



153 Friar Street, Reading, RG1 1HE

Fire Safety Strategy

For Vail Williams LLP

RIBA Stage 2

Revision 01

For Information

Date: 2 September 2022

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EXECUTIVE SUMMARY

Building Description	The development located at 153 Friar Street, Reading is an existing building consisting of both retail and office occupancies. The retail remise is located at Ground Floor level with the office demise located at 1st and 2nd floor which has independent access/escape. As part of the works to be undertaken it is proposed to convert the office accommodation at the upper floor levels to residential apartments. The retail unit located at Ground Floor shall not undergo any change as part of the proposed works and shall remain as per the existing condition. The current proposal sees the addition of 2 flats (1 per floor level). The height measured to the top firefighting level is considered to be less than 11m.
Design Guidance and Legislation	The development is generally to be designed in accordance with BS 9991:2015 for the new residential areas; as outlined above, the retail unit that is located at Ground Floor level is not being subject to change. All deviations from this guidance will require agreement with the Approving Authority and local Fire Service.
Fire Detection & Alarm Systems	It is proposed to have Category L5 fire detection and alarm system designed in accordance with BS 5839-1:2017 within the common residential areas of the building (common escape stair) for the purpose of activating the relevant smoke ventilation systems only (i.e. there are to be no sounders or call points provided in these areas). The residential apartments shall be provided with a Grade D LD2 residential fire detection and alarm system in accordance with BS 5839-6:2019
Evacuation Strategy	The evacuation strategy for the new residential apartments shall be a “stay put” evacuation strategy where only the occupants of the apartment of fire origin shall evacuate, whereas the other apartments shall remain in place.
Structural Fire Protection	As per Section 5.1 of this report, the “elements of structure” within the building construction are to achieve a minimum fire resistance rating of 60-minutes with respect to load bearing capacity.
Smoke Ventilation	The common escape stair serving the residential apartments at the upper floor levels should be provided with an Automatic Opening Vent (AOV) achieving a minimum of 1m² free area and should be installed at the head of the stair. Refer to Section 8.2 for additional information.

External Wall Construction	The external walls that are located within 1m of the adjacent boundary (i.e. those separating the development from adjacent buildings) shall be constructed to achieve a minimum fire resistance rating of 60-minutes achieved from each side separately. However, small unprotected openings having a maximum area of 1m² may be omitted or disregarded provided they are appropriately sized and separated from each other. Although there are no provisions/restrictions within BS 9991 for the classification of external wall construction on buildings that are located greater than 1m from the relevant boundary, Hydrock would recommend that any primary material within the external wall construction should achieve Class A2-s3, d2 or better. A detailed external fire spread analysis has been undertaken for the relevant elevations within Section 6.1 of this report.
Fire Service Access	The fire service access provisions shall remain as per the existing condition and primary access to the building’s interior shall be provided via the single common escape stair. All parts of the most remote apartment (i.e. apartment located at 2nd floor) are to be within 45m of the designated fire service access roadway in accordance with the recommendations of BS9991:2015. See Section 7.1 for further information.

1. INTRODUCTION

Hydrock Fire have been engaged by Vail Williams LLP on behalf of Hickie and Hickie Limited to provide fire engineering services for the proposed refurbishment and change of use works of 153 Friar Street, Reading, RG1 1HE. It is proposed that the upper floor levels (first and second) shall undergo a change of use for the building from office to residential use, the retail unit at ground floor shall remain as per the existing condition and shall not be altered as per the proposed works.

1.1 Purpose of Report

The purpose of this report is to demonstrate to the approving authorities that the proposed 143 Friar Street, Reading satisfies all functional requirements of Part B (Fire Safety) of Schedule 1 to the Building Regulations 2010 (as amended) and to outline the Fire Safety Strategy to the design team.

Regulation 5 of the Building Regulations 2010 (as amended) defines “a material change of use” in which a building or part of a building that was previously used for one purpose will be used for another. In this instance Case (b) of Regulation 5 would apply where the building shall contain a flat, where previously it did not.

Regulation 6 – “Requirements relating to material change of use” states that where there is a change of use of the whole building, such work (if any) shall be carried out as necessary to ensure that the building complies with the applicable requirements of Schedule 1 of the Building Regulations 2010 (as amended). Therefore, the works forming part of the change of use, shall comply in full with the latest requirements of Part B (B1 to B5) fire safety of the Building Regulations.

1.2 Basis of Report

This Fire Safety Strategy has been developed based on the information and drawings provided by as outlined in Table 1.

Table 1 Information on which the Fire Safety Strategy is based

Description	Drawing No.	Revision	Date
Existing and Proposed Plans	2846-002P1	P2	31.08.2022

1.3 Limitations of Report

1.3.1 Information Provided by Others

The Fire Safety Strategy represents only the best judgement of the consultants involved in its preparation, and is based, in part, on information provided by others. Under no circumstances is liability accepted for the accuracy of such information provided by others.

Please note Hydrock (fire) have only been provided a single GA plan. A request has been made for the proposed sections, site plan and elevations, however this has yet to be provided. The existing plan for the basement has been provided however, it is noted that the basement forms part of the retail demise and accessed by an independent stair which is below the stair serving the residential apartments on the floors above.

Therefore, in light of the above and as the basement forms part of the retail demise and not undergoing any change as a result of the proposed works, it is not considered within the scope of this report.

1.3.2 Alternative Methods of Compliance

Where the Fire Safety Strategy proposes alternative methods of compliance, that have been based on accepted codes of practice, to satisfy the functional requirements of Part B (Fire Safety) of Schedule 1 to the Building Regulations 2010 (as amended), they will be subject to the agreement of the approving authorities and local Fire and Rescue Service.

1.3.3 Minimum Requirements

This report outlines the minimum requirements to satisfy the functional requirements of Part B (Fire Safety) of Schedule 1 to the Building Regulation 2010 (as amended). However, whilst these satisfy the statutory imperatives, Hydrock advise consideration of additional fire safety measures. Examples of how the minimum fire safety requirements for the building may be enhanced and their benefits are provided in Section 10.

1.4 Building Overview

The development located at 153 Friar Street, Reading is an existing building which currently existing of a retail unit at Ground Floor level, with office accommodation at 1st and 2nd floor level. As part of the proposed works, the retail unit shall remain unaltered (i.e. outside the scope of works) and the office accommodation at the upper floors shall be converted to residential apartments constituting a change of use.

The location of the development can be seen identified in the figure below.

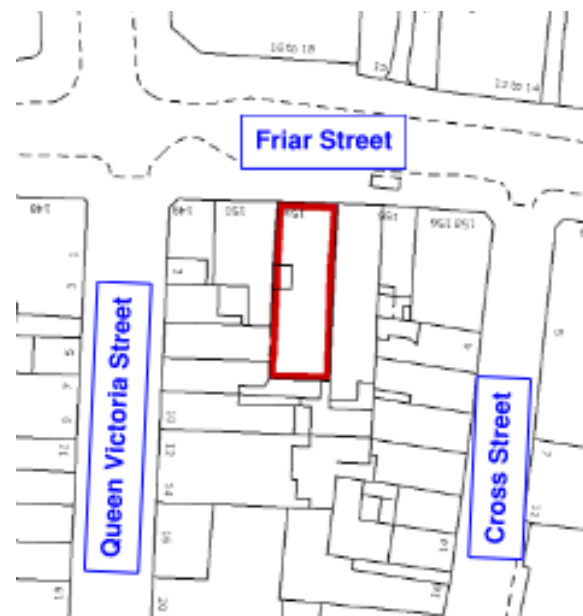


Figure 1 Site plan

1.4.1 General Arrangements

Ground Floor

As illustrated in Figure 2, the ground floor consists of an existing retail unit (shaded in red) which shall not form part of the proposed works (i.e. shall remain as per the existing condition) and can be considered as outside the scope of works. It can also be seen that the common residential stair as independent direct access to outside.

