/or terraces are proposed or the roof is part of an escape route, its structure is also required to provide structural fire resistance.

5.2 Compartmentation

Table 6 below lists element that shall be constructed as compartment walls/floors and their minimum fire resistance:

Table 6 - Compartmentation

Location	Compartmentation Required
Any wall separating one dwelling flat from another dwelling flat or any other part of the building	60 minutes ⁽¹⁾
Any wall enclosing a refuse store	60 minutes
Any other shaft which penetrates compartment floors.	60 minutes
Any floor ⁽²⁾	60 minutes

Note:

- (1) Where the wall/floor functions for more than one location, the most onerous fire resistance shall be applied, i.e., if a wall separates a cleaner store from a protected stair, it shall be 60 minutes, as per the structural fire resistance requirement.
- (2) For any floor within a maisonette of more than one storey, the fire resisting period is reduced to 30mins.

5.2.1 Construction of Compartment Walls

Each compartment wall shall be constructed to form a complete barrier to fire spread between the compartments and shall achieve a minimum of fire resistance (R, E, I) highlighted in the previous section.

Compartment walls shall run the full height of the storey in which they are situated.

Compartment walls in a top storey beneath a roof shall be continued through the roof space.

Compartment walls shall be able to accommodate the predicted deflection of the floor, in one of the two following ways:

- A head detail shall be provided between the compartment wall and the floor, which is capable of deforming while maintaining its integrity when exposed to fire; or
- the design of the compartment wall shall be such that it maintains its integrity by resisting the additional vertical load from the floor above when forced to sag under fire conditions

5.2.2 Openings Between Compartments

Openings shall be limited to those for any of the following.

- Fire door sets of the appropriate fire resistance, fitted in accordance with Table C1 of ADBV1:2020
- Pipes, ventilation ducts, service cables, chimneys, appliance ventilation ducts or ducts encasing one or more flue pipes, complying with the provisions in Section 9 of ADBV1:2020.
- Refuse chutes of class A1 construction.
- Protected shaft.

5.2.3 Junction of Compartment Wall/Floor with other Walls

At the junction with another compartment wall or an external wall, the fire resistance of the compartmentation shall be maintained.

5.3 Fire Resistance of Common Areas and Ancillary Accommodation

Common areas and ancillary accommodations shall be enclosed by fire resistance construction following ADBV1:2020:

Table 7 – Period of Fire Resistance

Location	Compartmentation Required
Common Protected Corridor / Lobby	60 minutes
Cleaner cupboard	60 minutes
Pram Store / Cycle Store	60 minutes
BT / Communication and Network Devices Room	60 minutes
Plant Rooms	60 minutes
LTHW	60 minutes
LV / ELV Switch Rooms	60 minutes

5.4 Service Shafts

Service shafts and other vertical ducts shall be enclosed throughout their height with fire-resisting construction with a minimum fire resistance of 60 minutes as per Table 6.

Access hatches for service shafts shall not be situated within a protected stair as they shall provide the same level of fire protection as the protected stair.

5.5 Fire Doors

All fire doors forming part of the means of escape from, and within, the building shall:

- be fitted only with simple fastenings that can be operated from the escape side of the door without the use of a key.
- be hung clear of any change in floor level.
- be hung so that they do not reduce the effective width of the escape route across a landing.
- if opening into a corridor, be recessed to the full width of the door.
- where hung to swing both ways (double swing), or subdividing corridors, be provided with a minimum of a vision panel; and
- open to an angle not less than 90°.
- be fitted with an automatic self-closing device, which is capable of closing the door from any angle and against any latch fitted to the door, in compliance with BS 8214: 2016.

Fire Door sets shall be tested in accordance with BS 476: Part 22: 1987 or BS EN 13501-2 to achieve the minimum period of fire resistance indicated on the accompanying plans.

Fire doors required to resist the passage of smoke at ambient temperature (i.e. those having the suffix 'S') shall be tested in accordance with BS 476-31: 1983 (Fire Tests on Building Materials & Structures – Methods for Measuring Smoke Penetration through Door Sets and Shutter Assemblies) and Section 31.1 (Method of Measurement under Ambient Temperature Conditions) with the threshold taped, and subjected to a pressure of 25 Pa, shall have a leakage rate not exceeding 3m³/h/m.

When the door is installed, the threshold gap will be sealed to ensure a leakage rate of 3 m³/h/m at 25 Pa is not exceeded, or the door is just contacting the floor.

