

Stage 2 Fire Safety Strategy Report

For

Ty Cambria, Cardiff

Reference: FSE2641

Issue No: 01

5 August 2026

Revision History

Issue Number:	01 – Draft Stage 2	Issue Date:	05/08/2026
Initial issue for design team comments			
Prepared by:		Contact:	
Kieran Cooper BEng(Hons) APAEWE, MIFSM, AIFireE		kcooper@heliosconsultancy.com 07927 615 734	
Reviewed by:		Contact:	
John Preston BEng(Hons), AIFireE		jpreston@heliosconsultancy.com 07598 524 108	
Reviewed by:		Contact:	
Richard Jones BA(Hons), Grad.Dip, AIFireE, MCABE CBuildE		rjones@heliosconsultancy.com 07902 434087	

Client Details

Client	Elite Real Escape Services UK Ltd
Client Address	16 Berkeley Street, London, W1J 8DZ, United Kingdom
Project	Ty Cambria, 29 Newport Road, Cardiff

Validity

This report is produced on the basis of the information and experience available at the time of preparation. It is applicable to the above-mentioned project only in accordance with the client's instructions. It is only valid provided no other modifications are made other than those for which a formal opinion has been sought from and given by Helios Fire & Construction Consultancy UK.

The report outlines the principal opinion of Helios Fire & Construction Consultancy and is prepared based on information issued by other parties, this report should not be viewed as an approval of that information and no liability is accepted for its accuracy.

All legislation quoted is primarily concerned with life safety and property protection is not specifically considered although the fire protection provisions to be provided for the building will offer some degree of property protection.

Furthermore, other issues such as insurers' requirements, cultural heritage, environmental, or continuity issues have not been specifically addressed or included within the development of the fire safety strategy.

Transmission and receipt of Information used in the preparation of the Fire Safety Strategy is agreed on the basis outlined in the fee proposal as issued by Helios Fire & Construction Consultancy. Should a web-based document management system be used, information that is specifically to be assessed and reviewed by Helios Fire & Construction Consultancy should be issued directly to the representative of Helios Fire & Construction Consultancy. The acceptance of access onto any web-based system by Helios Fire & Construction Consultancy does not constitute an acknowledgement that all information on the specific portal will have been assessed and reviewed. For Helios Fire & Construction Consultancy Ltd Disclaimers and IT Policy please see www.heliosconsultancy.com.

In preparing this fire strategy the design and construction will, unless stated otherwise in this report, be in accordance with the design principles of Approved Document B, applicable British Standards /Approved Documents and relevant codes of practice.

The terms 'will' and 'will be' in this report represent Helios Fire & Construction Consultancy's recommendations and understanding regarding the proposed design, construction, or management of the development. The validity of this report depends on these items being implemented as outlined.

This report relates to a project that is subject to third party approval. It must be ensured that the contents of this report are agreed with all relevant approval bodies prior to implementation

Contents

1	Overview of Development	5
1.1	Description	5
1.2	Height of Top Occupied Floor	5
1.3	General Building Arrangement	6
1.3.1	Ground Floor	6
1.3.2	Level 01	6
1.3.3	Level 02 – Level 06	6
1.3.4	Level 07	6
1.3.5	Level 08 – Level 14	7
1.3.6	Level 15	7
1.3.7	Level 16 – Level 22	7
1.3.8	Level 23	7
1.3.9	Roof Level	8
1.4	Helios Fire Sketches	9
1.5	Evacuation Strategy and Occupancy	18
1.6	Purpose of Report	18
1.7	Sources of Information	19
2	Statutory Compliance	20
2.1	The Building Regulations	20
2.2	Regulation 7 – Building Regulations	20
2.3	Guidance	20
2.3.1	Accessible Design	20
2.4	The Regulatory Reform (Fire Safety) Order 2005	20
2.4.1	Fire Safety Order 2005	20
2.4.2	Fire Safety Act 2021	20
2.4.3	Section 156 of the Building Safety Act 2022	20
2.5	The Welsh Building Safety Regime	21
2.6	Construction, Design and Management Regulations	21
2.7	Third Party Accreditation Schemes	21
3	Access & Facilities for the Fire Service	22
3.1	General Access	22
3.2	Vehicle Access	22
3.3	Firefighting Provisions	22
3.3.1	Firefighting Stairs	23
3.3.2	Firefighting Lobbies / Evacuation Lift Lobbies	23
3.3.3	Firefighters lift	23
3.3.4	Fire and Rescue Service Communications	23
3.3.5	Rising Mains	23
3.4	Smoke Ventilation	23
3.4.1	Smoke Ventilation to Firefighting Shafts	23
3.5	Wayfinding Signage	24
3.6	Firefighting Water Supplies	24

3.7	Automatic Water Fire Suppression System	24
3.8	Emergency Evacuation System	24
3.9	Firefighting Power Supplies	24
3.10	Secure Premises Information Boxes	24
4	Active Fire Protection Systems	26
4.1	Fire Detection and Alarm	26
4.1.1	Flats/ Amenity and Plant	26
4.1.2	Commercial Units	26
4.2	Emergency Evacuation Alert System	26
4.3	Emergency Lighting and Signage	26
4.3.1	Wayfinding Signage	27
4.4	Automatic Water Fire Suppression System (AWFSS)	27
4.4.1	Residential Areas	27
4.4.2	Communal Amenity / Ancillary Areas/ Commercial	27
4.5	Evacuation Lifts	27
4.6	Smoke Ventilation	28
4.6.1	General Requirements	28
4.6.2	Ancillary Smoke Ventilation	29
4.6.3	Smoke Shafts	29
4.6.4	Smoke Control Vents and Automatic Opening Vents (AOVs)	29
4.6.5	Smoke Ventilation Summary	30
4.7	Fire and Smoke Dampers	31
4.8	Category B Protective Devices	31
4.9	Power Supplies	31
5	Horizontal Means of Escape	33
5.1	Flat Types	33
5.1.1	Open Kitchens	33
5.1.2	Flats with Restricted Travel Distance	33
5.1.3	Cluster Accommodation	33
5.1.4	Balconies	34
5.2	Travel Distances	35
5.2.1	Travel Distances	35
5.2.2	Residential Summary	35
5.2.3	Ancillary Accommodation Summary	35
5.2.4	Roof Areas	35
5.2.5	Commercial	35
5.3	Exit Width Requirements	35
5.3.1	Clear Exit Widths	35
5.3.2	Residential Required Exit Widths	35
5.3.3	Ancillary Required Exit Widths	35
5.4	Inner Rooms	36
5.5	Dead Ends	36
5.6	Escape Routes – General	36
5.6.1	Protected Common Corridors	36

5.6.2	Protected Lobbies	36	11.1	General Requirements and Regulations	48
5.6.3	Evacuation Lobbies	36	11.2	Combustibility of External Walls	48
5.6.4	Non-Protected Corridors	36	11.3	External Surfaces – Surface Spread of Flame	48
5.6.5	Cross Corridor Protection	36	11.4	Materials and Products	49
5.6.6	Exits	36	11.5	Cavities Barriers and Fire Barriers	49
5.6.7	External Escape Routes	36	11.6	Roof Coverings	49
5.6.8	Services Running Horizontally within Common Corridors	37	11.7	Photovoltaic Panel Arrays	49
5.6.9	Assembly Points	37	11.8	Roof Garden/Roof Terrace	49
6	Vertical Escape	38	11.8.1	Construction of Communal Terraces and Roof Gardens	49
6.1	Vertical Escape	38	12	External Fire Spread – Space Separation	51
6.2	Vertical Clear Widths	38	12.1	Relevant Boundaries	51
6.2.1	Final Exit Routes from Stairs	38	12.2	Space Separation	51
6.3	Vertical Escape Routes – General	39	12.2.1	Space Separation Calculations	52
6.3.1	Firefighting Stair	39	13	Fire Safety Management	53
6.3.2	Escape Stair	39	13.1	Management Level and Requirements	53
6.3.3	Evacuation/ Firefighters lifts	39	13.1.1	Management	53
6.3.4	Protected Shaft	39	13.1.2	Fire Risk Management Strategy	53
6.3.5	Fire Protection to Internal Angles on External Walls	39	13.1.3	First Aid Firefighting Provisions	53
6.3.6	Smoke Ventilation to Stairs	39			
6.4	Accessible Means of Escape	39			
7	Internal Fire Spread – Linings	40			
7.1	Internal Linings	40			
7.2	Rooflights and Lighting Diffusers	40			
8	Internal Fire Spread – Structure	41			
8.1	Elements of Structure	41			
8.2	Minimum Fire Resistance Requirements	41			
8.3	Compartmentation	41			
8.3.1	Junctions with Compartment Walls and Roof	41			
8.3.2	Fire Protection to Internal Angles on External Walls	42			
8.4	Ancillary Accommodation	42			
8.5	Fire Doors	43			
8.5.1	Doors on Escape Routes	43			
8.6	Smoke Control Dampers	43			
9	Fire Rated Elements and Fire-Stopping	44			
9.1	Fire-Stopping	44			
9.2	Junctions to Fire Rated Elements	44			
9.3	Fire Barriers	44			
9.4	Penetrations to Fire Rated Construction	44			
9.4.1	Pipe Penetrations	44			
9.4.2	Ductwork Penetrations	45			
9.4.3	Air Transfer Grilles	46			
9.4.4	Exhaust from HVAC Whole Building or Interconnected Dwelling Systems	46			
10	Concealed Spaces	47			
11	External Fire Spread – External Wall and Roof Construction	48			

1 Overview of Development

1.1 Description

Ty Cambria is a proposed purpose-built student accommodation (PBSA) development on the site of 29 Newport Road, Cardiff. The scheme comprises a 24 storey building (ground plus 23 upper levels) providing a mix of studio flats and cluster flats. Each cluster flat comprises a shared living / kitchen / dining space (LDK) and bedrooms accessed off an internal protected entrance hallway.

The building is predominantly residential. The ground floor comprises a commercial / co-work unit, the main residential entrance lobby, a gym / wellness suite, a cycle store with an internal mezzanine level, a bin store and back of house ancillary accommodation including plant, the sprinkler tank and pump room, an LV room, a substation, comms and management accommodation.

Communal amenity accommodation is provided at Level 07 together with an external communal terrace formed over the roof of the lower part of the building. Further communal amenity accommodation, an external terrace and external plant are provided at Level 23.