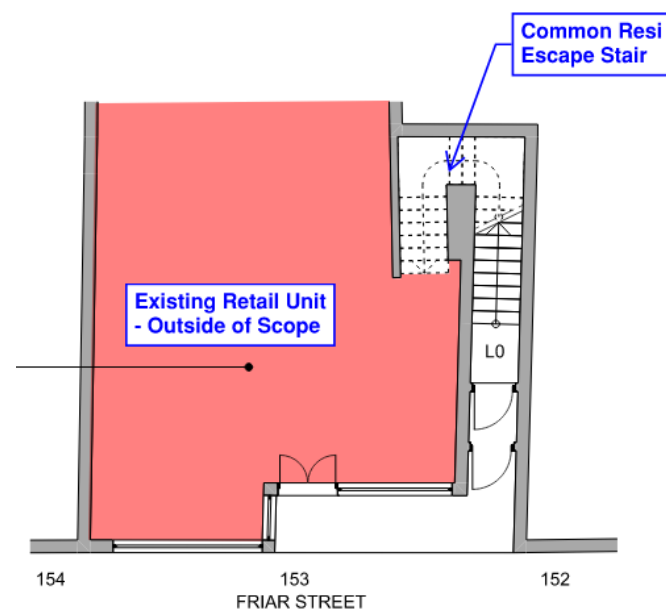


Figure 2 Ground floor general arrangement

First & Second Floors

At first and second floor level, there is a single residential apartment which opens directly onto the common single escape stair within the building (i.e. no lobby separation provided between the residential apartment and the escape stair). The typical apartment consists of a single bedroom and a combined kitchen and dining area. This can be seen illustrated in Figure 3.

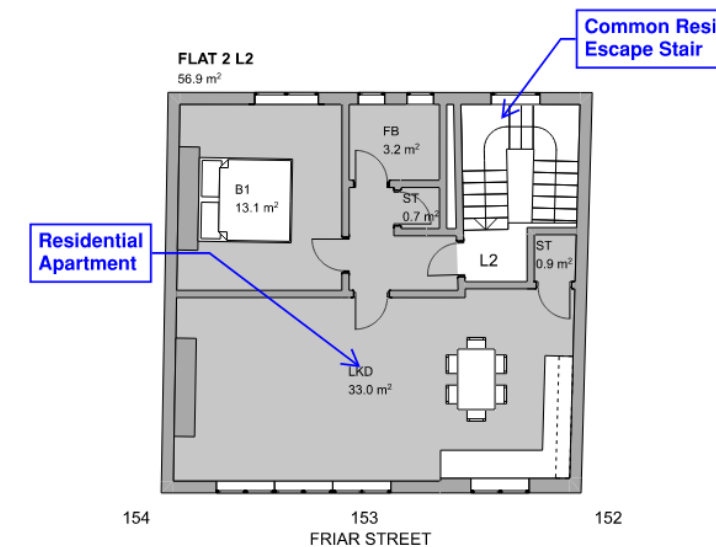


Figure 3 Typical upper floor; residential apartment

1.4.2 Building Height

For the purposes of the Fire Safety Strategy, it should be noted that the top occupied storey is located two storeys above lowest adjacent ground level of the building which is approximately 5.9m above ground level, as illustrated in Figure 4, with the overall building height believed to be approximately 8.0m. It should be noted that these height measurements were obtained from a site survey conducted by others (Hydrock Geo Team) and no measurements have been provided by the architectural team.

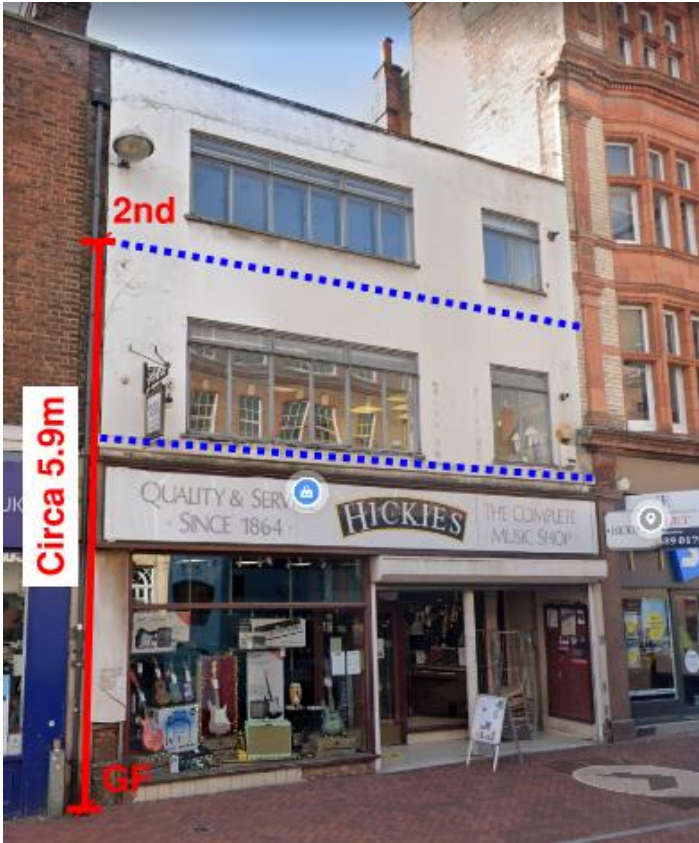


Figure 4 Image illustrating building height

2. LEGISLATION

The following sections provide an outline of the regulations and guidelines on which the Fire Safety Strategy is based.

2.1 The Building Regulations 2010

The building work will be subject to control under the restrictions of the Building Regulations 2010 (as amended). The Building Regulations are concerned with the life safety of persons in and around a building. The development will be designed and constructed to satisfy the functional requirements of Part B (Fire Safety) to Schedule 1 of the Building Regulations 2010 (as amended), which includes the following:

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

2.2 Guidance Documents

Guidance referred to in this report includes, but is not limited to the following:

- BS 9991:2015 ‘Fire safety in the design, management and use of residential buildings (dwellings) – Code of practice’;
- BS 5839-1:2017 ‘Code of practice for the design, installation, commissioning and maintenance of fire detection and fire alarm systems in non-domestic premises’;
- BS 81-72:2015 ‘Safety rules for the construction and installation of lifts. Particular applications for passenger and goods passenger lifts. Firefighters lifts’;
- BS 5499-4:2013 ‘Code of practice for escape route signing’;
- BR 187:2014 ‘External Fire Spread – Building separation and boundary distances’;
- BS 5266-1:2016 ‘Emergency lighting. Code of practice for the emergency lighting of premises’;
- BS 9990:2015 ‘Non-automatic firefighting systems in buildings’;
- BS EN 13501-1:2018 ‘Fire classification of construction products and building elements. Classification using data from reaction to fire tests’

Guidance for the fire precautions will generally follow the recommendations contained within BS9991:2015. Any deviations from these standards are to be provided with justification demonstrating that the functional requirements of the Building Regulations are met however these will be subject to approval from the approving authority and local Fire Service. Where no specific provision is mentioned in this document regarding any particular aspect, reference should be made to BS9991:2015. Consideration is also to be given to insurers and other stakeholders requirements.

The Fire Safety Strategy is to be read in conjunction with the Fire Strategy Drawings in Appendix A.

2.3 Other Applicable Legislation

2.3.1 The Regulatory Reform (Fire Safety) Order 2005

The Regulatory Reform (Fire Safety) Order (RRFSO) regulations shall apply to this development and are the landlord’s responsibility. The RRFSO came into force in 2006 with the aim of resolving the overlap caused by a number of previous legislations. Therefore, a large number of legislations were rationalised and consolidated into the RRFSO with the result that it also rationalised the number of enforcement authorities involved in fire safety matters.

The RRFSO applies to all workplaces and other non-domestic areas and premises, requiring the ‘Responsible Person’ to undertake an assessment of the fire risk in their premises and to keep this assessment under review. It requires that where the ‘Responsible Person’ does not have the relevant training and experience to undertake such an assessment they must appoint a suitable ‘Competent Person’ to undertake the Risk Assessment.

The main focus of the Risk Assessment is to ensure that the premises is safe for the occupants to use and that all fire safety measures are adequate and appropriately maintained. In new buildings, the Fire Risk Assessment ensures that the fire safety provisions required under the Building Regulations 2010 are maintained, whereas in existing buildings it ensures that despite any modifications undertaken throughout the building’s history, it is still safe for use. It is therefore important that the Fire Safety Strategy for more complex buildings (regardless of age) is clear and well documented.

Fire Safety Act (2021)

The Fire Safety Act 2021 (enacted on 16.05.2022) has amended the applicability of the RRFSO to residential buildings as follows:

- ‘Where a building contains two or more sets of domestic premises, the things to which this order applies include—

(a) the building’s structure and external walls and any common parts;

(b) all doors between the domestic premises and common parts (so far as not falling within sub-paragraph (a)).

- The reference to external walls includes—

(a) doors or windows in those walls, and

(b) anything attached to the exterior of those walls (including balconies).'

This clarification empowers fire and rescue services to take enforcement action and hold building owners to account if they are not compliant.