Where this is impracticable, the threshold gap will not exceed more than 3mm at any point unless otherwise specified by the test report.

All fire doors will be permanently identified in accordance with the recommendations of BS 8214: 2016 to indicate the period of fire resistance, the manufacturer, year of manufacture, and other pertinent details, i.e., whether the door is:

- To be kept closed when not in use,
- To be kept locked when not in use, or
- Held open by an electromagnetic or electro-mechanical device.

Every fire door set (i.e., the complete fire door assembly) will be supported by a fire test report and assessment from an accredited laboratory, which indicates that the complete assembly (including locks, latches, hinges etc.) will meet the required fire resistance performance.

Door closing and hold-open devices (Section 4.9.2) for fire doors will comply with BS 8214: 2016.

The proposed fire resistance of the fire doors shall be as shown in the table below:

Table 8 - Fire Door Fire Resistance

Location	Fire Resistance Required
Flat Entrance Doors (accessed through stair/lobby/corridor)	FD 30S
Flat Entrance Doors (accessed directly from outside on ground floor)	_(⁽¹⁾)
Protected Stair	FD 30S
Common Protected Lobby / Corridor	FD 30S
Any door forming part of the enclosure to a protected entrance hall in a flat	FD 30
Any door within any other fire-resisting construction in dwelling accommodation.	FD 30
Service Shaft doors not described above	FD 30S (<30m)

Note:

- (1) Where the flat or maisonette entrance door opens directly external on ground floor level, the door is not required to be fire door.

5.6 Pipe Penetrations

Any pipes passing through walls or floors (where the pipe is not in a protected shaft) or cavity barriers shall meet one of the following provisions:

- All pipes will be provided with proprietary sealing systems where they pass through the walls, floors and cavity barriers; or
- For pipes with a restricted diameter, where a proprietary sealing system is not used, fire-stopping may be used around the pipe, keeping the opening as small as possible but no more than the relevant dimensions given in Table 9.1 of ADBV1: 2020.
- A pipe of lead, aluminium, aluminium alloy, fibre-cement or PVC (In accordance with BS 4514 or BS 5255), with a maximum nominal diameter of 160mm, may be used with a sleeving of non-combustible pipe.

Note that BS 9991 provides states that where two or more small (<40mm) service penetrations occur within 40mm of each other, either:

- they shall be treated as a single penetration and a suitable proprietary seal that has been proven by test for the application shall be used to protect the combined opening area, or
- each penetration shall be individually fire-stopped with a suitable proprietary seal.

Therefore, in light of the latest changes to the Building Regulation and the new BS 9991:2021, it is recommended that these final points are applied.

5.7 Firestopping

All joints and imperfections of fire between fire-separating elements and any penetrations through these elements will be fire-stopped. Proprietary fire-stopping materials used will be suitable for each application as per the relevant test certification and will be installed per the manufacturer's instructions.

5.8 Ventilation Ductwork Protection

Any ductwork passing through a protected stair, lobby or corridor without an opening into that area shall be fire-resisting, and it shall be designed in accordance with paragraph 9.12 of ADBV1 and as described below.

In single stair buildings, the ductwork enclosure shall be imperforate where it passes through the stair or any protected lobby or protected corridor.

Ductwork breaching fire-resisting elements shall be designed and installed to ensure that it achieves the same level of fire resistance performance as the element it passes.

Where ductwork passes through a fire compartment wall or floor, fire separation shall be ensured by using either:

- Method 1 - Providing fire dampers or motorised smoke fire dampers
- Method 2 - Enclosing the ductwork in a fire-resistant enclosure,
- Method 3 - Providing fire resisting ductwork.

5.8.1 Method 1 - Dampers

All dampers shall be test proven for the specific application to achieve the necessary fire resistance period (bi-directionally) and smoke leakage in accordance with BS EN 1366-2: 2015 and classified to BS EN 13501-3.

The damper shall be installed strictly according to the manufacturer's instructions for the type of construction in which it will be fixed (e.g., masonry, plasterboard, etc.).

When installing multiple dampers in close proximity, it shall be ensured that the separation distances outlined in BS EN 1366-2: 2015 are adhered to (e.g., distances between dampers are not less than 200mm, and the distance between dampers and other obstructions is not less than 75mm). Relaxations in this are only acceptable where test evidence is available.

