

Design Note

Project	University of Manchester Fallowfield
Subject	Fire Safety Requirements
Project no	0053454
Date	25.08.2023

Revision	Description	Issued by	Date	Approved (signature)
00	Issued for outline planning	LL	29.06.2023	HC
01	Final issue for outline planning	NP	25.08.2023	HC

Introduction

This design note outlines the fire safety approach for the student residential development for the University of Manchester in Fallowfield. The site comprises new build residential blocks in a cluster flat arrangement served by shared vertical egress (staircases). The buildings will sit on the current student residence sites comprising Owens Park, Oak House and Woolton Hall.

This design note sets out information required for the current stage in the design and does not detail the fire safety provisions but sets out the principles to be adopted as the design progresses.

Design Approach

The buildings will be subject to the Building Regulations 2010 (as amended). The requirements for fire safety in this case are set out in Part B of the Building Regulations. The buildings will be designed to the standard guidance on compliance as presented in Approved Document B Vol 1 [1], supported by BS 9991 [2] where applicable.

Buildings over 18m also fall under the Building Safety Act 2022 [3].

This Report was prepared by Buro Happold Limited ("BHL") for the benefit, use and information of UoM and its Delivery Partner only for the purposes of the Fallowfield Campus Redevelopment Project Outline Planning Application. BHL assumes no liability or responsibility for any reliance placed on this Report by any other third party or for any actions taken by any such other third party in reliance of the information contained herein. BHL's responsibility regarding the contents of the Report shall be limited to the purpose for which the Report was produced and shall be subject to the express contract terms between BHL and Rider Levett Bucknall UK Limited. The Report shall not be construed as investment or financial advice. The findings of this Report are based on the available information as set out in this Report.

Means of Escape

Evacuation Strategy

The buildings will be designed based on a 'defend in place' or 'stay put' strategy. Only occupants from the dwelling (student cluster) of fire origin will evacuate and all other occupants will remain in place, unless directly affected by heat or smoke, or the fire and rescue service deem it necessary to evacuate other residents at a later stage.

Horizontal Escape

The maximum travel distance within the internal corridor of an individual cluster of flats should not exceed 9m in a single direction, increasing to 15m where the building is provided with sprinklers.

Kitchens in clusters should be located at the remote end of the corridor, away from the final exit to the cluster.

Vertical Escape

Residential buildings should be provided with at least one protected stairway for vertical escape subject to meeting the travel distances set out in section 0. Buildings over 30m should be provided with at least 2no. protected stairways.

The width of the stairway should not be less than 1000mm increased to 1100mm where the stair serves as a firefighting stair.

All escape stairs should discharge directly to external air, or through a protected corridor. The final exit from any stairs should be at least as wide as the stairs they serve.

There should not be connection to any ancillary spaces from the stair unless it is not the only stair serving the building and additional fire protection measures are in place.

Disabled Egress

A refuge area will be provided on every floor, in a place of relative safety, such as a protected lobby or stair landing. Refuges will be provided with a 2-way communication system, designed and installed in accordance with BS 5839-9 [4], which communicates with a central monitoring station.

Fire Safety Systems

Detection and Alarm

The cluster of flats should be provided with an automatic fire detection and alarm system to an LD1 standard, in accordance with BS 5839-6 [5], for simultaneous evacuation of the cluster of fire origin.

Buildings over 18m will be provided with an evacuation alert system to allow the fire service to evacuate the entire building.

BS 5839-1 [6] provides guidance on the design and selection of fire alarm warnings for people with impaired hearing. As people may be living in relative isolation, a visual and audible fire alarm may be the most appropriate solution.

Automatic Fire Suppression

Buildings over 11m should be provided with a category 4 residential sprinkler systems designed in accordance with BS 9251 [7]. Sprinklers should be provided within the individual flats, they do not need to be provided in the common areas such as stairs, corridors or landings when these areas are fire sterile.

The sprinkler system is required to satisfy the requirements of Part B of the Building Regulations and therefore should be provided with additional measures to improve system reliability and availability and is therefore to be regarded as a life safety system.

Smoke Ventilation

Smoke ventilation systems will be provided in a number of areas, including:

- The head of escape / firefighting staircases
- Firefighting lobbies
- Common corridors

Secondary Power Supplies

A secondary power supply serving the life safety systems of the buildings will be installed in the buildings. Independent of the primary power supply. Secondary and life safety power supplies will be designed in accordance with BS 9999.

Building systems requiring a secondary / back up emergency power supply include:

- fire detection and alarm;
- emergency voice communication systems (in refuges);
- firefighting lifts;
- firefighting shafts (associated equipment and normal lighting);
- firefighting shaft smoke ventilation;
- evacuation lifts;
- escape lighting;
- sprinkler system; and,
- staircase AOVs (subject to mode of operation).

Emergency Lighting and Signage

Emergency lighting will be designed and installed in accordance with BS 5266-1 [8].