2.3.2 Regulation 38

In conjunction with the RRFSo, Regulation 38 requires that information relating to the fire safety provisions within a building is provided to the ‘Responsible Person’ so that they (or an appointed ‘Competent Person’) can undertake the Fire Risk Assessment required under the RRFSo. It is therefore of paramount importance that the fire safety information for a building that falls under the requirements of the Building Regulations 2010 is kept up to date and a true reflection of the completed building.

This report does not form the Risk Assessment required under the RRFSo, nor does it absolve the client from exercising their duties under Regulation 38. However, the aim of this Fire Safety Strategy is to demonstrate how the project complies with the requirements of the Building Regulations 2010 (as amended) and therefore should form part of the information provided to the ‘Responsible Person’ in order for them to undertake and maintain the Fire Risk Assessment for the project.

3. MEANS OF WARNING AND ESCAPE

Means of escape provisions are generally to be in accordance with BS 9991:2015. Where the proposed means of escape strategy deviates from this guidance document it will require agreement with the approving authority and local Fire Service.

3.1 Fire Detection and Alarm System

Fire detection and alarm systems are designed to give warning of fire at an early stage to enable all occupants to evacuate the building safely, before the escape routes are impassable owing to the presence of fire, smoke or toxic gases.

3.1.1 Residential Apartments

All residential apartments within the 153 Friar Steet development are to be provided with a Grade D, Category LD2 fire detection and alarm system designed, installed and commissioned in accordance with BS 5839-6: 2019 – “Fire detection and alarm systems in domestic premises – Code of practice”.

3.1.2 Communal Residential Areas

It is proposed to provide a Category L5 fire detection and alarm system within the common residential areas (i.e., residential common corridors, stairs, and stair discharge routes/lobbies). The purpose of this system is to activate any relevant smoke ventilation systems in a fire scenario. Therefore, no sounders are to be provided in these areas.

The fire detection and alarm system are to be designed and installed in accordance with BS 5839-1:2017.

3.1.3 Fire Alarm System Interfaces

An automatic fire alarm system will have interfaces and links as necessary to operate equipment/devices and a number of examples are indicated below; for more information see BS5839-1:2017:

- Security systems on exit doors – released as required (if any are proposed within the building);
- Gas supply valves – isolate (if any are proposed within the building);
- Heating, ventilation and air conditioning systems – shut down to restrict spread of smoke and hot gases (if any are proposed within the building).

3.2 Evacuation Strategy

The evacuation strategy for the residential units is based on a ‘stay-put’ evacuation strategy where only the occupants within the unit of fire origin are to be alerted/evacuate and all other occupants within the building are to remain in place, unless they are directly affected by smoke/fire. This does not preclude the event that occupants may wish to self-evacuate at any time or if instructed to do so by the fire service. Any additional evacuation is at the discretion of the Fire Service if they decide it is necessary to do so during operational procedures.

The evacuation strategy for the retail unit located at ground floor shall operate under a simultaneous evacuation strategy and shall remain unaltered as part of the proposed works to be undertaken to the development.

3.3 Horizontal Means of Escape

3.3.1 Internal Unit Layouts

As the apartments have restricted travel distances within, such that the travel distances from the most remote point within the apartment to the entrance door of the flat does not exceed 9m, no protected entrance halls or alternative means of egress from the residential unit would be required in this respect.

However, in accordance with Figure 8(b) of BS 9991: 2015, as the apartments are not provided with common lobby separation between the apartments and the escape stairs, protected entrance halls are required to be provided. The requirements of protected entrance halls can be seen indicated in Figure 5 and would require to achieve 30-minutes fire resistance; travel distances within the protected entrance halls are also limited to 9m.

Alternatively to shown in Figure 5, the bathroom within the hallway of the apartment can be separated by the fire rated enclosure to the protected entrance hall if desired or preference but the door to the bathroom would be required to be FD30 rated and achieve a minimum fire resistance of 30-minutes.

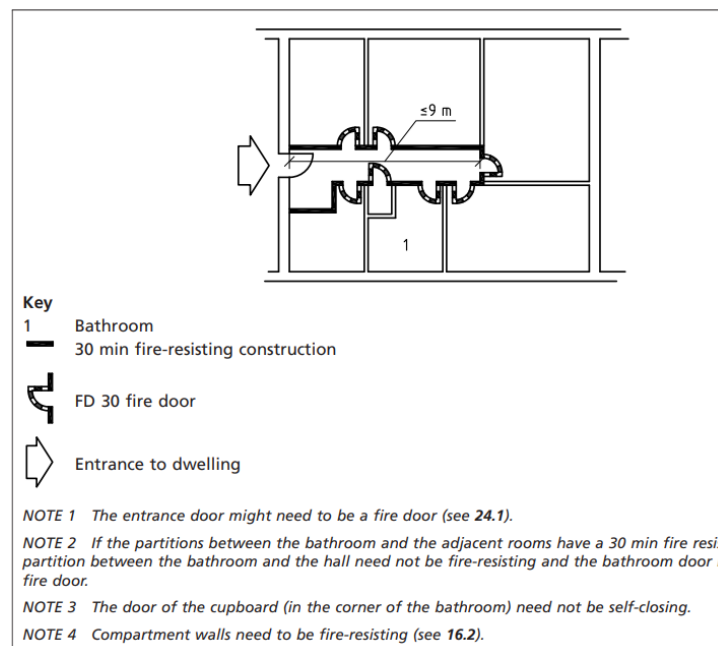


Figure 5 Protected entrance hall requirements (Figure 11 BS 9991: 2015)

3.3.2 Common Residential Areas

As outlined briefly above, the existing building would be considered as a “small building” as it does not have a storey at a height greater than 11m and has no more than three storeys above ground floor and is provided with a single escape stair, the common areas / escape routes should be designed in accordance with Figure 8 of BS 9991. The provisions of which can be outlined in the figure below where lobby separation is not provided, as it the case in this instance.

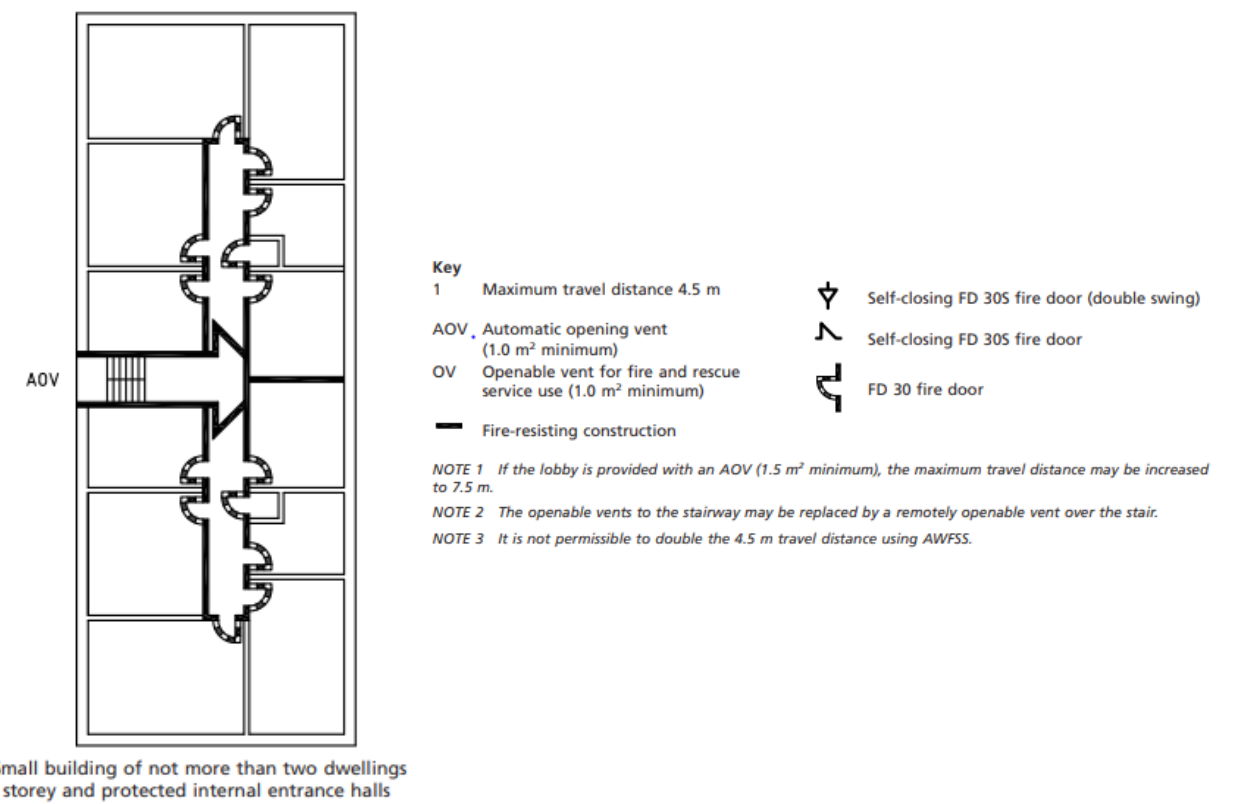


Figure 6 Design of common escape routes in small single stair buildings (Figure 8(b) of BS 9991)

As noted, previously, apartments with open directly onto the escape stair of the building are required to be provided with internal protected entrance halls. Additionally, BS 9991:2015 restricts the number of apartments that are permitted to open onto the escape stair to two per floor level – in this instance this is complied with as there is only one apartment located on each floor level and opening directly onto the escape stair.