Fire dampers shall be supported independently of the ductwork and mechanically fixed to a robust fire-resistant supporting structure. DW 145 (Guide to good practice for the Installation of Fire and Smoke Dampers) and ASFP guides shall be adopted for further requirements relating to the installation requirements, including builder's work and the certification process.

5.8.2 Method 2 - Fire resisting enclosure

In Method 2, a fire-resisting enclosure can be provided around the ductwork in lieu of providing dampers or fire-resisting ductwork.

The fire-resisting enclosure and the supporting structure shall be capable of achieving the required fire performance rating in accordance with BS 476-22 (national test) or tested to BS EN 1364-1 & 2 and classified to BS EN 13501-2.

As described in Method 1 above, Dampers shall be required where the ductwork penetrates the confines of the protected enclosure.

5.8.3 Method 3 - Fire resisting ductwork

In Method 3, the ductwork itself forms a protected shaft. The fire resistance can be achieved by the ductwork material itself or through the application of protective material.

The fire resistance of the ductwork, when tested from either side, shall be not less than the fire resistance required for the elements of construction in the area through which it passes. The supporting hangers shall support the ductwork for not less than the period of fire resistance of the ductwork.

Fire-resisting ductwork shall meet the appropriate fire resistance period for the specific application when tested in accordance with BS 476-24 or BS EN 1366-1 and classified in accordance with BS EN 13501-3.

ASFP publication (Fire resisting ductwork) shall be referenced for further requirements relating to the installation requirements and certification.

Fire resisting ductwork will typically require the provision of an insulating layer (e.g. non-combustible insulation or similar) to achieve the necessary fire resistance standard in terms of insulation.

5.9 Cavity Barriers

Cavity barriers shall be provided:

- To close the edges of cavities, including around openings.
- At the junction between an external cavity wall (traditional and non-traditional) and every compartment floor and compartment wall; and
- at the junction between an internal cavity wall and every compartment floor, compartment wall, or other wall or door assembly which forms a fire-resisting barrier.

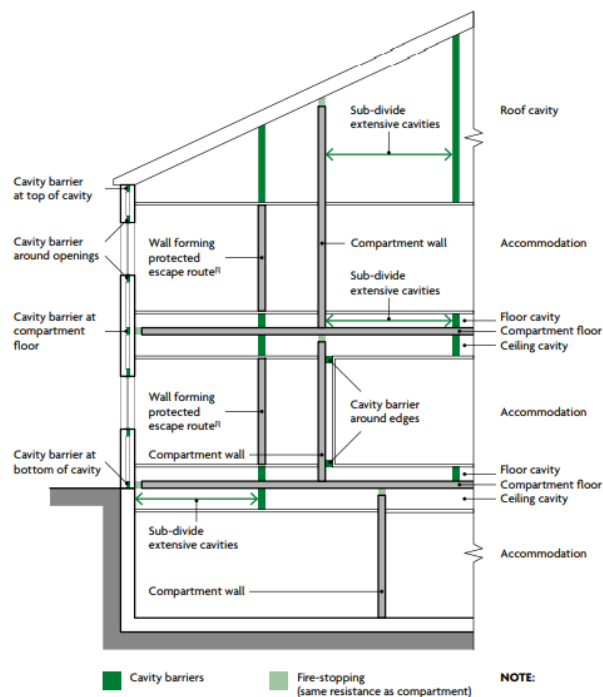


Figure 8 – Provisions for cavity barriers (extracted from Diagram 8.1 of ADB V1)

Note, if the cavity wall consists of two leaves of either concrete or masonry each at least 75mm thick, the wall is exempt to provide a cavity barrier between the compartment wall/floor junction.

5.9.1 Separation of bedrooms

A cavity that exists above or below partitions between bedrooms where the enclosures are not carried to full storey height, or (in the case of the top storey) to the underside of the roof covering, shall be either:

- fitted with cavity barriers on the line of the partitions; or
- for cavities above the partitions, enclosed on the lower side by a fire-resisting ceiling which extends throughout the building, compartment or separated part.

5.9.2 Construction and Fixing of Cavity Barriers

In accordance with paragraph 5.20 – 5.23 of ADBV1:2020, every cavity barrier shall be constructed to provide at least 30 minute's integrity (E 30) and 15 minute's insulation (I 15) of fire resistance and be mechanically fixed tightly to rigid construction. If this is not possible, the junction is to be fire stopped.