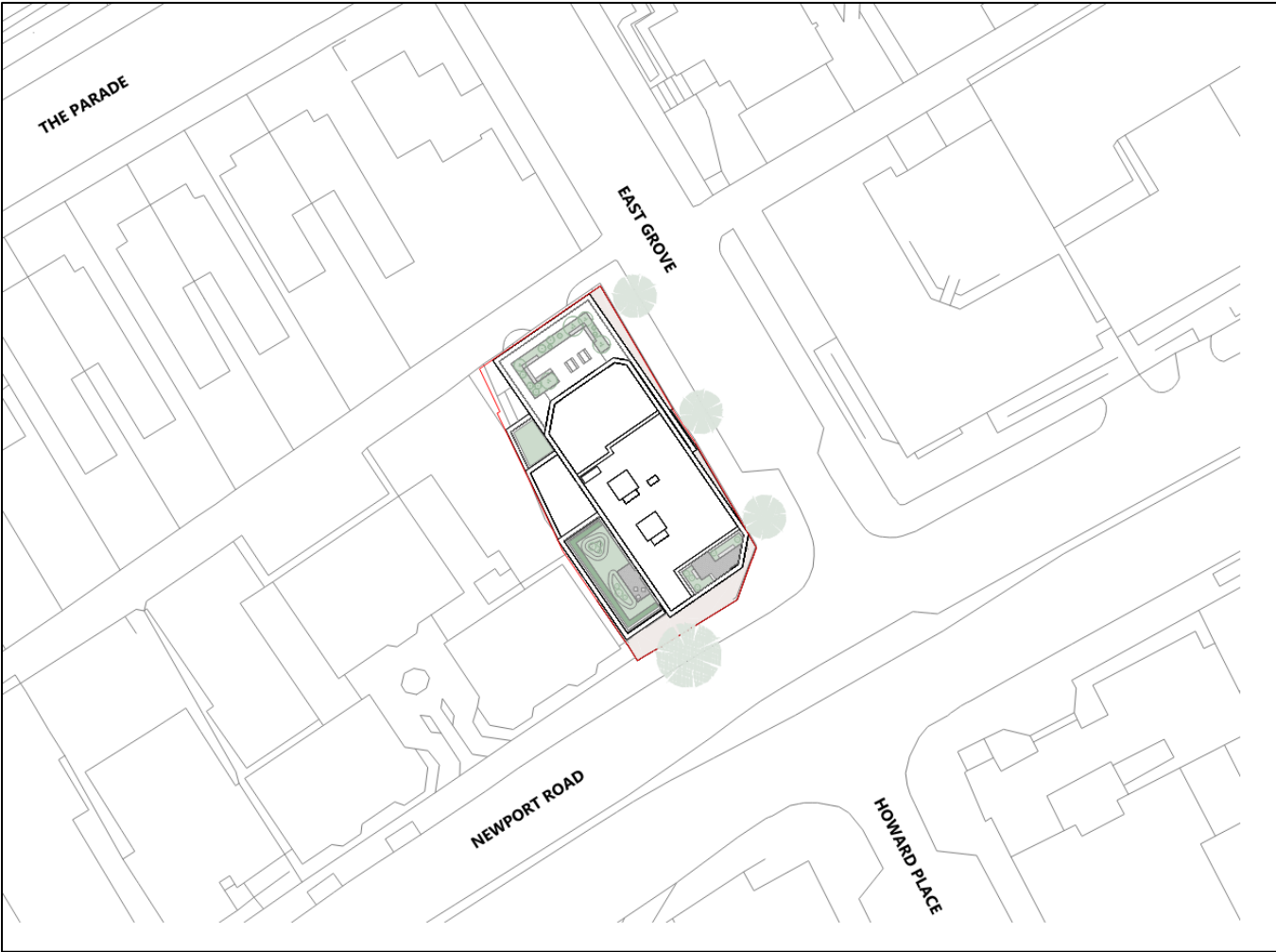


Figure 1: Site Plan

The building is served by two stairs (Stair 1 and Stair 2) located adjacent to one another towards the centre of the floor plate. Each stair is served by its own lift (Lift 1 and Lift 2) and its own evacuation / firefighting lift lobby, and both stairs discharge to open air at ground floor level. Stair 1 discharges via the evacuation lift lobby and Stair 2 has direct access to outside. There is no basement.

1.2 Height of Top Occupied Floor

For the purpose of this fire safety strategy, the height of the top occupied storey in the building has been taken from the lowest surrounding ground level. Based on the architect's elevations, ground floor level is set at +11.000 and the finished floor level of Level 23, the top occupied storey, is +80.525. The height to the top occupied floor is therefore circa 69.5m. Roof level is +83.825 and the parapet level is +85.825.

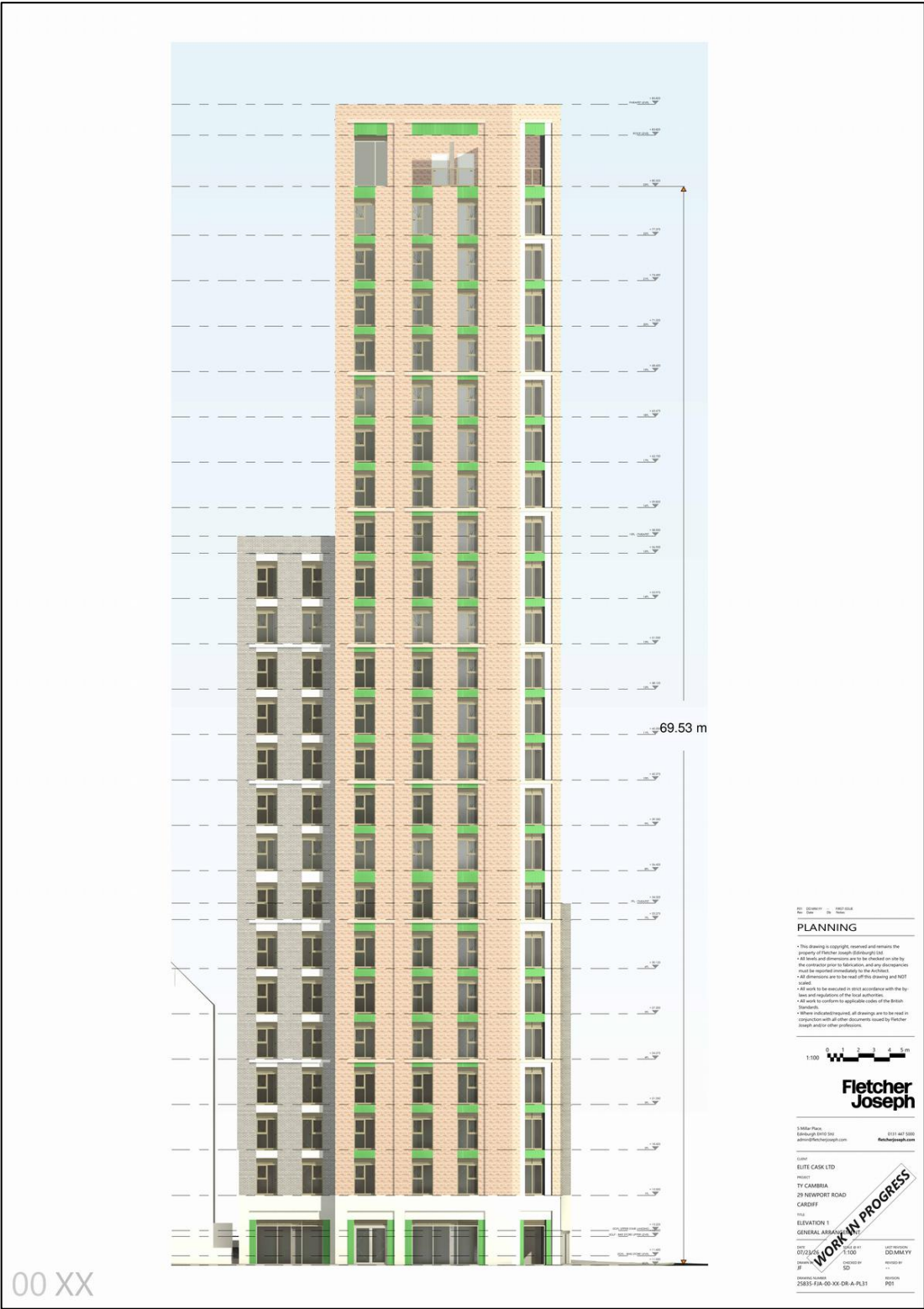


Figure 2: General Building Arrangement – Elevation 1

1.3 General Building Arrangement

1.3.1 Ground Floor

The ground floor comprises the commercial / co-work unit (circa 130m²), the main residential entrance lobby, a gym / wellness suite, a cycle store with an internal mezzanine level, a bin store and back of house ancillary accommodation comprising the sprinkler tank and pump room, plant, a substation, an LV room, comms, management accommodation and back of house toilet facilities. The total approximate floor area is circa 820m².

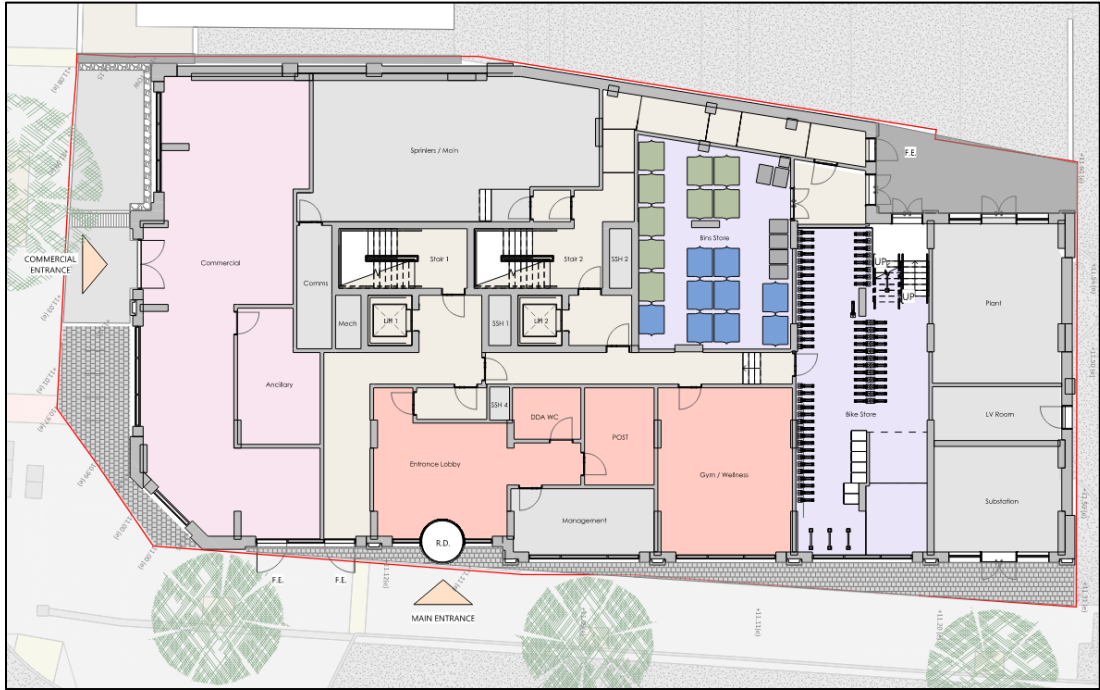


Figure 3: Ground Floor Arrangement

1.3.2 Level 01

Level 01 comprises studio flats and cluster flats and is served by both stairs. Two water / plant rooms are located at the northern end of the floor plate in a dead-end condition and are lobby protected. The total approximate floor area is circa 745m².



Figure 4: Level 01

1.3.3 Level 02 – Level 06

Levels 02 to 06 comprise studio flats and cluster flats and are served by both stairs. The total approximate floor area of each of these levels is circa 740m².



Figure 5: Level 02 – Level 06

1.3.4 Level 07

Level 07 comprises studio flats, one cluster flat and a communal amenity space (circa 93m²), and is served by both stairs. The footprint steps in at this level and an external communal terrace of circa 105m² is formed over the roof of the lower part of the building. The total approximate enclosed floor area is circa 525m² excluding the terrace.