All exits and routes to exits will be clearly marked with appropriate emergency escape signs so that the occupants can easily determine their most direct route to a place of safety in the event of an emergency. The system will be designed and installed in accordance with BS 5499-4 [9] and BS ISO 3864-1 [10].

To assist the fire service to identify each floor, floor identification and flat indicator signs should be provided in buildings above 11m.

Structure

The level of fire resistance provided to elements of structure in a building is based on the use of the building and its height from ground level to the highest occupied floor level.

The following minimum periods of fire resistance are applicable for this development.

Table 0—1 Minimum periods of fire resistance

Building height	Minimum Period of Fire Resistance
Up to 11m	60 minutes
Up to 18m (sprinklered)	60 minutes

Building height	Minimum Period of Fire Resistance
Up to 30m (sprinklered)	90 minutes
More than 30m (sprinklered)	120 minutes

Fire Separation

Corridors in cluster flats should be provided with fire resisting construction of at least 30 minutes. Kitchens should be separated from any bedrooms with fire resisting construction of at least 30 minutes.

Plant and ancillary spaces should be enclosed in fire resisting construction appropriate to the risk.

Escape stairs and service risers should be constructed as protected shafts to the same period of fire resistance as the building.

External Fire Spread

External Surfaces

All residential buildings over 18m in height have a requirement that all materials which become part of an external wall or specified attachment achieve class A2-s1, d0 or class A1 in accordance with BS EN 13501-1 [11], other than those exempted.

In buildings that include a 'residential' purpose with a storey 11m or more in height, any insulation product, filler material (such as the core materials of metal composite panels, sandwich panels and window spandrel panels but not including gaskets, sealants and similar) etc. used in the construction of an external wall should be class A2-s1, d0 or better.

External Fire Spread Analysis

Due to the high level of compartmentation within residential buildings it is unlikely that, given the space separation indicated on the site plan, there is undue risk of fire spread between buildings. A detailed assessment will be carried out as the design progresses and fire resistance will be provided if required.

Adjoining buildings will be separated by fire resisting construction as per the structural fire resistance of the taller building.

Internal angles between buildings or where the fire fighting core or escape stair sits on an internal angle will be provided with fire resisting construction to prevent fire spread and protect egress and fire fighting provisions.

Fire Service Access

Building Access

For the cluster flats, either of the following provisions should be made.

Provide access for a pumping appliance to within 45m of all points inside each cluster flat of a block, measured along the route of the hose, or

Provide fire mains where:

- Access is provided for a pumping appliance to within 18m of each fire main inlet connection point. Inlets should be on the face of the building. And
- The fire main inlet connection point should be visible from the parking position of the appliance and meet the provisions in Section 8 of BS 9990 [12].

For buildings over 18m a fire fighting shaft must be provided. See section 0.

Vehicular Access

Roadways leading to the buildings, and those provided around the buildings where pump appliances can drive and/or park will be designed to meet the criteria given in Table 0—1:

Table 0—1 Fire Vehicle Access

Appliance Type	Minimum Width of Road between Curbs (m)	Minimum Width of Gateways (m)	Minimum Turning Circle Between Curbs (m)	Minimum Turning Circle Between Walls (m)	Minimum Clearance Height (m)	Minimum Carrying Capacity (tonnes)
Pump	3.7	3.1	16.8	19.2	3.7	12.0
High reach	3.7	3.1	26.0	29.0	4.0	17.0

Building Access Assessment

An initial assessment of the current access provisions has been undertaken, as shown in Figure 0-1. Vehicular access highlighted in orange, where the minimum width of the road should be 3.7m. Arrows show potential parking positions.

Turning facilities should be provided so that the maximum dead-end access route does not exceed 20m. It is proposed for vehicles to use hammerhead turning facilities reach the buildings where the fire tender cannot continue along the route/roadway.