Cavity barriers in a stud wall or partition, or around openings, may be formed of:

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

6. B4 - External Fire Spread

6.1 External Surfaces

External walls shall be constructed so that the rapid spread of flame, which is likely to endanger the lives of occupants in or around the building, shall not be supported. They shall be designed to sufficiently control flame spread within or over an external wall build-up to avoid creating a route for high-speed flame spread to surmount compartment floors or walls.

Following the 2018 amendments to Regulation 7 (2) of the Building Regulations 2010, the materials which become part of an external wall, stacked balcony or specified attachment, in any residential building >18m, shall be of European Classification A2-s1, d0 or A1, classified as per BS EN 13501-1:2018.

The following are exempted from Regulation 7(2) as referenced in the Regulation 7(3) list of exemptions:

- cavity trays when used between two leaves of masonry.
- any part of a roof (other than any part of a roof which falls within paragraph (iv) of regulation 2(6)) if that part is connected to an external wall.
- door frames and doors.
- electrical installations.
- insulation and waterproofing 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.

BS 9991:2021 draft, recommends that the above shall be followed for buildings over >11m.

Therefore in light of the latest changes to the Building Regulation and the new BS 9991:2021, it is recommended that all external walls including any attachment, such as balconies, from the proposed buildings, shall be constructed of class A2-s1, d0 or better materials, and provided with cavity barriers as per section 5.9.

6.2 External Surfaces of Walls

6.2.1 Provisions of External Surfaces of Walls

It is our recommendation that where possible the external wall surfaces consist of Class A2-s1, d0 or better and/or be of a tested detail in accordance with BR 135, with the only exceptions as noted by Regulation 7(2) of ADBV1:2019(+Amendments). It is noted that this recommendation is a higher requirement than that given by the Building Regulations.

6.2.2 Space Separation

Fire safety guidance recommends that a building should be separated from its relevant boundary by at least half the distance at which the total thermal radiation intensity received from all unprotected areas in the external walls of each separate compartment would be 12.6 kW/m^2 assuming the radiation intensity at each unprotected area is 84 kW/m^2 , for buildings of residential use.

This is shown schematically in the following figure. The external fire spread assessment contained within this section assesses the radiation intensity received by the receiving panel, i.e., the site boundary, in the context of a scenario whereby a fire develops within a compartment of the proposed Brunel Walk Scheme.

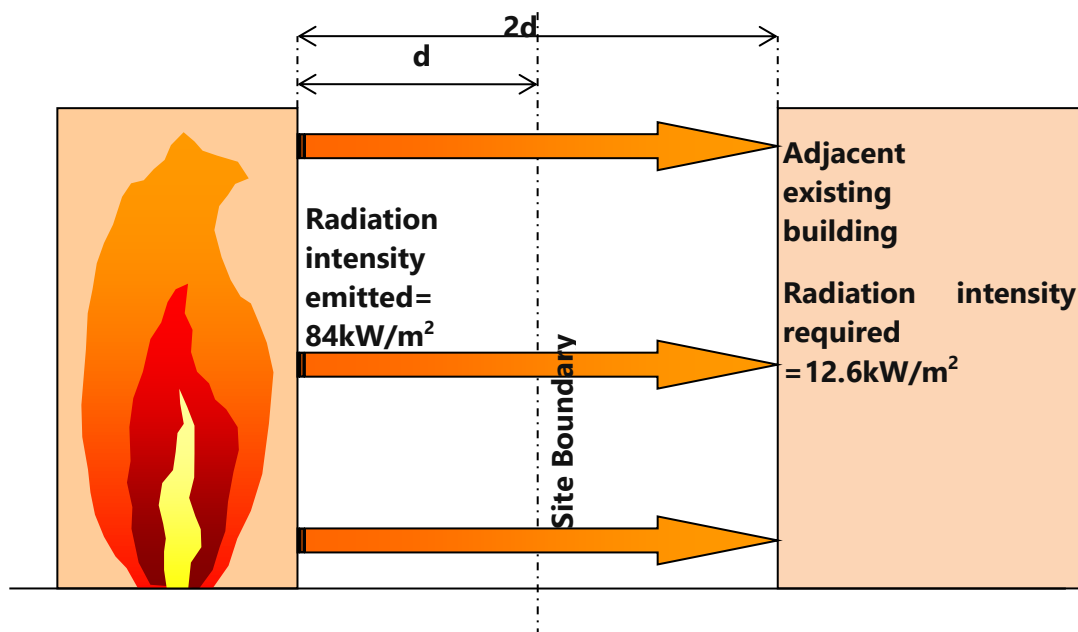


Figure 9 – Recommended distance to relevant boundary based on radiation intensity.