Additionally, where apartments open directly onto the escape stair an Automatic Opening Vent (AOV) having a minimum geometric free area of 1m² is to be provided/installed at the head of the escape stair.

3.4 Vertical Means of Escape

3.4.1 Protected Stairways

A protected stairway needs to be relatively free of potential sources of fire. In accordance with Clause 21.1 of BS9991:2015, access hatches for service shafts should not be situated within a means of escape stair unless providing smoke control or pressurisation for that staircase.

3.4.2 Stair Discharge

In accordance with Clause 34.a of BS9991:2015, residential stairs are to discharge to external directly or via a protected route which is lobby protected from any adjacent accommodation.

The existing single escape stair within the building complies with the above as it is provided with direct independent access to the outside of the building onto Friar Street (i.e. a place of ultimate safety) without having to pass through the retail unit that is provided at ground floor level of the building.

3.4.3 *Required Stair Widths*

The unobstructed width (measured between the walls and/or balustrades) of the common stair is not to be less than 750 mm, with a clear vertical distance of 2.0 m. The encroachment of balustrades may be excluded from the clear/unobstructed width of the stair where they do not protrude more than 100mm into the stair width.

The common single escape stair provided within the building is provided with a clear width of approximately 960mm, as measured from the general arrangement drawings, and therefore would be considered sufficient.

The escape stairs are to be constructed in accordance with BS 5385-1:2010.

3.5 **Escape Signage**

Escape signage is to be provided within the common escape routes. Escape signage is to be designed and installed in accordance with BS 5499-4:2013. Signage utilised throughout the building is to be consistent and in accordance with BS ISO 3864-1:2011.

4. INTERNAL FIRE SPREAD (LININGS)

4.1 Internal Fire Spread (Linings)

The interior wall and ceiling surfaces in a building may have a significant influence on how fast a fire may develop. The Building Regulations require that internal linings shall adequately resist the spread of flame over their surfaces and, if ignited, have either a heat release rate or a rate of fire growth which is reasonable in the circumstances.

It is particularly important that in circulation spaces, where the rapid spread of fire is most likely to prevent occupants from escaping, the surface linings are restricted by making provision for them to have low rates of heat release and surface spread of flame.

The internal surface linings are to be in accordance with Table 2 throughout the building.

Table 2 Internal lining requirements

Location	British Standard Performance Class ^[1]	European Performance Class ^[2]
Residential rooms having an area not more than 4m ²	3	D-s3, d2
All other rooms	1	C-s3, d2
Circulation spaces within dwellings	1	C-s3, d2
Other circulation spaces	0	B-s3, d2

- Notes
- 1. Relates to performance measures in BS 476 Parts 6 & 7 criteria
 - 2. Relates to performance determined in accordance with BS EN 13501-1:2018

The surface linings of the walls and ceilings should generally conform to the classifications outlined in Table 2. However, parts of walls in rooms may be of a lower class but not lower than Class 3 (national class) or Class D-s3, d2 (European class) provided that the total of those parts in any one room does not exceed 50% of the floor area of the room (subject to a maximum of 20m² in residential areas).

For the purposes of internal surface lining requirements, the following definitions should be noted:

- Room

An enclosed space within a building that is not used solely as a circulation space. The term includes not only conventional rooms, but also cupboards that are not fittings and large spaces such as warehouses and auditoria. The term does not include voids such as ducts, ceiling voids and roof spaces;
- Circulation space

A space (including a protected stairway) mainly used as a means of access between a room and an exit from the building or compartment.

Table 3 outlines the inclusions/exclusions regarding the definitions for walls and ceilings for the purposes of internal surface spread of flame requirements.

Table 3 Internal lining inclusions/exclusions

	Walls	Ceilings
Definition includes	- The surface of glazing (except glazing in doors) - Any part of a ceiling which slopes at an angle of more than 70° to the horizontal	- The surface of glazing - Any part of a wall which slopes at an angle of 70° or less to the horizontal - The underside of a mezzanine or gallery - The underside of a roof exposed to the room below
Definition excludes	- Doors and door frames - Window frames and frames in which glazing is fitted - Architraves, cover moulds, picture rails, skirtings and similar narrow members - Fireplace surrounds, mantle shelves and fitted furniture	- Trap doors and trap door frames - The frames of windows or rooflights and frames in which glazing is fitted - Architraves, cover moulds, picture rails, exposed beams and similar narrow members

5. INTERNAL FIRE SPREAD (STRUCTURE)

5.1 Elements of Structure

For the purposes of the Fire Safety Strategy, the top occupied storey of the building (i.e. excluding levels consisting of plant only) is circa 5.9m above ground level, as per the approximate measurement obtained from site and illustrated in Figure 3 previously. Therefore, the required fire resistance for the elements of structure is 60 minutes (with regard to load-bearing capacity) in accordance with Table 4 of BS 9991:2015.

The structure of the roof and the structure that supports only the roof need not to be fire rated unless the roof:

- Forms part of an escape route; or
- Function as a floor; or
- Is part of a portal frame structure where the roof and the supporting stanchions form a single element of structure; or
- Is integral to the stability of a fire-resisting external wall.

5.2 Compartmentation

In accordance with Clause 17 and Table 3 of BS 9991:2015:

- All floors containing residential units are to be designed as compartment floors achieving the same level of fire resistance as required for elements of structure;
- All residential units are to be separated from all other areas of the building by at least 60-minute fire rated construction (apartment entrance doors to be FD30S fire doors);
- All walls separating occupancies are to be designed as compartment walls (achieving a minimum of 60-minutes fire resistance or as required for elements of structure, whichever is less);
- Floor separating the retail unit and an apartment above (i.e. floor separating residential apartment at first floor from retail unit located at ground floor).

5.3 Additional Fire Resistance Requirements

Fire resistance to achieve the required compartmentation and protection to escape routes is to be provided in accordance with BS 9991:2015 as outlined in Table 4.

Table 4 Fire resistance requirements

Space		Minimum Fire Resistance ^[1] (minutes)			Method of Exposure
		Load-bearing Capacity (R)	Integrity (E)	Insulation (I)	
Structural Frames, Beams and Columns		60 ^[2]	-	-	Exposed faces
Load-bearing Wall Elements		60 ^[2]	-	-	Each side separately
Compartment Walls		60 ^[2]	60 ^[2]	60 ^[2]	Each side separately
Compartment Floors (all floors)		60 ^[2]	60 ^[2]	60 ^[2]	From underside
Roofs	Any part forming part of an escape route	30	30	30	From underside
	Any part forming the function of a floor	60 ^[2]	60 ^[2]	60 ^[2]	From underside
External Walls ^[3]	Any part within 1m of a relevant boundary	60 ^[2]	60 ^[2]	60 ^[2]	Each side separately
	Any part more than 1m from a relevant boundary	60 ^[2]	60 ^[2]	15	From inside building
	Any part within 1.8m of an external escape route	30	30	-	From inside building
Protected Shafts	Between shaft and protected lobby or corridor	30	30	30	Each side separately
	Between shaft any other accommodation	60 ^[2]	60 ^[2]	60 ^[2]	Each side separately
Protected Lobbies and Corridors		30	30	30	Each side separately
Flat Internal Protected Entrance Halls		30	30	30	Each side separately
Cavity Barrier		-	30	15	Each side separately
Fire Stopping		As for the wall/floor in which it is installed			

- Notes
1. When tested in accordance with the relevant parts of BS476 or equivalent European standard
 2. Equivalent to that required for elements of structure as defined in Section 5.1
 3. This does not apply to allowable unprotected openings calculated within in 6.1

5.5 Ancillary Accommodation

The required fire rated enclosures to areas of ancillary accommodation are outlined in Table 5.