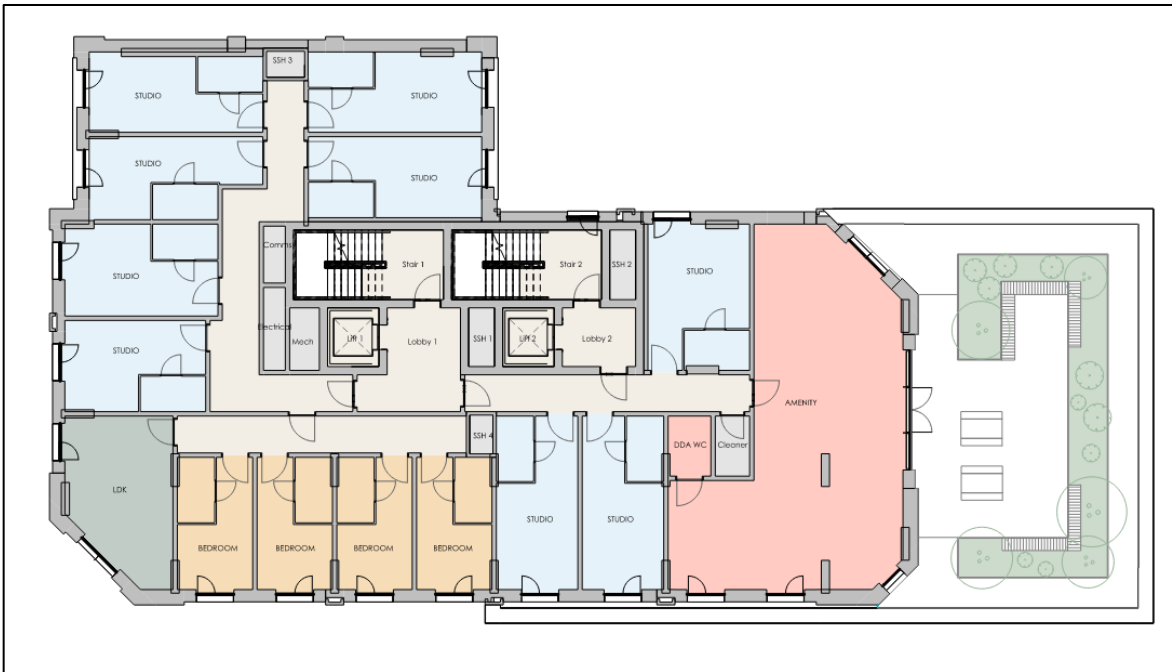


Figure 6: Level 07

1.3.5 Level 08 – Level 14

Levels 08 to 14 comprise studio flats and cluster flats and are served by both stairs. The total approximate floor area of each of these levels is circa 535m².

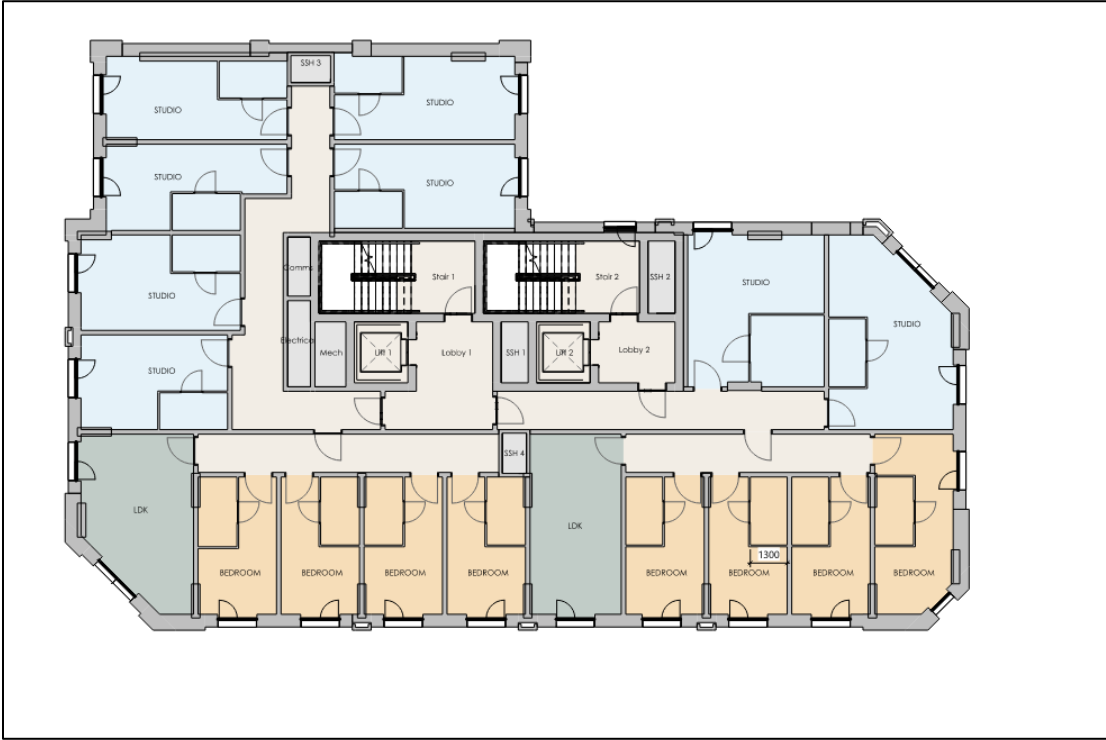


Figure 7: Level 08 – Level 14

1.3.6 Level 15

Level 15 comprises studio flats and cluster flats and is served by both stairs. The footprint steps in again at this level. The total approximate floor area is circa 440m².

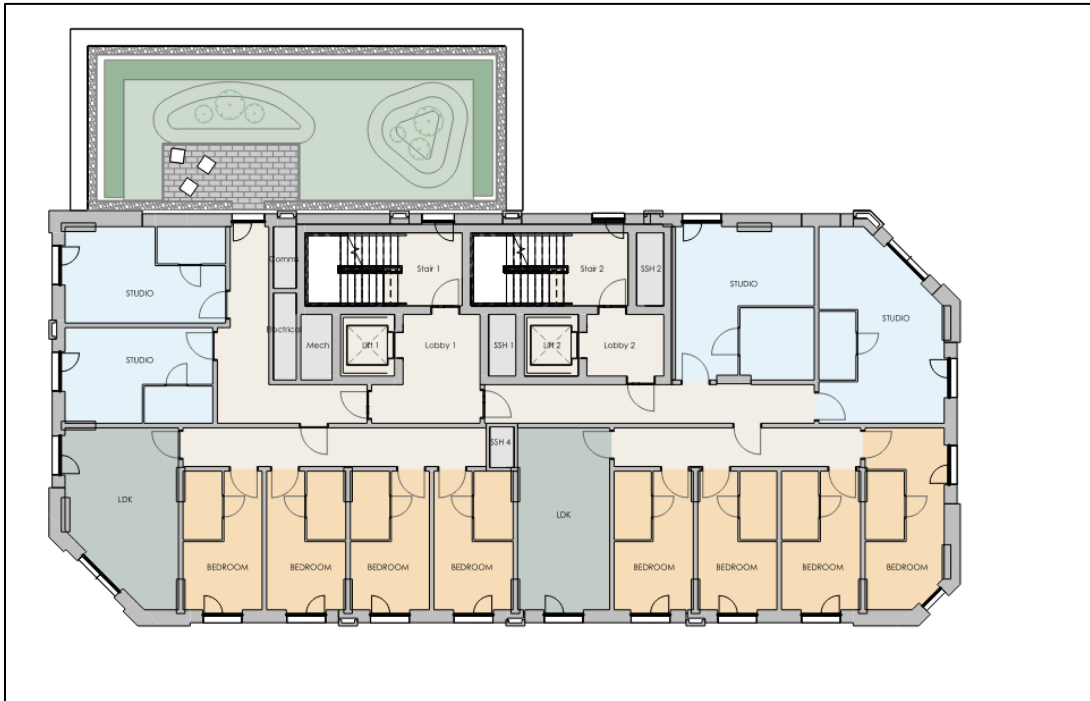


Figure 8: Level 15

1.3.7 Level 16 – Level 22

Levels 16 to 22 comprise studio flats and cluster flats and are served by both stairs. The total approximate floor area of each of these levels is circa 440m².



Figure 9: Level 16 – Level 22

1.3.8 Level 23

Level 23 comprises two communal amenity spaces (circa 30m² and circa 55m²), an external terrace of circa 32m², a water / plant room (circa 55m²) and an external plant area (circa 112m²). There is no student accommodation at this level. The level is served by both stairs. The total approximate floor area, including the external terrace and external plant area within the building envelope, is circa 440m².

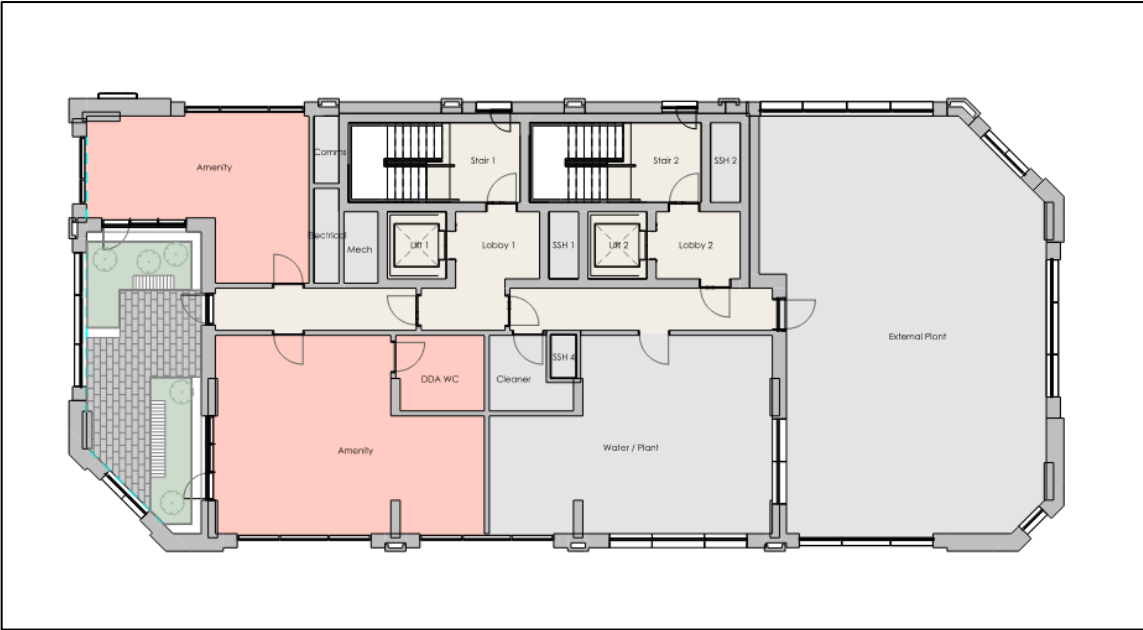


Figure 10: Level 23

1.3.9 **Roof Level**

The roof comprises the two lift overrun pop-ups, a mechanical plant enclosure and the heads of the smoke ventilation shafts and stair automatic opening vents. There is no resident access to the roof.