For purpose-built blocks of residential apartments such as the Brunel Walk scheme the high degree of compartmentation recommended and deployed within the design can normally be seen as adequate in ensuring fire, hot gases and smoke are contained within the apartment of origin.

The distance to the relevant boundary e.g., site boundary, centreline of road, etc., the height and width of the compartment radiating panel, and the presence of sprinklers, will dictate the allowable unprotected areas on each of the elevations.

The external fire spread calculations have been based on the standard enclosing rectangle method detailed in BRE Report 187. Joule Group have reviewed the worst-case scenario (Block B) for the external fire spread assessment in the following table:

Table 9 – BR 187 External Wall Analysis – Allowable unprotected areas for Block A

Elevation	Sprinkler System (Y/N)	Enclosing Rectangle (w x h) (m)	Boundary distance required for 100% unprotected areas* (m)	Actual Boundary Distance ⁽¹⁾ (m)	Allowable percentage of actual façade unprotected (%)	Proposed unprotected area to the compartment (%)
Block A – North elevation	Y	2.45 x 5.75	1.5	7.4 ⁽¹⁾	100	100
Block A – South elevation	Y	2.45 x 8.62	1.75	4.4	100	65
Block A – East elevation	Y	1.5 x 6.53	1.75	10.1 ⁽²⁾	100	59
Block A – West elevation	Y	1.5 x 5.7	1.5	2.8	90	45

*Based on BR 187 Enclosing Rectangles Table B / Table C and utilising the halving of the boundary distance based on sprinkler provision to the proposed buildings.

Notes:

- (1) The actual boundary distance has been taken to the notional boundary line which is halfway between the proposed Block A and the nearest exiting building on site. It is reasonable to justify that the space separation criteria is met in accordance with BRE 187 as the required distance (with the provision of sprinklers) is 2.25m.
- (2) The actual boundary distance has been taken to the notional boundary line which is halfway between the proposed Blocks on site. It is reasonable to justify that the space separation criteria is met in accordance with BRE 187 as the required distance (with the provision of sprinklers) is 2.25m.

6.2.3 Roof coverage

All roofs proposed (pitched and flat) to the development shall be designed to achieve a B_{ROOF} (t4) classification.

Areas such as green roofs and planters that might not achieve that classification shall be isolated 3m away from any vertical building façade above the terrace surface and by 0.5m from other perimeters of the terrace and roof lights, ventilation openings or other penetrations of the roof.

Perimeter construction that forms part of an external wall, such as parapets, balustrading shall be constructed of class A2-s1, d0 or better materials.

In addition, if roof gardens are proposed to the flat roofs they shall be designed in accordance with the "Fire Performance of Green Roofs and Walls" guidance, published by the Department for Communities and Local Government¹.

7. B5 - Firefighting Provisions

7.1 Vehicle Access Road

Fire vehicle access will be provided throughout the site as highlighted in Red below.