Table 5 Ancillary accommodation fire resistance requirements

Space	Minimum Fire Resistance ^[1] (minutes)
Electrical Switch Room	60
Store rooms	30 ^[2]

- Notes
- 1. When tested in accordance with the relevant parts of BS 476 or equivalent European standard
 - 2. Bicycle stores within the apartments to be enclosed in 30-minutes fire resistant construction – Refer to fire strategy drawings for additional information

5.6 Fire Doors

Fire doors are to be provided in all fire rated partitions noted in Section 5.3 and 5.4. The fire resistance requirements for the doors are outlined in Table 6.

Table 6 Fire door fire resistance requirements

Location	Minimum Fire Resistance ^[1] (minutes)
Compartment Walls	Same fire resistance as the wall it is installed, with (S)
Compartment Walls – Apartment Entrance Doors	FD30S
Protected Shafts (Risers etc.)	Half the period of fire resistance of the element in which they are installed but no less than 30-minutes
Protected Escape Stairs	FD30S
Compartment Floor	Same fire resistance as the wall it is installed
Protected Internal Entrance Hall	FD30
Ancillary Accommodation	Same as for the required construction of the wall, with (S), without (S) where it does not open into a protected corridor
Cavity Barrier	FD30S

- Notes
- 1. When tested in accordance with the relevant parts of BS476 or equivalent European standard
 - 2. All fire doors except doors into places of special fire hazard should be fitted with self-closers when opening onto escape routes. Places of special fire hazard should be locked shut when not in use and provided with appropriate signage.

A fire door that is required to resist the passage of smoke at ambient temperature conditions (i.e. with suffix ‘S’) should either:

- a. have a leakage rate not exceeding 3m3/h/m, when testing in accordance with BS476-31.1 with a threshold taped and subjected to a pressure of 25Pa; or
- b. meet the classification requirement of Sa when tested in accordance with BSEN1634-3.

5.7 Ductwork

Method 1 – Thermally actuated fire dampers

- Fire dampers that are thermally operated can be provided where ductwork penetrates though fire resisting construction;
- Fire dampers only actuated by fusible links are not suitable for protected escape routes or sleeping risk;
- Method 1 is not suitable for ductwork serving kitchen extracts or sleeping risk.

Method 2 – Fire-resisting enclosures

- The fire resisting enclosures should achieve the same fire resistance as the wall the ductwork penetrates which forms a compartment known as a protected shaft. This allows a multiplicity of services to be transferred together with the duct to traverse a number of compartments within the building without the need for further sub divisions.
- Method 2 can only be used on ductwork that passes through an escape route providing the ductwork does not serve the escape route it passes through.

Method 3 – Protection using fire-resisting ductwork

- The ductwork itself forms a protected shaft. The ductwork should achieve the same fire resistance as the wall the ductwork penetrates. The fire resistance can be achieved by the ductwork material itself, or through the application of a protective material.
- Method 3 can only be used on ductwork that passes through an escape route providing the ductwork does not serve the escape route it passes through.
- The supporting hangers should be capable of supporting the ductwork for not less than the period of fire resistance of the ductwork.

Method 4 – Smoke operated fire dampers

- Method 4 may be used for extract ductwork passing through the enclosures of protected escape routes, both where the ductwork does and does not serve the escape route
 - Note: Method 4 is not suitable for ductwork serving kitchen extracts.
 - Note: Fire and smoke dampers should conform to BS EN 15650:2010. They should have an ES classification equal to or greater than 60 minutes.

For further information, refer to Clause 21 of BS 9991: 2015.

5.8 Fire Stopping

If the fire separating element is to be successful, every joint or imperfection of fit, or opening to allow services to pass through the element, should be adequately protected by sealing or fire stopping so that the fire resistance of the element is not impaired. Fire stopping is to be provided at the following locations:

- In line with fire rated walls and floors where there is a penetration of the wall/floor in order to maintain the fire resistance integrity of the wall/floor;
- Between fire rated walls/floors and an external wall to ensure the fire resistance integrity of the wall/floor is maintained to the external wall.

Where fire stopping is provided, it is to achieve the same level of fire resistance as required for the wall/floor it replaces. For more information see Clause 24.4 from BS 9991:2015.

5.9 Cavity Barriers

In accordance with BS 9991:2015 cavity barriers are to be provided in the cavity of:

- an external wall at all cavity edges and around all openings in the external wall (i.e. windows);
- an external wall in line with a compartment floor where it meets the external wall;
- an external wall in line with a compartment wall where it meets the external wall;
- an internal cavity wall at the junction with a fire rated wall/floor.

It should be noted that cavity barriers need not be provided within internal or external cavity walls where the following conditions are met:

- Cavity barriers are provided around all edges and openings in the cavity wall; and
- The cavity is enclosed within two leaves (one either side) of either concrete or masonry each at least 75mm thick.

Cavity barriers should also be provided in cavities to prevent the excessive spread of unseen fire and smoke. Cavity barriers are to be provided to ensure the maximum dimensions of undivided concealed spaces do not exceed the requirements outlined in Table 7.

Table 7 Maximum dimensions of concealed spaces

Location of Cavity	Class of Surface/Product Exposed in Cavity		Maximum Distance in Any Direction
	National Class ^[1]	European Class ^[2]	
Between Roof and Ceiling	Any	Any	20m
Any Other Cavity	Class 0 or Class 1	Class A1, Class A2, Class B or Class C	20m
	Any Other Class	Any Other Class	10m

- Notes
- 1. Relates to performance measures in BS476 Parts 6 & 7 criteria
 - 2. Relates to performance determined in accordance with BSEN13501-1:2018

Cavity barriers in a stud wall or partition, or provided around openings, may be formed of the following;

- Steel at least 0.5mm thick;
- Timber at least 38mm thick;
- Polyethylene sleeved mineral wool or mineral wool slab (both require to be under compression when used in cavity barrier construction); or
- Calcium silicate, cement based or gypsum plaster boards at least 12mm thick.

Where provided, cavity barriers are to achieve at least 30 minutes fire resistance for integrity and 15 minutes fire resistance for insulation (E30 I15). Refer to Clause 19.1 of BS 9991:2015 for further information with regard to cavity barrier provisions, construction and fixing requirements.

6. EXTERNAL FIRE SPREAD

6.1 Fire Spread to Adjacent Properties

In order to prevent fire spread between properties it should be ensured sufficient separation distance is provided between fire compartments within the building and the relevant boundaries based on the extent of unprotected area to the fire compartments.

External fire spread analysis should be conducted based on the enclosing rectangle method as described in BR187:2014.

An indicative external fire spread analysis has been conducted in the following subsections of this report however, this should be verified at the subsequent stages of the project (i.e. Stage 3).

6.1.1 Enclosing Rectangle Method

The enclosing rectangle method considers each fire compartment within the building separately. The methodology for this analysis is summarised as follows:

- A plane of reference is defined which ‘touches’ the elevation under consideration at least once but does not pass through it;
- A rectangle is constructed enclosing all unprotected areas on the elevation. The dimensions of this rectangle are then rounded up to the nearest dimensions defined in the tables of BR187:2014;
- The unprotected area on the elevation projecting on to the plane of reference is taken as a percentage of the area of the ‘enclosing rectangle’;
- The tables in BR187:2014 are then used to determine the required minimum distance between the plane of reference and the relevant boundary based on the dimensions of the enclosing rectangle and the percentage of unprotected area;
- The methodology of the enclosing rectangle analysis may also be carried out in ‘reverse’ based on a known boundary distance to determine the maximum percentage unprotected area on the elevation.

6.1.2 Enclosing Rectangle Analysis Assumptions

External fire spread analysis in accordance with BR187:2014 is based on the following assumptions:

- All parts on the elevation to the fire compartment are considered ‘unprotected’ except the following:
 - All parts of the elevation that meet the fire resistance requirements for elements of structure with regard to integrity (i.e. 60 minutes) and 15 minutes for insulation;

- Small unprotected areas (less than 1m²) and groups of unprotected areas (within an area not exceeding 1m²) that are separated from all other unprotected areas on the compartment elevation by at least 4m (reduced to 1.5m where one of the unprotected areas does not exceed 0.1m²);
- Unprotected areas to protected shaft that is enclosed within at least 60-minute fire rated construction;
- The relevant boundary distance is taken from the plane of reference to the adjacent site boundary except where the adjacent boundary is to a public roadway or river etc. In the case the adjacent boundary is a public roadway or river the relevant boundary distance may be taken to the middle of the road or river etc;
- Analysis for each fire compartment is to be conducted based on the relevant occupancy characteristic of the compartment (i.e. residential, etc.);
- The analysis will consider the ‘worst-case’ scenario for each elevation (i.e. compartment with greatest extent of unprotected area closest to the relevant boundary). Providing the analysis for the worst case demonstrates compliance it is considered acceptable to assume all other compartments on the elevation are also acceptable with regard to external fire spread.