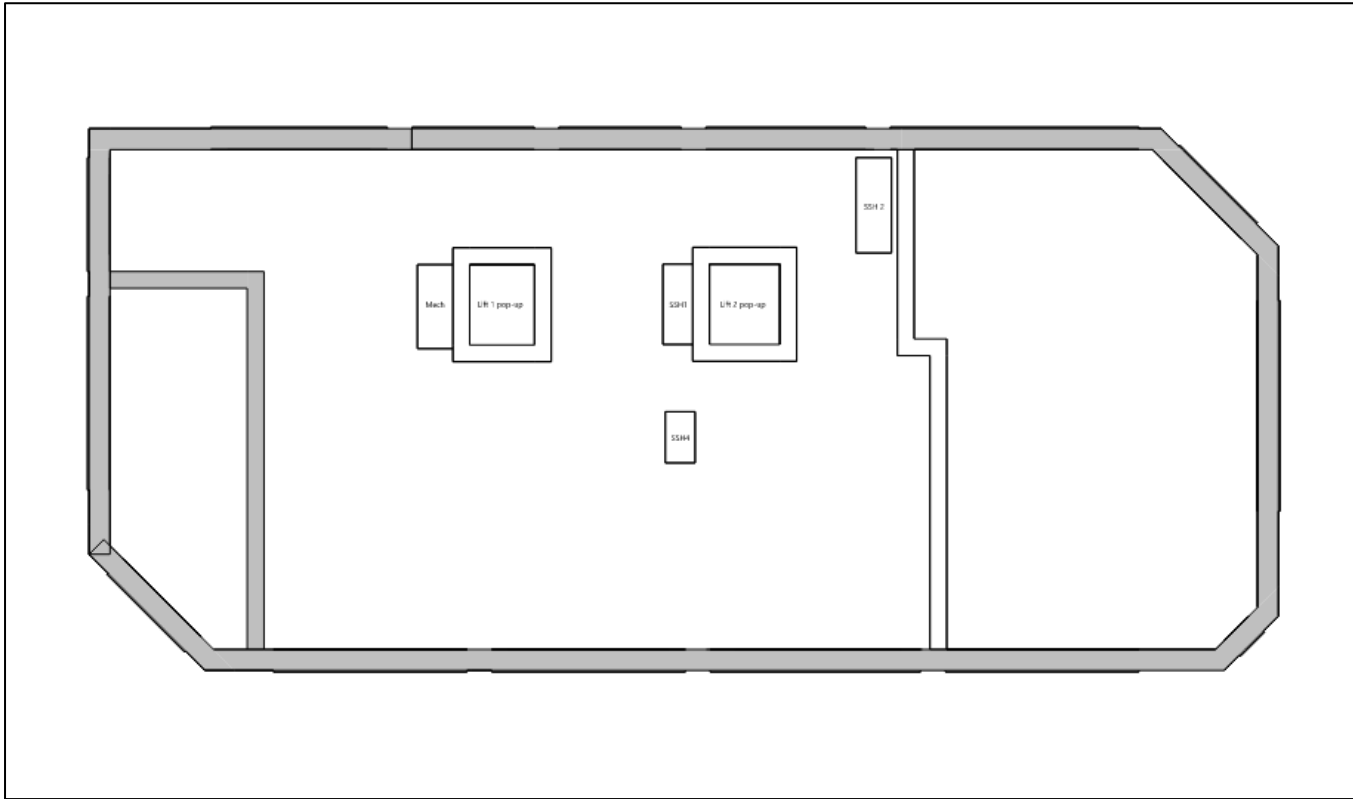


Figure 11: Roof Level

1.4 Helios Fire Sketches

The Helios fire safety sketches are noted below and should be read in conjunction with this report. The sketches are mark-ups prepared to inform the architect in the production of their fire strategy drawings and are not a substitute for those drawings.