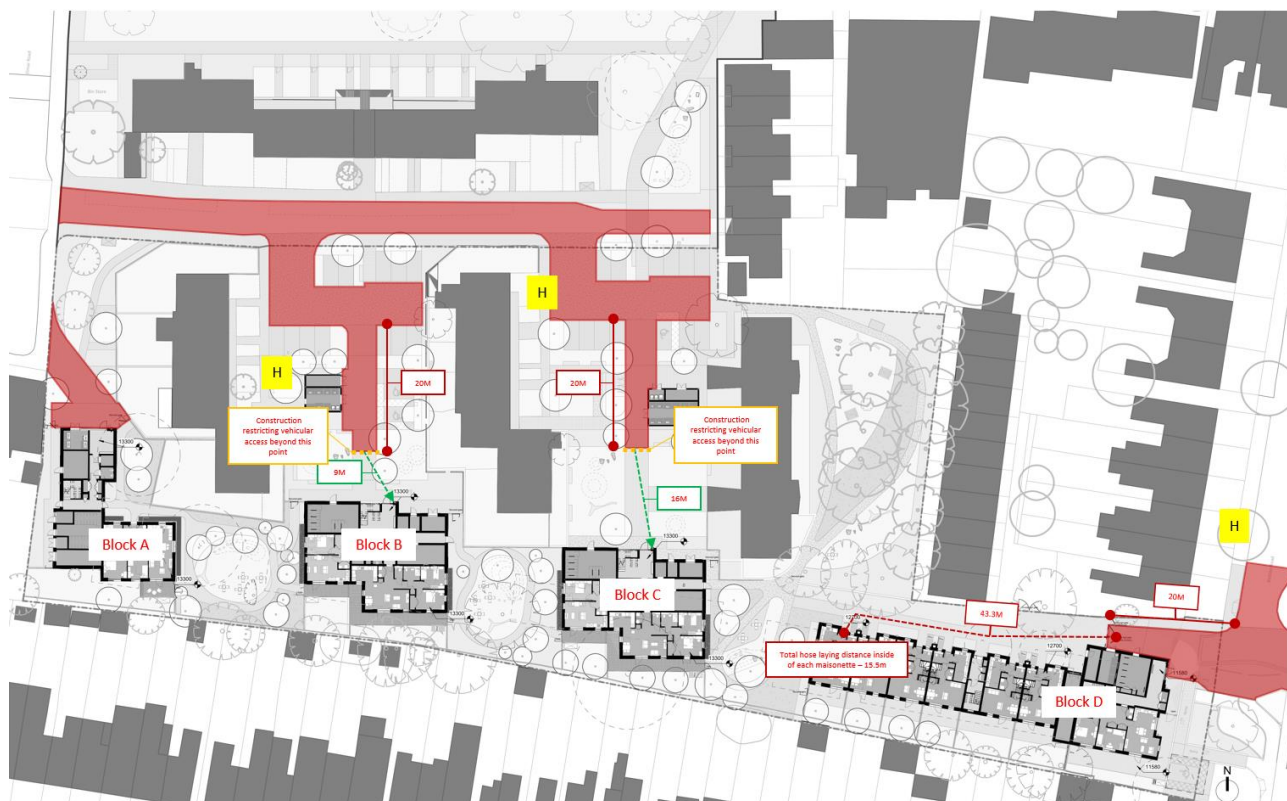


Figure 10 - Proposed Fire Vehicle Access Road

The proposed vehicle access road shall follow the design requirements for pump appliances in accordance with table 13.1 of ADBV1:2020 as per Table 10 below:

Table 10: Fire Appliance Access Route Specification

Appliance Type	Minimum width of road between kerbs (m)	Minimum width 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	14.0 ^[1]

Note: The above requirements are to be reviewed and agreed with the local Fire and Rescue Service as the appliances operated by some Fire Services may be of greater weight or different dimensions.

[1] Guidance Note 29 (GN29) as produced by London Fire Brigade requires that the carrying capacity of a road permitting access should be no less than 14.0 tonnes.

A number of access gates are provided throughout the site, means to permit manual Fire Service override of the gates should be incorporated into the design.

7.1.1 Water supply to Fire Appliances

ADBV1 recommends a building requires additional fire hydrants if both of the following apply:

- It has a compartment with an area of more than 280 m²; and
- It is being erected more than 100 m from an existing fire hydrant.

It can be confirmed that existing hydrants are provided within the site boundary of the scheme and along the access route leading towards the scheme on Kirkton Road to the East. As dry rising mains are provided to each block throughout the site it is required that a hydrant be provided within 90m of the inlet into each rising main, the following approximate measurements have been attained:

- Block A – c.73m.
- Block B – c.34.5m.
- Block C – c.50m; and
- Block D – c.56m.

It should be noted that all distances have been measured along a route suitable for laying hose.

7.2 Fire Mains

7.2.1 Buildings not Fitted with Fire Main

In accordance with ADBV1 and BS 9991, dwellings that are not fitted with fire mains shall permit a fire appliance to gain access to enable a hose-laying distance not more than 45m to all points within each dwelling, measured on a route suitable for laying hose. This recommendation applies to all two storey dwellings <4.5m accessed independently on the ground floor in Block D. It should be noted that this does not apply to Blocks A, B and C and the Block D1/2 apartments as they are provided with dry rising mains, this approach only the Block D2 maisonettes.

However, it has been identified that the longest route for laying hose from the furthest maisonette in Block D1 to the fire appliance is measured at approximately 58.8m. This is the sum of the internal hose route of each maisonette (15.5m) and the maximum distance from the entrance of the furthest maisonette to the parking position of the pump appliance (43.3m).