6.1.3 External Fire Spread Analysis

Figure 7 indicatively illustrates the distances to the relevant site boundary for the development and thus the separation distances that have been considered as part of the external fire spread analysis where the actual footprint of the development can be seen indicated in a blue dashed line and the site boundary is indicated by the red line.

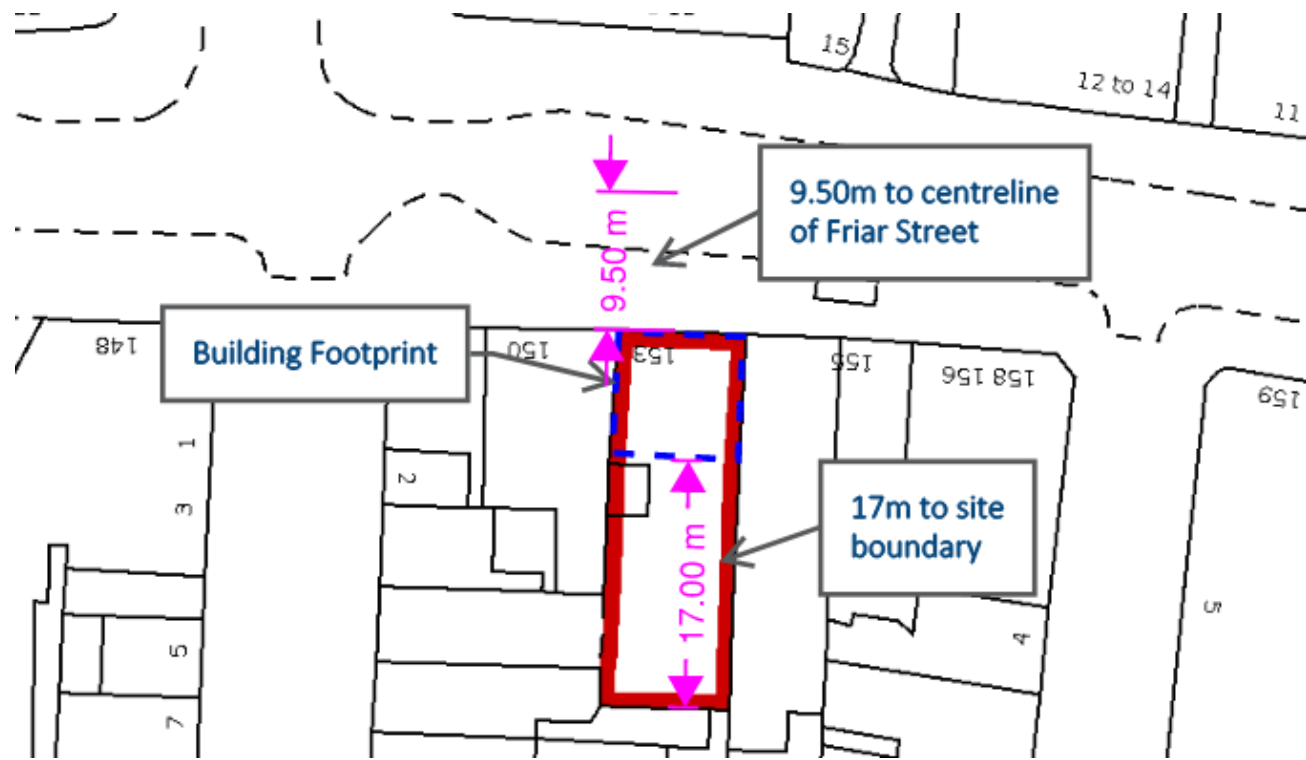


Figure 7 Site Separation distances from boundaries

The maximum permissible unprotected area for the residential apartment floor levels (i.e. upper floor levels only) can be seen outlined within the table below in accordance with BR 187 as outlined previously.

Table 8 Permitted unprotected area assessment

Building Elevation	Separation Distance from Boundary (m)	Compartment Size (m x m)	Enclosing Rectangle Size (m x m)	Permitted Unprotected Area (%)
North Elevation – First Floor	9.50m (centreline of Friar Street)	8.05m x 4m	9m x 6m	100%
North Elevation – Second Floor	9.50m (centreline of Friar Street)	8.05m x 4m	9m x 6m	100%
East Elevation – First Floor ^[1]	<1m	n/a	n/a	n/a
East Elevation – Second Floor ^[1]	<1m	n/a	n/a	n/a
South Elevation – First Floor	>4.0m	5.85m x 4m	6m x 6m	100%
South Elevation – Second Floor	>4.0m	5.85m x 4m	6m x 6m	100%
West Elevation – First Floor ^[1]	<1m	n/a	n/a	n/a
West Elevation – Second Floor ^[1]	<1m	n/a	n/a	n/a

Notes

1. External walls within 1m of the relevant boundary should achieve a minimum fire resistance of 60-minutes (R, E, I) achieved from each side separately

6.2 Re-Entrant Corners

The building design should prevent fire spread from occurring around walls/floors required to be fire rated via an external corner in the façade (i.e. re-entrant corners). Therefore, where the internal angle of a corner in the façade is less than 135°, unprotected areas to areas of separate sides of a fire rated wall/floor are to be separated by at least 1800mm as illustrated in Figure 8.

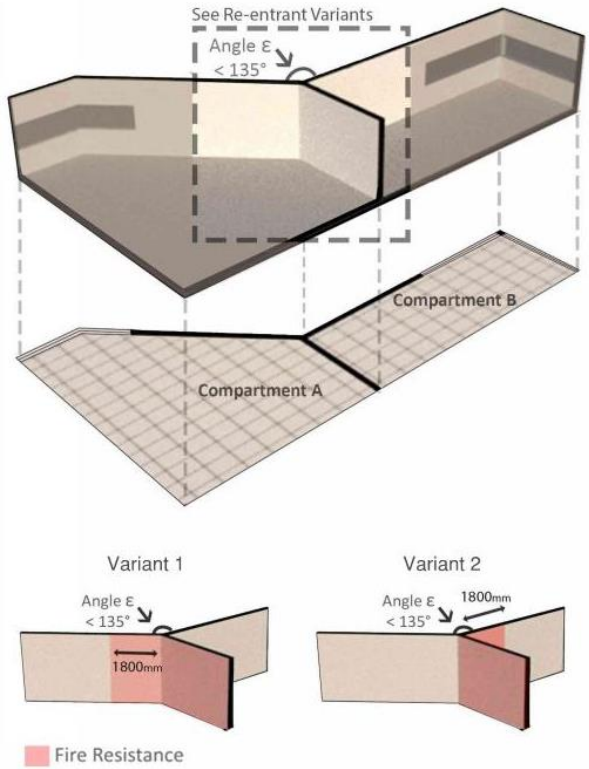


Figure 8 Re-entrant corner requirements

6.3 Building Façade

External walls should be constructed using a material that does not support fire spread and therefore endanger people in or around the building. Flame spread over or within an external wall construction should be controlled to avoid creating a route for rapid fire spread bypassing compartment floors or wall. It should also be ensured external walls close to relevant boundaries are not readily ignitable to avoid fire spread between buildings.

In accordance with BS 9991:2015 external walls should either meet the performance criteria of BR135 when testing accordance with BS 8414-1 or BS 8414-2 or should meet the following requirements:

- Where the external wall is within 1m of a relevant boundary the external surface is to achieve the following requirement:
 - Class B-S3, d2 or better (European class). Profiled or flat steel sheet at least 0.5mm thick with an organic coating of no more than 0.2mm thickness is also acceptable;
 - Class B-s3, d2 or better (European class). Profiled or flat steel sheet at least 0.5mm thick with an organic coating of no more than 0.2mm thickness is also acceptable;
- Cavity barriers are to be provided as outlined in Section 5.9;

Where the top storey of a residential building is not more than 18m above ground level there are no explicit restrictions on the combustibility of the external wall construction noted within BS9991:2015. However, Requirement B4 of Schedule 1 to the Building Regulations 2010 (as amended) requires that “...the external walls of the building shall adequately resist the spread of fire over the walls and from one building to another, having regard to the height, use and location of the building.”