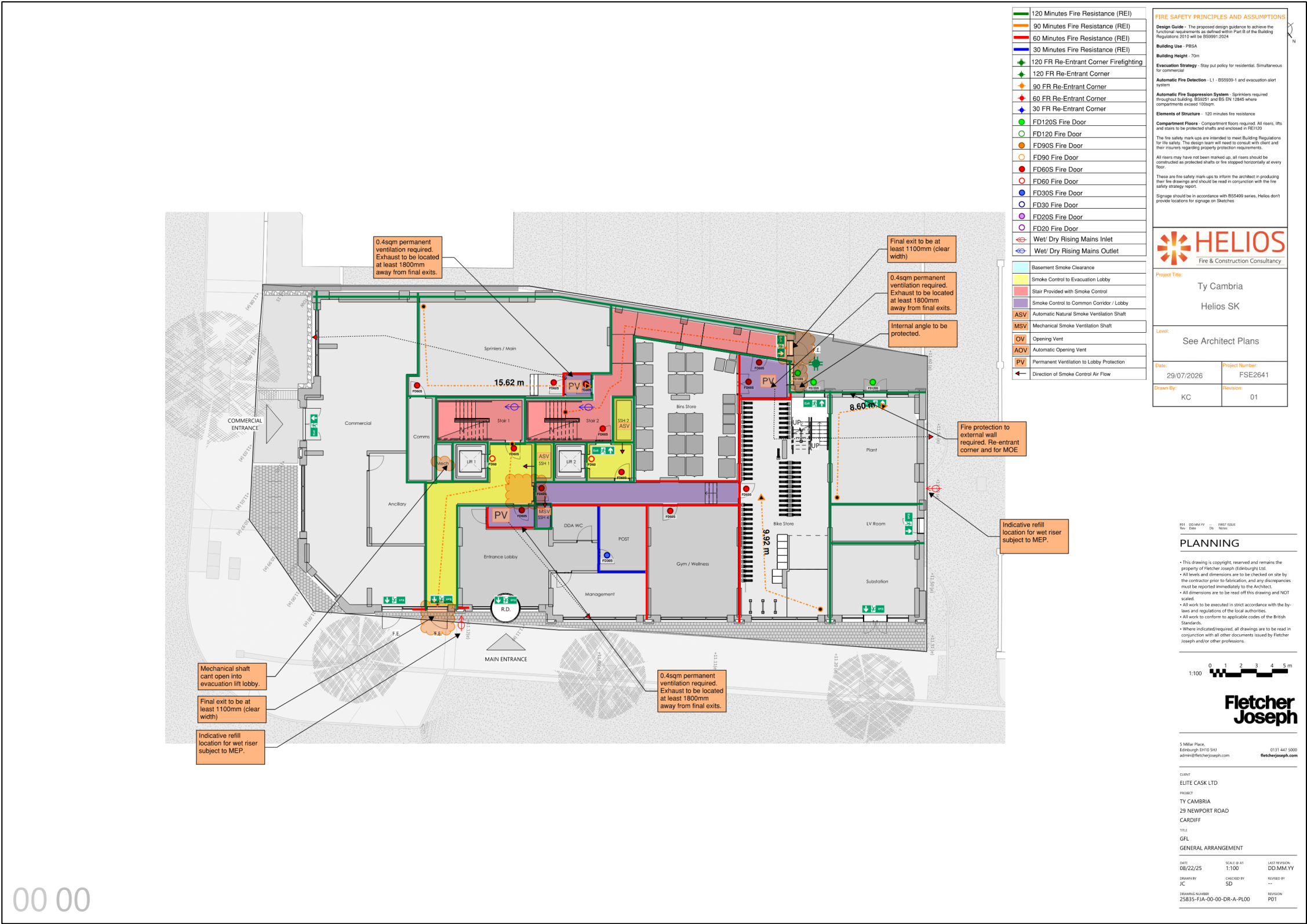


Figure 12: Helios SK FSE2641– Ground Floor



Page 10



Page 11

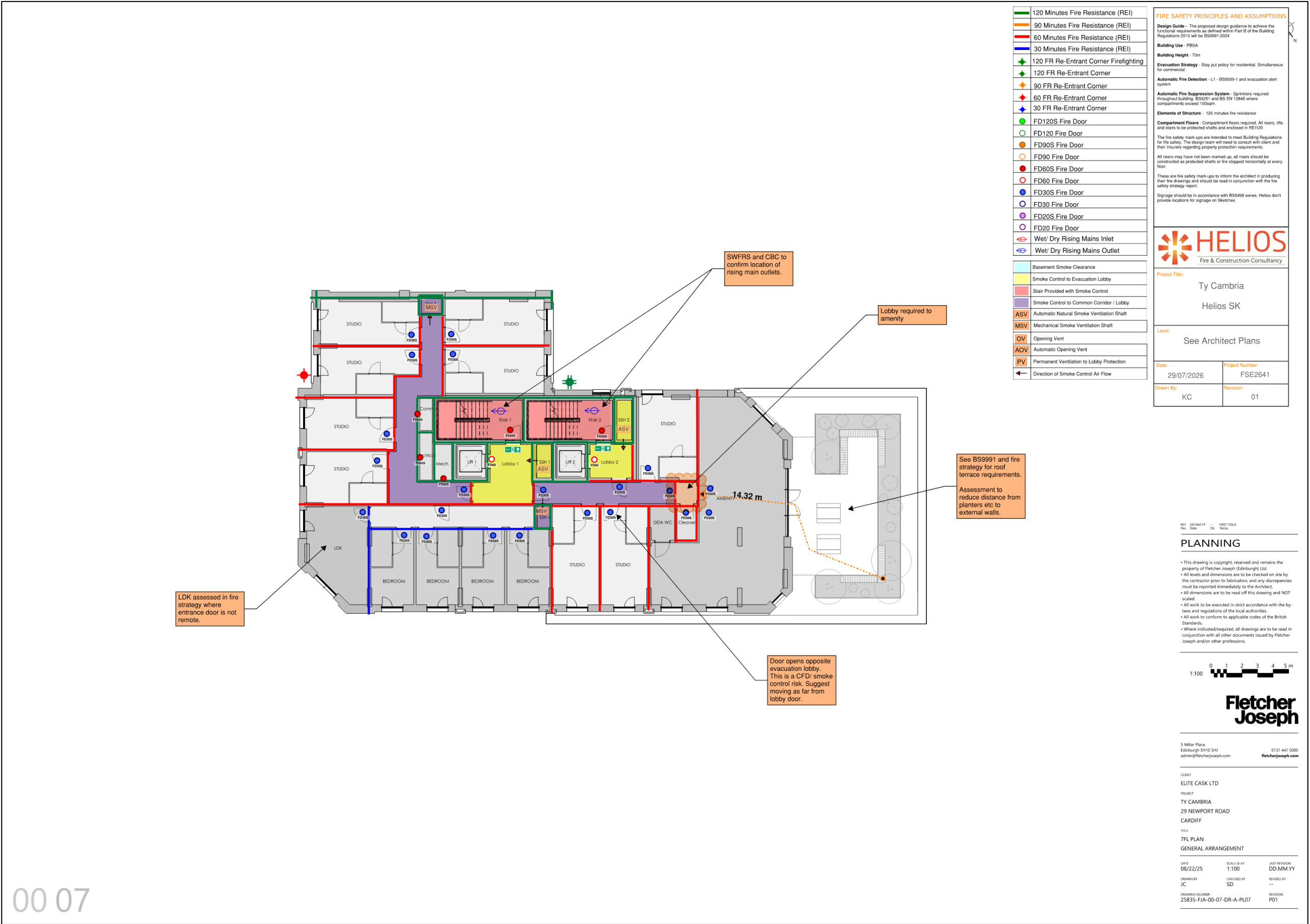


Figure 15: Helios SK FSE2641 – Level 07

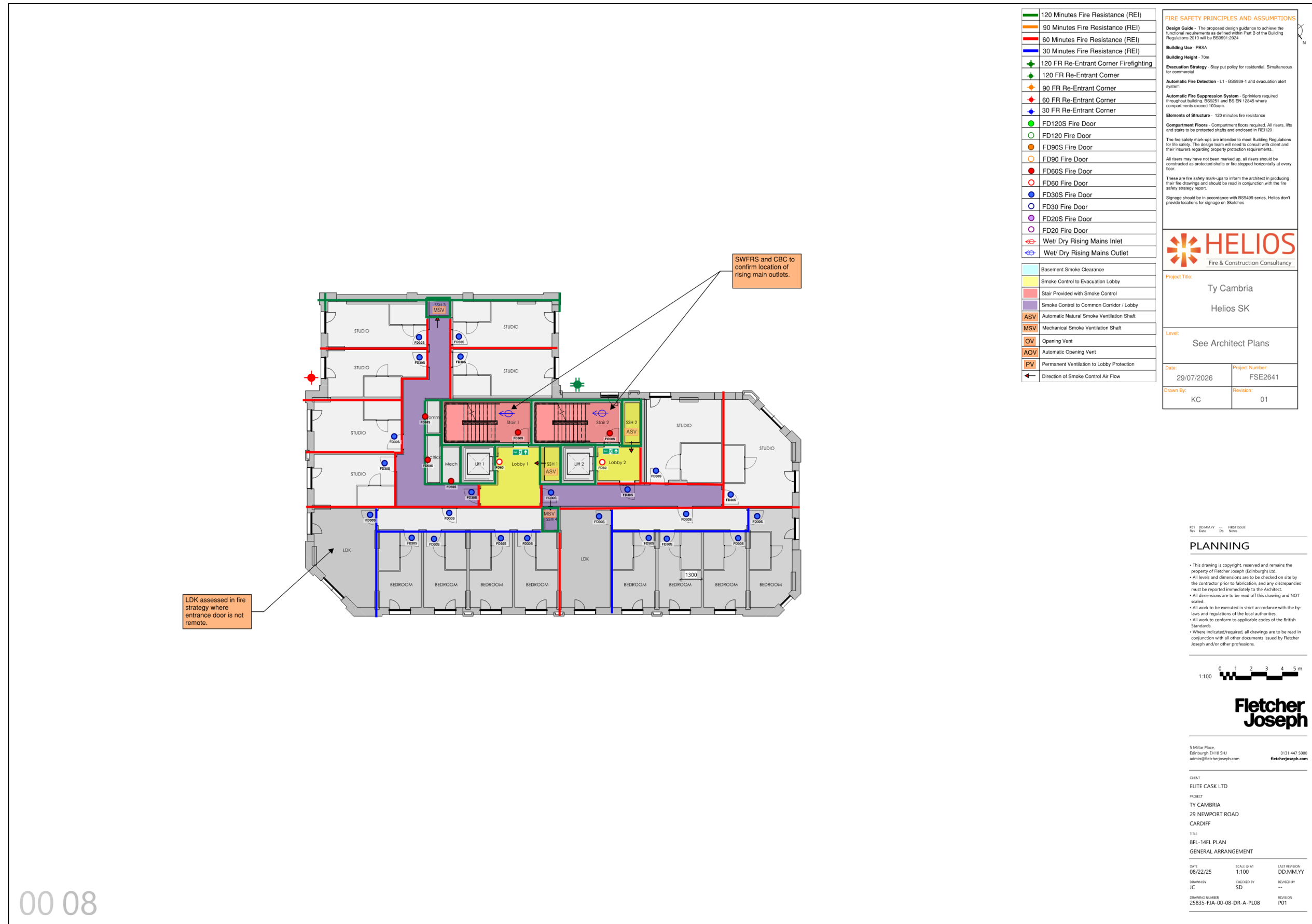


Figure 16: Helios SK FSE2641 – Level 08 – Level 14



	120 Minutes Fire Resistance (REI)
	90 Minutes Fire Resistance (REI)
	60 Minutes Fire Resistance (REI)
	30 Minutes Fire Resistance (REI)
	120 FR Re-Entrant Corner Firefighting
	120 FR Re-Entrant Corner
	90 FR Re-Entrant Corner
	60 FR Re-Entrant Corner
	30 FR Re-Entrant Corner
	FD120S Fire Door
	FD120 Fire Door
	FD90S Fire Door
	FD90 Fire Door
	FD60S Fire Door
	FD60 Fire Door
	FD30S Fire Door
	FD30 Fire Door
	FD20S Fire Door
	FD20 Fire Door
	Wet/ Dry Rising Mains Inlet
	Wet/ Dry Rising Mains Outlet
	Basement Smoke Clearance
	Smoke Control to Evacuation Lobby
	Stair Provided with Smoke Control
	Smoke Control to Common Corridor / Lobby
	ASV Automatic Natural Smoke Ventilation Shaft
	MSV Mechanical Smoke Ventilation Shaft
	OV Opening Vent
	AOV Automatic Opening Vent
	PV Permanent Ventilation to Lobby Protection
	Direction of Smoke Control Air Flow

FIRE SAFETY PRINCIPLES AND ASSUMPTIONS

Design Guide - The proposed design guidance to achieve the functional requirements as defined within Part B of the Building Regulations 2010 will be BS9991:2024

Building Use - PBSA

Building Height - 70m

Evacuation Strategy - Stay put policy for residential. Simultaneous for commercial

Automatic Fire Detection - L1 - BS5939-1 and evacuation alert system

Automatic Fire Suppression System - Sprinklers required throughout building. BS9251 and BS EN 12845 where compartments exceed 100sqm.

Elements of Structure - 120 minutes fire resistance

Compartment Floors - Compartment floors required. All risers, lifts and stairs to be protected shafts and enclosed in REI120

The fire safety mark-ups are intended to meet Building Regulations for life safety. The design team will need to consult with client and their insurers regarding property protection requirements.

All risers may have not been marked up, all risers should be constructed as protected shafts or fire stopped horizontally at every floor.

These are fire safety mark-ups to inform the architect in producing their fire drawings and should be read in conjunction with the fire safety strategy report.

Signage should be in accordance with BS5499 series. Helios don't provide locations for signage on sketches



HELIOS
Fire & Construction Consultancy

Project Title:

Ty Cambria
Helios SK

Level:

See Architect Plans

Date:
29/07/2026

Project Number:
FSE2641

Drawn By:
KC

Revision:
01

Rev	DD.MM.YY	By	Notes
-----	----------	----	-------

PLANNING

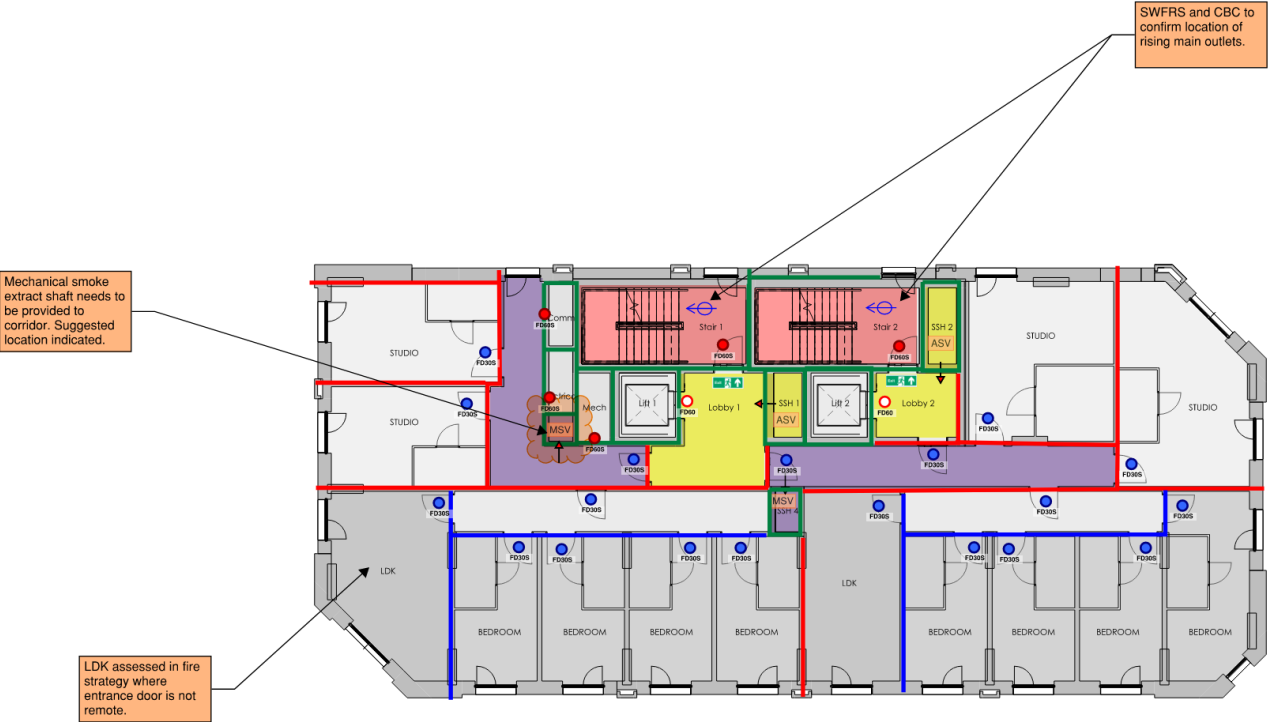
- This drawing is copyright, reserved and remains the property of Fletcher Joseph (Edinburgh) Ltd.
- All levels and dimensions are to be checked on site by the contractor prior to fabrication, and any discrepancies must be reported immediately to the Architect.
- All dimensions are to be read off this drawing and NOT scaled.
- All work to be executed in strict accordance with the by-laws and regulations of the local authorities.
- All work to conform to applicable codes of the British Standards.
- Where indicated/required, all drawings are to be read in conjunction with all other documents issued by Fletcher Joseph and/or other professions.



Fletcher
Joseph

5 Millar Place,
Edinburgh EH10 5JH
admin@fletcherjoseph.com 0131 447 5000
fletcherjoseph.com

CLIENT	ELITE CASK LTD		
PROJECT	TY CAMBRIA 29 NEWPORT ROAD CARDIFF		
TITLE	16FL-22FL PLAN GENERAL ARRANGEMENT		
DATE	SCALE @ A1	LAST REVISION	
08/22/25	1:100	DD.MM.YY	
DRAWN BY	CHECKED BY	REVISED BY	
JC	SD	--	
DRAWING NUMBER	REVISION		
25835-FJA-00-16-DR-A-PL16	P01		