In order to mitigate against the extended hose-laying route and in accordance with BS 9991, the Block D2 maisonettes will be fitted with a Category 2 sprinkler suppression throughout in accordance with BS 9251:2021, it will also have an increased discharge density of 4mm/min for operation across a single head or 2.8mm per sprinkler head for a maximum of two sprinklers. As per the recommendations of BS 9991 and where a house/flat is not provided with a fire main and where the upper floor is less than 4.5m when measured to the nearest adjacent ground level, it is permitted to enable an overall hose-laying distance of up to c.90m. The current maximum hose-laying distance is c.58.8m to the furthest most maisonette from the appliance parking position, it is therefore considered that the current proposals are acceptable and within the recommended maximum permitted distance in BS 9991.

It should be noted that this condition effects the maisonettes as highlighted on the figure below, while the remaining maisonettes within Block D have a hose-laying distance that is less than 45m. It is not however proposed to change this strategy for the maisonettes within 45m. Although this approach is compliant as per the recommendations of BS 9991, it is encouraged that the Local Fire and Rescue Service and the appointed Building Control Officer are made aware of the proposed arrangement and provide appropriate approval.

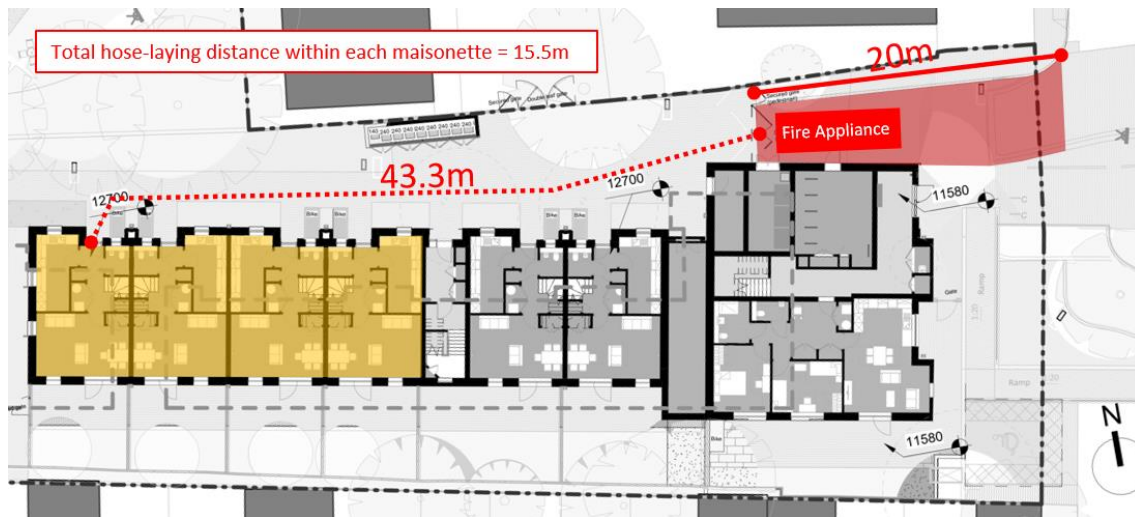


Figure 11 - Proposed Hose Route to the Furthest Maisonette of Block D from the Fire Appliance

7.2.2 Buildings Fitted with Fire Main

Buildings lower than 18m are not required to provide fire mains, however, to meet the requirement for rescue service access, all blocks will be fitted with a dry riser located within the stair enclosure. All blocks shall be designed so all points within the flat are no more than 45 m from the fire main based on a route suitable for laying hose.

Where fire mains are proposed, the fire main inlet connection point shall be provided within 18m of the fire appliance in each block. Proposed fire main inlets shall be located on the face of the building, visible from the apparatus.

7.3 Personnel Access

The height to the top storey for the proposed buildings in the Brunel Walk scheme does not exceed 18m and therefore firefighting shafts are not required to be provided to the scheme.

For Buildings Blocks A, B&C the Fire and Rescue Service personnel will access the building through the protected stairs and subsequently approach the flat of fire origin by the common lobby space.

For Building D, the Fire and Rescue Service will enter through the Ground floor level access of the dwellinghouses or by means of the protected stairs and subsequently approach the flat of fire origin via a protected entrance hall.

8. Fire Safety Management

8.1 General

The fire safety management of premises is crucial to its safe operation and maintenance. The effectiveness of active and passive fire protection measures may be potentially reduced without adequate management and staff supervision.

It is recommended that a fire safety management plan be developed with the Local Authority and Fire Service.