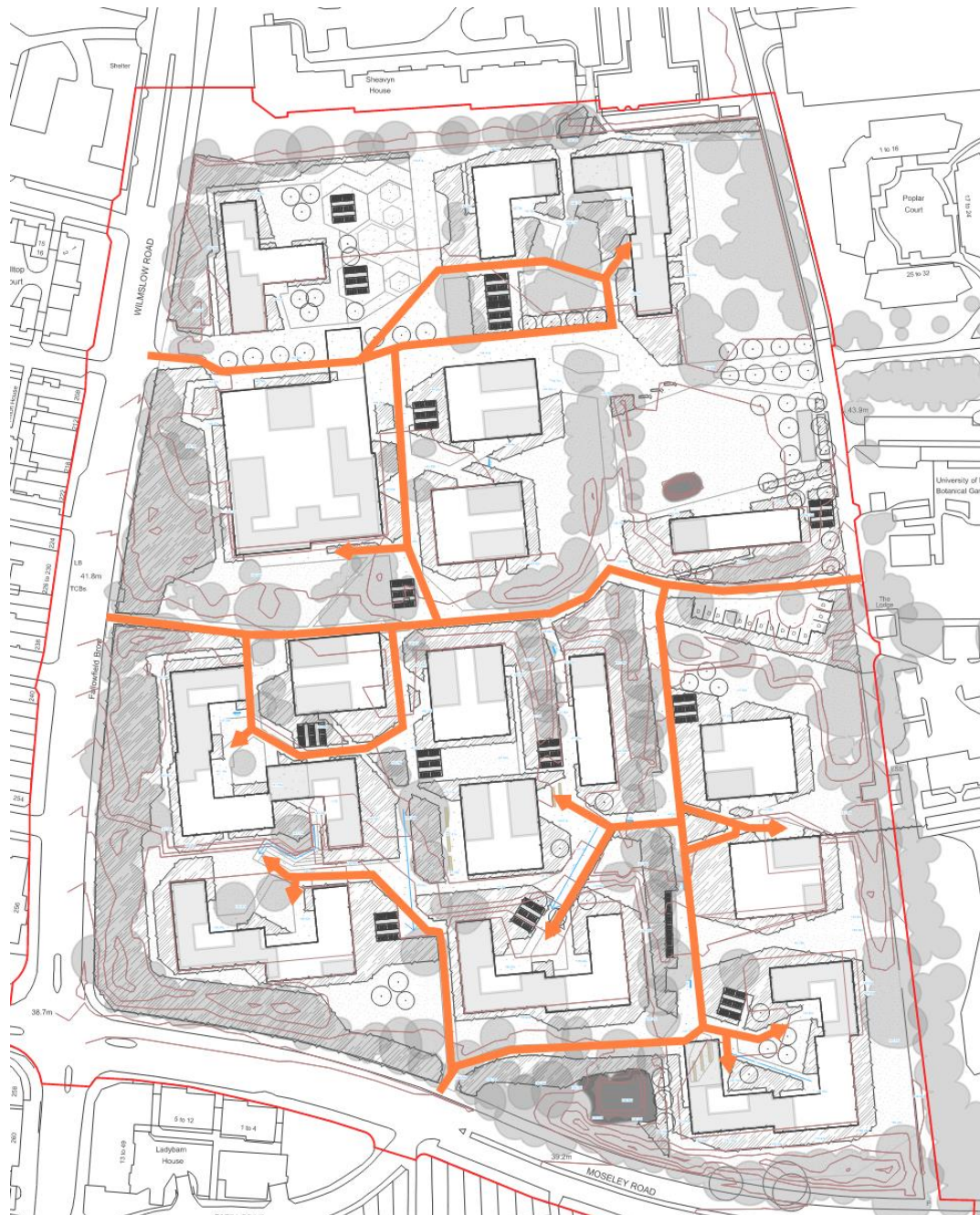


Figure 0-1 Access Routes Mark Up

Internal Firefighting Provisions

Residential buildings over 18m require firefighting shafts, including firefighting stairs, firefighting lift, a ventilated firefighting lobby/common corridor, dry fire mains and smoke ventilation at the head of the stair. Access to the firefighting shaft at ground floor should be directly from the open air or accessed by a protected internal corridor not exceeding 18m in length.

Flats should be within 60m of a firefighting shaft on a route suitable for laying a hose.

Fire Hydrants

Hydrants should be provided within 90m of the buildings. An assessment of the existing hydrant provision should be carried out to determine where additional hydrant provision is required.

References

- [1] Approved Document B: Volume 1 - Dwellings, BSI, 2019.
- [2] BS 9991: Fire safety in the design, management and use of residential buildings - code of practice, BSI, 2015.
- [3] Building Safety Act 2022, HM Government, 2022.
- [4] BS 5839-9: Fire detection and fire alarm systems for buildings. Code of practice for the design, installation, commissioning and maintenance of emergency voice communication systems, BSI, 2021.
- [5] BS 5839-6: Fire detection and fire alarm systems for buildings. Code of practice for the design, installation, commissioning and maintenance of fire detection and fire alarm systems in domestic premises, BSI, 2019.
- [6] BS 5839-1: Fire detection and fire alarm systems for buildings. Code of practice for design, installation, commissioning and maintenance of systems in non-domestic premises, BSI, 2017.
- [7] BS 9251: Fire sprinkler systems for domestic and residential occupancies - code of practice, BSI, 2021.
- [8] BS 5266-1: Emergency lighting. Code of practice for the emergency lighting of premises, BSI, 2016.
- [9] BS 5499-4: Safety signs. Code of practice for escape route signing, BSI, 2013.
- [10] BS ISO 3864-1: Graphical symbols - Safety colours and safety signs. Design principles for safety signs and safety markings, BSI, 2011.
- [11] BS EN 13501-1: Fire classification of construction products and building elements. Classification using data from reaction to fire tests, BSI, 2018.
- [12] BS 9990: Non-automatic fire-fighting systems in buildings - Code of practice, BSI, 2015.