00 16

FSE2641– Level 16 – Level 22

Figure 18: Helios SK

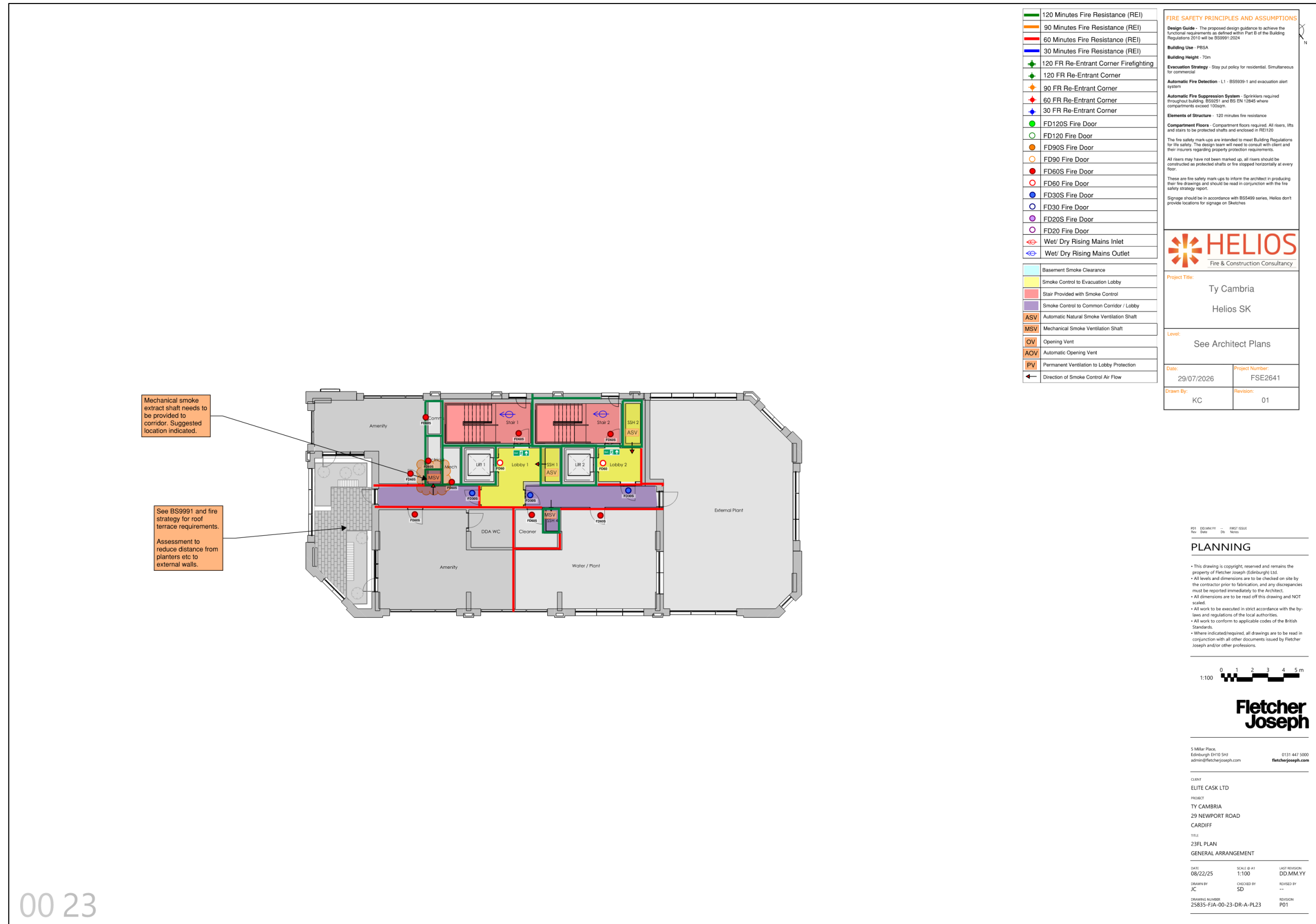


Figure 19: Helios SK FSE2641 – Level 23



1.5 Evacuation Strategy and Occupancy

The building is proposed to operate a Stay Put evacuation strategy for the student accommodation, therefore for the residential areas it is not necessary to determine occupancy numbers. It is proposed to provide an emergency evacuation alert system to the building to allow a Fire and Rescue Service managed emergency evacuation. This will be operated on a floor by floor basis. The capacity of the stairs has been assessed and the stair widths can accommodate a managed evacuation.

The commercial / co-work unit on the ground floor will operate an independent simultaneous evacuation strategy.

The communal amenity spaces, external terraces, gym / wellness suite and commercial / co-work unit occupancies have been determined based on the available escape provisions and are noted below. Indicative floor space factors have been applied to the commercial and gym areas for comparison.

Table 1: Amenity and Commercial Unit Occupancy Assumptions

Area	Available Exits	Allowable Occupancy
Level 23 – Communal Amenity (circa 30m² and circa 55m²)	One inward opening exit to each space	Maximum of 60 occupants in each space
Level 23 – External Terrace (circa 32m²)	Escape via the adjoining Level 23 amenity space	Maximum of 60 occupants combined with the adjoining amenity space
Level 07 – Communal Amenity (circa 93m²) and External Terrace (circa 105m²)	One inward opening exit	Maximum of 60 occupants combined
Ground Floor – Commercial / Co-Work Unit (circa 130m²)	One exit	Maximum of 60 occupants. Applying a floor space factor of 6.0m ² /person the design occupancy is circa 16 persons
Ground Floor – Gym / Wellness (circa 63m²)	One exit into the entrance lobby	Maximum of 60 occupants. Applying a floor space factor of 5.0m ² /person the design occupancy is circa 13 persons
Ground Floor – Cycle Store including mezzanine (circa 73m²)	One exit into a protected lobby	Assumed less than 60 occupants
Ground Floor – Ancillary areas	NA	Assumed less than 60 for each space as these are not normally occupied

1.6 Purpose of Report

The objective of this report is to develop a fire safety strategy, which satisfies the requirements of The Building Regulations 2010 whilst maintaining an acceptable level of life safety, protection of adjacent property and adequate provisions for fire service intervention.

BS9991: 2024 incorporating Corrigendum No.1 and BS9999:2017 will be used as the primary guidance documents for the development in order to achieve statutory approval under Part B of the Building Regulations 2010.

Where no specific provision is mentioned in this fire safety strategy regarding any particular aspect reference should be made to BS9991 & BS9999.

This report details the fire safety strategy and is intended to highlight the key design issues and the proposed solutions to meet the challenges of compliance with the Building Regulations 2010.

This document will therefore act as the basis of discussions between the design team and Approval Authorities, in order to obtain approval in principle for the design in respect to fire safety compliance.

Where the proposed design depart from the recommendations noted in the guidance documents above, an assessment will be undertaken to demonstrate the proposed design solution meets the functional requirements of the Building Regulations 2010; this assessment can take the form of a qualitative or a quantitative assessment dependant on the nature of the departure.

Further information / confirmation is required by the Design Team / Client and approvals from Building Control; these have been provided in the following colours throughout the report:

- **‘Blue’** – Information / confirmation is required from the Design Team / End User.
- **‘Purple’** – Approvals are required from the Authorities Having Jurisdiction.

The fire strategy report should be read in full by all relevant parties.

Primary departures from the recommended guidance are required to be agreed with the Authorities Having Jurisdiction (AHJ's) and are summarised below including a reference to the relevant section of the fire safety strategy where the design assessments have been carried out.

Table 2: Summary of Departures from Design Guidance

Provision	Helios Comment	Section
B1 – Means of Warning and Escape		
Fire main outlet location	Fire main outlets are proposed within the firefighting / evacuation lift lobbies rather than within the stair enclosure. BS 9991 Clause 47.1 permits fire mains to be located in any other position as agreed with the appropriate authority. Based on previous discussions with SWFRS this is the service preference. To be confirmed by SWFRS.	4.3.5
Level 07 communal terrace	Escape from the Level 07 external communal terrace is via the adjoining communal amenity space rather than directly into a protected corridor or protected stairway as recommended by Annex E.5. Justification provided on the basis that travel distances are within single direction limits.	6.1.3
Cluster flat kitchen separation	In the cluster flats the shared LDK is located adjacent to the cluster entrance door. Mitigation is proposed by way of a Category B preventative cut-off device to BS EN 50615, automatic water fire suppression throughout, Category L1 detection and door screecher on LDK.	6.1.1
Ground floor entrance lobby	Where the ground floor entrance lobby is a sterile or limited use space, omission of lobby protection between the lobby and the evacuation lift lobby is proposed subject to agreement with the AHJ.	6.7.2
B4 – External Fire Spread		
Communal terraces – roof garden	Where soft landscaping or planters are proposed to the Level 07 and Level 23 terraces, reduction of the 3m sterile zone to the vertical building façade to 1.2m in lieu of Annex E.4.	12.8

1.7 Sources of Information

The information within this report is based on information and drawings provided to Helios Fire & Construction Consultancy up to the date of this report.

Table 3: Drawings

Drawings/ Document Title	Drawing/ Document Reference	Revision
Ground Floor Plan	25835-FJA-00-00-DR-A-PL00	P01
First Floor Plan	25835-FJA-00-01-DR-A-PL01	P01
2nd – 6th Floor Plan	25835-FJA-00-02-DR-A-PL02	P01
7th Floor Plan	25835-FJA-00-07-DR-A-PL07	P01
8th – 14th Floor Plan	25835-FJA-00-08-DR-A-PL08	P01
15th Floor Plan	25835-FJA-00-15-DR-A-PL15	P01
16th – 22nd Floor Plan	25835-FJA-00-16-DR-A-PL16	P01
23rd Floor Plan	25835-FJA-00-23-DR-A-PL23	P01
Roof Plan	25835-FJA-00-RF-DR-A-PL24	P01
Elevation 1	25835-FJA-00-XX-DR-A-PL31	P01
Elevation 2	25835-FJA-00-XX-DR-A-PL32	P01
Elevation 3	25835-FJA-00-XX-DR-A-PL33	P01
Elevation 4	25835-FJA-00-XX-DR-A-PL34	P01
3D Views	25835-FJA-00-XX-DR-A-PL40	P01
Section 1	25835-FJA-00-XX-DR-A-PL51	P01

Note: The figures within this report are intended to illustrate the fire safety principles. For confirmation of layout or other design details, reference should be made to the current plans.

2 Statutory Compliance

2.1 The Building Regulations

Building work in Wales is regulated separately from England. The Building (High-Risk Buildings Procedures) (England) Regulations 2023 do not apply in Wales. The equivalent Welsh regime is set out in The Building (Higher-Risk Buildings Procedures) (Wales) Regulations 2025, which were made on 12 December 2025 and came into force on 1 July 2026. As this development had not commenced and no initial notice had been accepted before that date, the transitional arrangements do not apply and the scheme falls to be dealt with under the new Welsh regime. The procedural implications are addressed in Section 3.5.

The building will be subject to the statutory requirements of the Building Regulations 2010 as they apply in Wales. It is therefore necessary for the building to meet the functional requirements of Part B of Schedule 1 to these Regulations. These requirements relate to:

Requirement Means of warning and escape B1. The building shall be designed and constructed so that there are appropriate provisions for the early warning of fire, and appropriate means of escape in case of fire from the building to a place of safety outside the building capable of being safely and effectively used at all material times.	Requirement Internal fire spread (linings) B2. (1) To inhibit the spread of fire within the building, the internal linings shall: (a) adequately resist the spread of flame over their surfaces; and (b) have, if ignited, a rate of heat release or a rate of fire growth, which is reasonable in the circumstances. (2) In this paragraph 'internal linings' mean the materials or products used in lining any partition, wall, ceiling or other internal structure.	Requirement Internal fire spread (structure) B3. (1) The building shall be designed and constructed so that, in the event of fire, its stability will be maintained for a reasonable period: (2) A wall common to two or more buildings shall be designed and constructed so that it adequately resists the spread of fire between those buildings. For the purposes of this sub-paragraph a house in a terrace and a semi-detached house are each to be treated as a separate building. (3) Where reasonably necessary to inhibit the spread of fire within the building, measures shall be taken, to an extent appropriate to the size and intended use of the building, comprising either or both of the following: (a) sub-division of the building with fire-resisting construction; (b) installation of suitable automatic fire suppression systems. (4) The building shall be designed and constructed so that the unseen spread of fire and smoke within concealed spaces in its structure and fabric is inhibited.
Requirement Access and facilities for the fire service B5.(1) The building shall be designed and constructed so as to provide reasonable facilities to assist firefighters in the protection of life. (2) Reasonable provision shall be made within the site of the building to enable fire appliances to gain access to the building.	Requirement External fire spread B4. (1) 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 position of the building. (2) The roof of the building shall adequately resist the spread of fire over the roof and from one building to another, having regard to the use and position of the building.	

Figure 21: Schedule 1 Part B of the Building Regulations 2010

2.2 Regulation 7 – Building Regulations

In assessing the Building Regulations and Schedule 1, this report will also specifically highlight and assess Regulation 7 of the Building Regulations relating to 'Materials and Workmanship' which outlines the general principles of materials being used in the construction being appropriate for the circumstances in which they are used and installed, and also commenting on the workmanship standards and certification expected for material installation.