In accordance with Clause 10.1 of ADB1: 2020, the external wall of a building should not provide a medium for fire spread if that is likely to be a risk to health and safety. Additionally, Clause 10.4 of ADB1: 2020 states that in relation to buildings of any height or use, consideration should be given to the choice of materials (including their extent and arrangement) used for the external wall, or attachments to the wall, to reduce the risk of fire spread over the wall. Therefore, even where prescriptive guidance for the combustibility of external wall construction on residential buildings is less specific for buildings with no storey more than 18m above ground level, consideration should be given to whether the provision of any combustible material within the external wall construction presents a risk to health and safety and satisfies the functional requirement B4 of Schedule 1 to the Building Regulations.

Hydrock advise that all primary materials in the external walls are to achieve Class A2-s3, d2 or better. Permitted exemptions to this requirement are to follow those outlined within the building (Amendment) Regulations 2018 [S.I. 2018/1230]. These can also be found in the Regulation 7(2) section within ADB1:2020 (pages 76-77).

It is to be noted that the Approved Document B June 2022 Amendments (coming into effect in December 2022) will require the outermost external material and any insulation product used in the external wall to achieve Class A2-s1, d0 or A1 (for buildings with a top storey more than 11m above ground level).

6.3.1 Typical External Wall Build-up

It is noted that the existing external walls of the development are primarily of brick, block or concrete construction that would inherently achieve and/or provide a level of fire resistance. The presence of cavities, insulation and membranes within the existing wall build-up is unknown at present.

Should works be undertaken to the external wall build-up, the provisions outlined in the previous sections are to be taken into consideration.

6.4 Roof Coverings

The roof covering is to achieve a classification of $B_{ROOF}(t_4)$ when tested in accordance with BS EN 13501-5 – “Fire classification of construction products and building elements. Classification using data from external fire exposure to roof tests” as it is within 6m of the relevant boundaries and/or adjacent buildings

Where the roof covering passes over a compartment wall, the roof covering should be situated on top of a deck of material of Class A2-s3, d2 or better, for at least 1500mm either side of the compartment wall. It should be noted that this requirement is not considered necessary where the roof achieves a fire resistance (from the underside) equivalent to that of the compartment wall (e.g. where the roof is a concrete slab).

Compartment walls should be fire-stopped up to the roof construction.

7. FACILITIES FOR FIREFIGHTING

The following section describes the arrangements for firefighting provisions in the event of a fire in order to comply with B5 of Schedule 1 to the Building Regulations 2010 (as amended).

7.1 Firefighting Access

Buildings with no floors higher than 18 m above fire rescue and access level and with no basement lower than 10 m below fire rescue and access level, such as the development located at 153 Friar Street, do not require fire-fighting shafts.

The protected single escape stair within the building shall be used for providing access for the Fire and Rescue service to the buildings internal (upper floors only).

In accordance with Section 50.1.2 of BS 9991: 2015, as access for Fire and Rescue service is provided to within 45m of all points within a dwelling/apartment, measured on a route suitable for laying hose, a dry riser would not be required to be provided within the building. This can be seen illustrated in Figure 9.

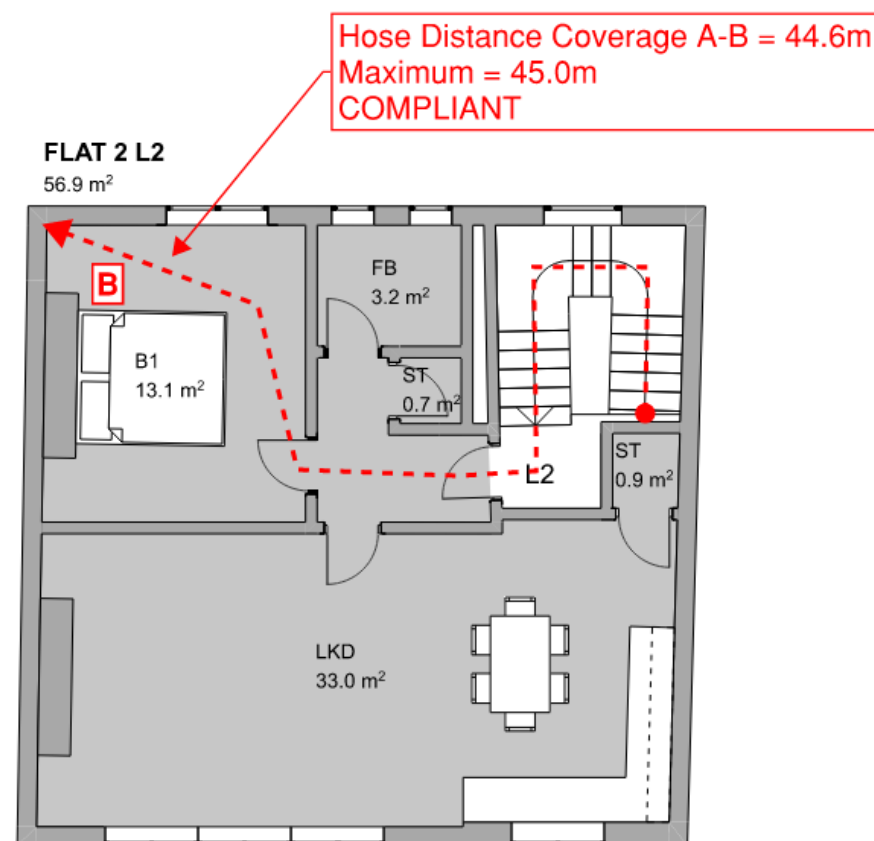


Figure 9 Hose coverage distance (apartment 2nd floor)

7.1.1 Fire Appliance Access

For the purposes of the Fire Safety Strategy, access for a fire pump appliance is to meet the following requirements:

- The minimum width between kerbs is to be no less than 3.7 m;
- The minimum width of fire tender accessible gateways is to be no less than 3.1 m;
- The minimum turning circle between kerbs and walls is to be no less than 16.8 m and 19.2 m, respectively;
- The minimum clearance height is to be no less than 3.7 m;
- The minimum carrying capacity should be no less than 12.5 tonnes (or 15 tonnes based on expected comments from the Fire Service);
- Where the length of a dead-end fire appliance access route exceeds 20 m, it should be provided with turning facilities (i.e., a hammer-head or turning circle).

Access for the fire service pump appliance will be provided by the North elevation of the development, which is directly overlooking Friar Street.

7.2 Fire Mains

No fire mains are required within the building as the building height does not exceed 18m and access to all points within the most remote apartment is provided within 45m of fire service and rescue location.

7.3 Fire Hydrants

In accordance with the requirements set out in BS 9991:2015, fire hydrants are to be provided within 90 m of an entry point to the building and not more than 90 m apart. The location of any new/existing fire hydrants is to be confirmed by the design team.

8. FIRE PROTECTION SYSTEMS

This section describes the fire protection systems to be provided with the development in order to ensure the safety of occupants and Fire Service personnel in the event of a fire.

8.1 Emergency Lighting

Emergency lighting is to be provided throughout the development designed, installed and commissioned in accordance with BS5266-1:2016.

8.2 Smoke Ventilation

The common single escape stair provided within the development should be provided with Automatic Opening Vent (AOV) achieving a minimum geometric free area of 1m² which should be measured in accordance with the provisions outlined within Diagram D7 – “Free area of smoke ventilators” of Approved Document B – Volume 1:2020.

The natural ventilator product should be tested and certified in accordance with BS EN 12101-2.

8.3 Secondary Power Supply

To ensure the operation of all life safety systems during a fire, a secondary power supply should be provided. Secondary power supplies are to be provided for the following primary life safety systems; however, this list is non-exhaustive;

- Smoke ventilation systems (including AOV's);
- Fire detection and alarm systems;
- Emergency lighting and illuminated escape signage.

All power supplies, electrical wiring, and control equipment should be protected against fire for an appropriate period of time where the effects of fire are likely to result in the failure or incorrect operation of the life safety system. Power and control cables should be installed in accordance with BS 8519:2020.

9. PROVISIONS FOR DISABLED OCCUPANTS

The Equality Act became law in October 2010. It replaced previous legislation (Disability Discrimination Act 1995) and provides employers and employees information on what they need to do to make their workplaces a fair environment and comply with the law.

With regard to fire safety, it is generally assumed that disabled occupants will be able to escape to a place away from danger without assistance from the Fire Service. However, there will be a certain proportion of building occupants, such as those who are non-ambulant disabled, i.e. wheelchair users, who will not be able to negotiate stairs unaided; therefore, an evacuation management procedure for disabled occupants will need to be incorporated into the Fire Safety Management Strategy. This is the responsibility of the end user of the building or 'The Responsible Person'.