The building shall be provided with a management statement, policy documentation, and procedures. The plan shall include the following:

- Development of appropriate management levels through assessment (including occupancy).
- Fire safety policy statement and manual.
- Control of building modifications to ensure fire safety is not compromised.
- General housekeeping requirements.
- Control of hazardous materials (Including storage and proposals).
- Maintenance and testing procedures and records for active fire protection systems (e.g. fire alarm and detection systems, sprinkler and other suppression systems, fire curtains/shutters, ventilation systems etc.).
- Maintenance of means of escape provisions (including fire doors, escape routes etc.).
- Maintaining Fire Service Access to the building
- Development of plant shut down procedures in the event of a fire in various areas of the building.
- Develop a suitable management plan to address concerns raised regarding an interruption to the water supply. This management plan, which will be developed prior to building handover/operation, will particularly consider the following during times of interrupted supply:
 - Availability of water from other sources,
 - Risks of fire occurrence,
 - Put in place suitable provisions to reduce particular risk of fire occurrence at these times, and
 - Put in place suitable provisions to reduce particular risks to site staff and firefighters.
- Fire management plans shall be reviewed regularly and updated to reflect changes to the building design.
- Rotational cycle to help ensure waste is not retained in areas of the waste bunker for extended periods.

8.2 Fire Risk Assessment

The appropriate persons (i.e., the employer and any other persons who have control of any part of the premises) has to carry out a fire risk assessment which must focus on the safety in case of fire of all 'relevant persons' prior to the building being occupied and following building handover.

This risk assessment shall be reviewed at regular intervals or if management protocols, processes or equipment changes within the building.

The risk assessment shall pay particular attention to those at special risks, such as the disabled and those with special needs. It must include consideration of any dangerous substance likely to be on the premises.

A fire risk assessment process shall identify risks that can be removed or reduced and assist with the decision-making process regarding the nature and extent of the general fire precautions to protect people against the fire risks that may exist.

Particular areas (not exhaustive) that will require consideration include:

- Procedures to limit the main sources of ignition.
- Procedures to limit the likelihood of ignition in areas of high fire loading
- Actions to be undertaken in the event of a fire occurring.
- Consideration of people at increased risk; disabled occupants and occupants who are working on elevated platforms.
- Risk assessment of areas that are not normally accessible, i.e. crane walkways. To determine suitable procedures for access, i.e. permit to access, buddy system etc.

The significant findings of the fire risk assessment must be presented to the Fire and Rescue Authority when requested to demonstrate compliance with the requirements of the fire safety order.

9. Limitations and Assumptions

Complying with the recommendations of this report will not guarantee that a fire will not occur.

This report considers life safety through the appropriate Building Regulations. This report does not specifically address business continuity, property protection and insurance issues.

Unless otherwise described in this report, the fire strategy assumes that the detailed design of the building construction and systems therein will comply with current Building Regulations and supporting guidance. This Fire Strategy Report sets out the approach to be adopted to achieve satisfactory fire safety levels within the building. The detailed design of the various fire safety installations, both active and passive, and the preparation of design drawings and specifications identifying such installations remain the responsibility of the respective design team members, e.g., services consultant and project Architect.

This report includes several illustrations and drawings. These drawing are indicative only and are intended only to describe the concepts and principles of the building fire strategy. Reference shall be made to the design and construction drawings produced by other design team members for full details of the building design.

10. References

- The Building Regulations 2010 for England and Wales (as amended in 2018)
- The Regulatory Reform Order 2005
- Construction Design Management Regulations (NO) 2016
- Approved Document B: Volume 1 Fire Safety Dwellings 2020
- Approved Document B: Volume 2 Fire Safety Buildings Other than Dwellinghouses 2019
- Fire Prevention on Construction Sites (Joint Code of Practice by Building Employers Confederation, Loss Prevention Council and National Contractors Group)
- BS 9991:2015 Fire safety in the design, management and use of residential buildings. Code of practice
- BS 9991:2021 DRAFT - Fire safety in the design, management and use of residential buildings. Code of practice
- BS9999:2017 Code of practice for fire safety in the design, management and use of buildings, British Standards Institution
- BS5839:2017 Fire detection and fire alarm systems for buildings; Part 1 Code of practice for the design, installation and maintenance of fire detection and fire alarm systems for building
- BS5839:2019 Fire detection and fire alarm systems for buildings; Part 6 Code of practice for the design, installation and maintenance of fire detection and fire alarm systems in domestic premises