2.3 Guidance

For the building, compliance with the above requirements will be achieved by using the guidance from BS9991 and BS9999 where appropriate and supplementing this with fire engineering solutions when necessary to ensure that the key fire safety objectives for the design are achieved.

This legislation is primarily concerned with life safety and property protection is not specifically considered although the fire protection provisions to be provided for the building will offer some degree of property protection.

Furthermore, other issues such as insurer's requirements, cultural heritage, environmental, or continuity issues have not been specifically addressed or included within the development of the fire safety strategy.

2.3.1 Accessible Design

The primary evacuation strategy is a Stay Put evacuation where the high level of compartmentation is deemed to provide adequate protection to the occupants.

Where a fire is considered in an individual studio or cluster flat, the occupant is deemed to leave that space and proceed to the protected lobby / staircase which is then the 'Stay Put' protected location.

Remaining occupants, based on the levels of compartmentation, should remain in place unless directly affected by heat or smoke, or unless directed to leave by the Fire and Rescue Service. This is the primary driver for the additional ventilation requirements to common corridors and staircases in student accommodation blocks, to maintain tenable conditions in the escape staircases whilst a fire is contained within an individual flat.

In accordance with BS9991, all residential buildings containing lifts should incorporate at least one evacuation lift per stair to allow mobility impaired escape. This will be met, see Section 6.4 for more information on Accessible Design.

2.4 The Regulatory Reform (Fire Safety) Order 2005

2.4.1 Fire Safety Order 2005

Once the building is completed and occupied, the Regulatory Reform Fire Safety Order 2005 (RR (FS) O) becomes the controlling fire safety legislation.

It is necessary, among other things, under this order for the owner/occupier of the building to carry out and maintain a fire safety risk assessment. The building's management team will also be responsible under this order to ensure that the building's fire safety provisions are appropriately managed, maintained and tested over the whole life of the building.

2.4.2 Fire Safety Act 2021

The Fire Safety Act clarifies the scope of the Fire Safety Order to make clear it applies to the structure, external walls (including cladding and balconies) and individual flat entrance doors between domestic premises and the common parts of a multi-occupied residential building.

2.4.3 Section 156 of the Building Safety Act 2022

The Fire Safety (England) Regulations 2022 were laid under Article 24 of the Fire Safety Order 2005 and extend to England only; they do not apply to this development. In Wales the equivalent strengthening of the Fire Safety Order was delivered by Section 156 of the Building Safety Act 2022, which came into force in Wales on 1 October 2023. Section 156 requires the Responsible Person to record the fire risk assessment in full, including all of the findings, and to record their fire safety arrangements; to take reasonably practicable steps to identify any other Responsible Persons for the premises and to share contact details and the extent of their respective responsibilities; to provide relevant fire safety information to an incoming Responsible Person on any change; and, in buildings containing two or more sets of domestic premises, to provide residents with information on the identified fire risks, the fire safety measures, the identity of the Responsible Person and the identity of the person who carried out the risk assessment. Further duties in relation to the occupation of the building arise under the Building Safety (Wales) Act 2026, which is addressed in Section 3.5.

2.5 The Welsh Building Safety Regime

The Welsh building safety regime for the design and construction of higher-risk buildings came into force on 1 July 2026 through The Building (Higher-Risk Buildings Procedures) (Wales) Regulations 2025 and The Building etc. (Amendment) (No. 2) (Wales) Regulations 2025, commenced by The Building Safety Act 2022 (Commencement No. 6) (Wales) Regulations 2025. This development is therefore subject to the new regime.

A higher-risk building for the design and construction phase in Wales is described in The Building Safety (Description of Higher-Risk Building) (Design and Construction Phase) (Wales) Regulations 2023 as a building that is at least 18m in height or has at least seven storeys and contains at least one residential unit, or is a hospital, care home or children's home. It should be noted that the Welsh threshold is one residential unit, whereas the equivalent English description requires two or more. **Ty Cambria is circa 69.5m in height with 24 storeys and contains residential units, and is therefore a higher-risk building for the purposes of the design and construction phase.**

The Regulations introduce a dutyholder regime for all building work, with the client required to appoint a Principal Designer and a Principal Contractor and all dutyholders required to plan, manage and monitor their work and to demonstrate competence, or to be supervised by a competent person. For higher-risk building work the client is additionally required to establish and operate a mandatory occurrence reporting system before work starts, and to maintain the golden thread of information in a digital format throughout the design, construction and occupation of the building.

For this development the building control authority is therefore **Cardiff Council**, and there is no route to, or requirement for, submission to the Building Safety Regulator.

A change control procedure applies during construction, and notice of commencement must be given at least five days before work starts. On completion a further application must be made and a completion certificate obtained before the building, or any part of it, is occupied; this is commonly referred to as Gateway 3.

Once the building is occupied it will also fall within the scope of the Building Safety (Wales) Act 2026, which received Royal Assent on 27 April 2026 and establishes the occupation phase regime for buildings that are at least 11m in height or have at least five storeys. Under that Act the building will require registration with the relevant building safety authority, being a designated local authority within each fire and rescue authority area, and the statutory dutyholders will be required to assess and manage fire safety and structural safety risks on an ongoing basis, with the fire and rescue service acting as the fire safety authority.

2.6 Construction, Design and Management Regulations

Projects undertaken within the UK are subject to the requirements of the Construction, Design and Management Regulations (CDM).

This report defines the strategy for meeting the functional and performance requirements for fire safety in the finished building. Where any conclusions or recommendations have been arrived at which specify particular materials, products, or forms of construction these will have been assessed, in accordance with CDM Regulation 9 (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 the standards put forward in this report to specify works, they are understood to be competent in alerting the Client, Principal Designer, and Contractor and Building Occupier.

2.7 Third Party Accreditation Schemes

Independent Third-Party Certification Schemes provide confidence the required level of performance is achieved in the design, product selection, product manufacture, installation and commissioning of a building system, structure or component.

Third party certification schemes for fire protection products, design, installation and commissioning are an effective means of providing assurances of quality, reliability and safety. These schemes can assist in demonstrating compliance with the Material and Workmanship requirements of Regulation 7 to the Building Regulations is satisfied.

Helios would recommend that where appropriate manufacturers and installers that are subject to independent certification schemes are considered / specified for this development.

3 Access & Facilities for the Fire Service

3.1 General Access

Vehicular and pedestrian access to the Ty Cambria development is from Newport Road and East Grove Road. There is access via Trinity Court Lane that has been considered for North West access.

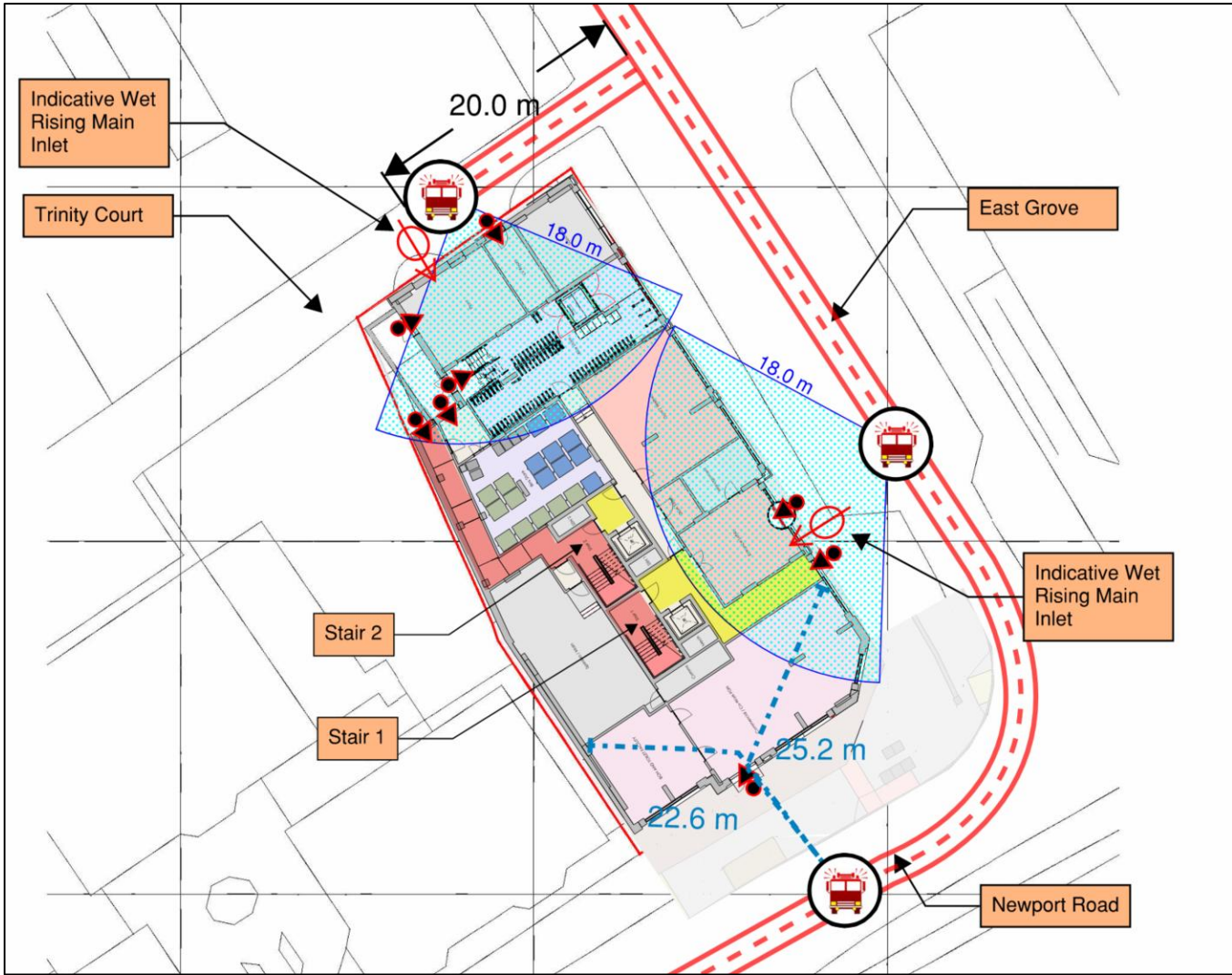


Figure 22: Site Plan – Fire and Rescue Service Access

The height to the top occupied floor is circa 69.5m and all storeys are less than 900m² in area. As the building has a storey more than 18m above fire and rescue service access level, one or more of the common stairs is required to be designed as a firefighting stairway in accordance with BS 9991 Clause 10 and Clause 46.3.

Due to the height of the building, both stairs are proposed to be designed and constructed as firefighting stairways for resilience, each served by a firefighting / evacuation lift, a firefighting / evacuation lift lobby and a wet rising main. All parts of all residential floors can be accessed within a 60m hose laying distance from a fire main outlet.

The commercial / co-work unit and back of house areas on the ground floor can be accessed from the fire appliance by hose within 45m.

Access to both firefighting shafts is available from the main ground floor entrance and the secondary ground floor final exits, subject to the dynamic risk assessment of the fire and rescue service and the location of the fire.

3.2 Vehicle Access

The access provision will be designed in accordance with the table below. The table below contains standardised figures as well as ranges based on past discussions with fire services around the UK.

The access roads are existing and therefore assumed to comply, however any works undertaken should meet the recommendations below.

The fire service will not need to reverse more than 20m.