Fire safety procedures will therefore, where appropriate, make provision for occupants who might need assistance to make their way to a place of ultimate safety in a fire. If there is a need to make specific arrangements, then it is assumed that consultation with the individual(s) or representative organisations should take place at the earliest opportunity.

9.1 Disabled Refuge Areas

No disabled refuge areas are provided within the protected/common escape stair serving the building as the residential apartments located at the upper levels of the buildings (first and second floor level), as the residential apartments shall adopt a "stay put" evacuation strategy where only the occupants of the flat of fire origin shall evacuate. It is also to be noted that there is no lift access to the residential apartments, with access to the upper levels by the stair only.

10. PROPERTY PROTECTION AND ENHANCED LIFE SAFETY

Smoke and fire spread are major causes of property, contents and business interruption losses. Consideration may be given to the introduction of additional fire protection systems for property protection. Such measures would serve to reduce the cost of damage replacement to structural elements and architectural features due to fire and smoke. Fire protection systems may also help in ensuring business continuity by reducing the ‘down time’ to repair fire damage within the building.

Property protection measures also provide benefit in enhancing the life safety provisions for building occupants and the Fire Service beyond the requirements of the minimum statutory obligations.

10.1 Fire Suppression

The inclusion of fire suppression is a measure to reduce fire severity and development in order to provide property protection. A fire suppression system, installed throughout a building, serves to reduce the growth of fire and confines fire damage to a relatively small area. In many cases a fire will be extinguished during the incipient stage.

Sprinkler systems are to be designed and installed in accordance with BS 9251:2014 within all residential areas (including ancillary residential areas) and BS EN 12845:2015 for all non-residential areas.

The benefits and disadvantages of fire suppression systems are outlined in Table 9.

Table 9 Benefits and disadvantages of fire suppression system

Benefits	Disadvantages
- Increased safety for occupants and the Fire Service - Reduction of damage to property - Reduced down time for damage repair - Potential reduction in structural fire protection provision requirements - Benefits with regard to insurance premiums for building owners and leaseholders, etc.	- Upfront cost of installation. However, it should be noted that a residential sprinkler system infrastructure may share pumps and tanks with the cold-water system serving the building - Ongoing maintenance costs - Spatial restrictions - Design constraints

10.2 Smoke Ventilation

In many fires, smoke is the greatest contribution to the damage of property as it serves to transport heat and effluents to many parts of a building. Smoke damage often results in the replacement of structural and architectural elements such as glazing and decorative items.

Severe smoke damage within a building can result in interruption to business whilst repair is undertaken. Smoke damage is often more severe than that resulting from the radiative effects of fire.

A well designed, strategic smoke ventilation system can serve to maintain the resulting smoke layer within a reservoir; at a temperature and a height above which damage could be caused within the main building. A smoke control system would actuate on the detection of smoke within the building.

A smoke ventilation system has other advantages for property protection where it provides Fire Service personnel with greater visibility within the building allowing them to reach the scene and extinguish the fire more quickly.

Smoke ventilation can be designed to provide natural or mechanical extract smoke ventilation.

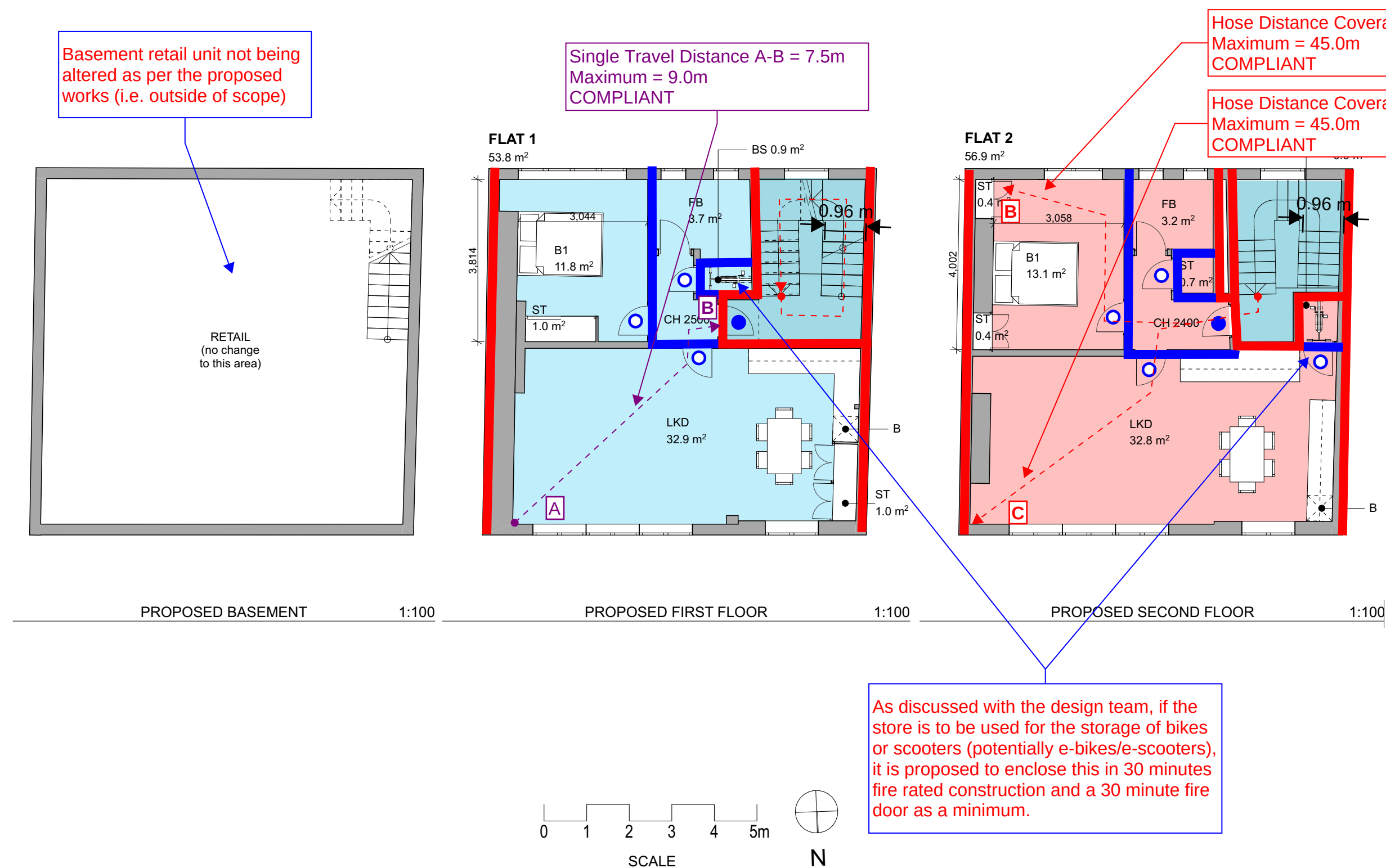
10.3 External Wall Construction

It is currently recommended for all materials used within the external wall construction to be Class A2 or better (euro class) with regard to combustibility to further restrict the spread of flame via the façade to provide an enhanced level of life safety. This enhancement would not only provide benefit with regard to occupant life safety but may also provide property protection and building insurance premium reductions.

APPENDIX A – FIRE STRATEGY DRAWINGS

1. This drawing is the property of Hydrock.
2. All dimensions are to be checked on site before the commencement of works. Any discrepancies are to be reported to the Architect & Engineer for verification. Figured dimensions only are to be taken from this drawing.
3. This drawing is to be read in conjunction with the Fire Safety Strategy Report.
4. Fire Strategy Drawings will require agreement with the local approving authorities.

	FD30 fire door
	FD60 fire door
	FD30S fire door
	FD60S fire door
	30 minute fire rated construction
	60 minute fire rated construction
	Single travel distance
	Total travel distance
	Hose distance



01	02.09.22	Stage 2 For Information						SMC	T
Rev	Date	Description						By	C
Architect :									
Hives Architects									
 Hydrock Consultants Ltd Merchant House Wapping Road Bristol BS1 4RW T +44 (0)117 945 0225 bristolcentral@hydrock.com www.hydrock.com									
Client :									
Vail Williams									
Project Title:									
153 Friar Street Reading									
Drawing Title:									
Level 00 to Level 02 Fire Strategy Drawings									
Drawing Status:									
Stage 2 For Information									
Hydrock Job No:									
25739									
Drawing	Checked:	Scale @ A1		Date	Issue Date				
SMC	TS	1:100		02.09.22	02.09.22				
Drawing Number:								Revision:	
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