Table 4: Fire & Rescue Service Vehicle Access Routes



Appliance	Width of Road between Kerbs	Gateway Width	Clearance Height	Carrying Capacity	Turning Circle	
					Kerb to Kerb	Wall to Wall
Pump	3.7m	3.1m	3.7m	12.5 – 15 tonnes	16.8m	19.2m
Combined Aerial Platform	3.7m	3.1 - 6.0m	4.0m	17 – 26 tonnes	26.0m	29.0m

3.3 Firefighting Provisions

BS 9991 Clause 10 recommends that in buildings with a storey 18m or more above ground level, one or more common stairs should be designed as firefighting stairways. Clause 7.4.1 further recommends that in buildings with a storey 50m or more above ground level and designed with a stay put strategy, every lift should be designed as a firefighters' lift. Ty Cambria meets these requirements.

Both stairs will be designed for firefighting. This is an enhancement over the guidance and provides resilience in the event that one shaft is compromised.

The fire resistance at ground floor around the evacuation lift lobbies will be increased to 120 minutes for robustness as per Helios' recommendations.

Stair 1 will be accessed via the firefighting/ evacuation lift lobby as per BS9991. Stair 2 will have access direct to outside. As Stair 1 and Stair 2 are adjoining, in accordance with BS 9991 Clause 10 b) they will be separated by imperforate construction having at least the same period of fire resistance as the stair enclosures, and no openings will be permitted in the separating elements common to both stair enclosures.

3.3.1 Firefighting Stairs

The minimum clear width for a firefighting stair is 1100mm. The stairs will be designed in accordance with Clause 9 and Clause 46.3.5 of BS 9991.

Requirements for the firefighting stair include:

- A firefighting stair should not contain any cupboards or provide access to service shafts serving the remainder of the building.
- Only services associated with the firefighting shaft, such as ventilation systems and lighting for the shaft, should pass through or be contained within the firefighting stair.
- The stair should have a clear width of not less than 1100mm, this width should be kept clear for a vertical distance of 2000mm.
- Emergency escape lighting in firefighting stair enclosures should be provided in accordance with BS5266-1.
- Both firefighters' lift and stair are used together during firefighting operations.
- The firefighting stair should serve every storey that is served by the firefighters' lift.
- Signage numerically indicating the floor level should be provided within the firefighting stair.
- Lights and landing constructed of Class A2-s1, d0 or better.

Note: Due to the height, the escape stair enclosure should also be constructed of materials achieving Class A1 or A2-s1, d0.

3.3.2 Firefighting Lobbies / Evacuation Lift Lobbies

Firefighting stairs should be provided with common corridor/ lobby protection to act as a bridge head for firefighting operations [firefighting lobby (where applicable evacuation lift lobby)] and to protect the staircase from the ingress of smoke. The building incorporates evacuation lift lobbies which also function as firefighting lobbies. In line with guidance, the firefighting /evacuation lift lobby will not have any accommodation opening into it and the stair will be accessed from the lobby.

Only electrical services associated with the firefighting shaft, such as for smoke ventilation systems, fire alarm and lighting for the shaft, will pass through or be contained within the firefighting lobby as noted in BS7671 i.e.

Cables or other electrical equipment shall not be installed in a firefighting lobby, shaft or staircase of a protected escape route unless part of:

- Any essential fire safety or related safety system
- General needs lighting
- Socket-outlets provided for cleaning or maintenance.

Generally, this means cables in a firefighting lobby, shaft or staircase of a protected escape route should be limited to lighting and associated accessories, emergency lighting and fire detection and alarm systems, although cables for other safety systems may be necessary.

In relation to other services that are distributing via the firefighting / evacuation lift lobby the services should either be separated from the lobby by a minimum of REI 60 fire protection from both directions effectively removing the services from the lobby / corridor; or the services should meet all of the following criteria:

- The exposed surface of the material/product used is class B-s3, d2 or better.
- The supports and fixings in the cavity are class A1.
- Any pipe insulation system is class B-s3, d2 or better
- Where electrical wiring in the cavity is allowed within the firefighting shaft (i.e. those instances noted above) it will be laid in metal trays or metal conduit.

The common corridors prior to the lobbies are to be ventilated to provide protection to the firefighting / lift lobbies.

A fire and rescue mustering point with a minimum area of 5m² should be provided at fire and rescue service access level. The ground floor lobbies serving the firefighting shafts meet this minimum area requirement.

3.3.3 Firefighters lift

In line with Clause 7.4.1 within BS 9991:2024, for buildings with a storey over 50m or more above ground level and designed with a stay put strategy every lift will be designed as a firefighter's lifts programmed to function as an evacuation lift, until the lift is recalled using the firefighters lift switch.

The firefighters lift installation includes the lift car itself, the lift installation within the well and the lift machinery spaces, together with the lift control system and the fire service communications system. The firefighting installations will conform to BS EN 81-72 and BS EN 81-76.

The power supply to the lift and lighting will consist of primary and secondary supplies. There will also be a means to minimise the effect of water penetration into the firefighters lift well. For more information see Annex G from BS9991 for keeping firefighters lifts free from water.

Note: Annex G will also be followed for evacuation lifts.

Access points to the lift are to be designed in accordance with BSEN81-72.

On the basis the firefighters' lifts are to function as evacuation lifts, separate lobbies are being provided. The common corridors prior to the lobbies are to be ventilated to provide protection to the firefighting / evacuation lift lobbies.

3.3.4 Fire and Rescue Service Communications

As the proposed building is over 50m in height, in line with guidance within BS9991, communications will be extended by the installation systems such as a radiating cable (leaky feeder), distributed antennae systems (DAS) or the installation of fire telephones in building over 50m.

[Design team to confirm preferred approach.](#)

3.3.5 Rising Mains

The rising mains will be designed in accordance with BS9990 and BS9991.

In buildings with a top floor exceeding 50m above ground level a Wet Riser should be provided to assist firefighting. This is because access is limited and the difficulties of providing adequate water flow and pressure to fight a fire on upper levels in excess of 50m will be outside the capabilities of the fire and rescue services mobile equipment.

BS 9991 Clause 47.1 recommends that fire mains are located within the stair enclosure, but expressly permits any other position as agreed with the appropriate authority. Based on previous discussions with SWFRS, the wet rising main outlets are proposed within the firefighting / evacuation lift lobbies, with one wet rising main provided in each core. **SWFRS to confirm the outlet locations.**

The fire service requires access to within 18 metres and in sight of a suitable entrance giving access to the wet fire main, and within sight of the wet riser inlet for the emergency replenishment of the suction tank for the wet fire main.

Helios recommend two inlet points to assist the fire and rescue service with their dynamic risk assessment and to reduce the likelihood of falling debris damaging firefighting hose.

[Design team to consider two inlet connection points for resilience.](#)

3.4 Smoke Ventilation

3.4.1 Smoke Ventilation to Firefighting Shafts

Smoke ventilation is required to the building, see Section 4.6 in this report for full information on smoke control requirements.

3.5 Wayfinding Signage

Wayfinding signage for the Fire and Rescue Service will be provided in the full premises; floor identification signs will be provided on every landing of a protected stairway and every protected corridor/lobby into which a firefighter's lift opens.

Flat indicator signs identifying the studio and cluster flat numbers will also be used and supplemented by arrows where necessary.

The floor identification signs will meet all of the following conditions:

- The signs should be located on every landing of a protected stairway and every protected corridor/lobby.
- The text should be in sans serif typeface with a letter height of at least 50mm. The height of the numeral that designates the floor number should be at least 75mm.
- The signs should be visible from the top step of a stair and where possible, from inside the firefighters lift when the car doors open.
- The signs should be mounted between 1.7m and 2m above floor level and, as far as practicable, all the signs should be mounted at the same height.
- The text should be on a contrasting background, easily legible and readable in low level lighting conditions or when illuminated with a torch.

As the building has storeys over 50m or more from ground level:

- A low mounted guidance system will be provided within the stairway in addition to the provisions set out in Clause 40.2 within BS9991.

Note: BS9991 2024 included the following note: Recommendations for low-mounted way guidance systems can be found in BS5266-2 (withdrawn).

For more information on Wayfinding Signage see Clause 48.2 BS9991.

3.6 Firefighting Water Supplies

In accordance with BS9991 & BS9990, firefighting water supplies to buildings should consist of either:

2. Public Hydrants provided and maintained by the Water Authority; or
3. Private hydrants in line with BS9990; or
4. Static or natural water supply providing a stored capacity of 45,000 litres.

The building will be provided with a wet rising main.

Hydrants should be located in positions that are near to building entry points and fire appliance parking positions as follows.

Design team to confirm the location of existing fire hydrants serving Newport Road. In accordance with BS 9991 Clause 47.2, for a building fitted with a wet fire main, hydrants should be provided within 90m of an entry point to the building and not more than 90m apart.

3.7 Automatic Water Fire Suppression System

The building will be provided with automatic water fire suppression system. See Section 4.4 for more information.

3.8 Emergency Evacuation System

In addition to the fire detection and alarm system provided within the building, a separate Evacuation Alert System in accordance with BS8629 and Clause 48.3 from BS9991 will be provided, for use by the fire service. See Section 4.2 for more information.

3.9 Firefighting Power Supplies

All power supplies, electrical wiring and control equipment will be protected against the effects of fire for an appropriate period. Power and control cables will be installed in accordance with BS8519 and BS7671:2018 + A2:2022 [Including corrigendum May 2023].

A secondary power supply is required for essential fire safety measures and will be in accordance with Clause 21 from BS9991. Any life safety system will require secondary power supplies, see Section 5.9 for more information.

3.10 Secure Premises Information Boxes

As recommended in Clause 48.1 from BS9991 there will be a facility to store a building Emergency Response Pack [ERP] in an accessible location to aid the Fire & Rescue Service in understanding building layouts, outlining access provisions, and notifying them of the active systems within the building.

The Premises Information Box [PIB] will be sited at the primary Fire & Rescue Service entry point to the building in proximity to the other fire safety systems e.g. evacuation alert panel / fire alarm panel / smoke control systems / PV inverter shut offs and rising main connectors; if the building is managed 24 / 7 this can be located in a concierge / security office on the basis this is readily accessible at all times and is easily locatable for the Fire & Rescue Service.

Design team to confirm 24/7 management.

The PIB will be securely fixed to the building to avoid damage or vandalism and be mounted circa 1400mm from finished floor level to allow easy access; the box will be of a robust and secure design as the information within could be determined as sensitive under GDPR requirements.

A PIB will be unlocked using one of the following two methods:

- Key system; or
- Mechanically operated keypad.

The PIB should be suitably signed at the Fire & Rescue Service entry point into the building unless the building is managed 24 / 7 and management assistance is available to the Fire & Rescue Service.



Figure 23: Premises Information Box Signage

The Premises Information Box is specifically for the use of the Fire & Rescue Service in any potential fire incident, the information contained within the box will specifically relate to the relevant information for this premises e.g.

- Two sets of building layouts / floor plans [A3] laminated or in plastic wallets; the plans should be specific to fire service requirements and show all services provided for the fire service, e.g., firefighters lifts.
- An Emergency Response Pack containing information that is required for the purpose of operational firefighting and rescue e.g.
 - A logbook for recording events, amendments, updates, and reviews of the PIB system and equipment.
 - 'Off The Run' notice containing details of any firefighting fixed installations not available for use by the Fire & Rescue Service.
 - A Summary of information available to the Fire & Rescue Service.
 - Orientation Site Plan, showing the location of the building in relation to surrounding buildings and local infrastructure including Firefighting water supplies.
 - Information on residents with mobility, cognitive or sensory impairments.
 - Details of any significant fire safety issues e.g., compartmentation, higher risk external wall systems; storage of specific risk items within the building or other fire safety issues which may affect the behaviour and growth of fire within the building.
 - A detailed description of the evacuation strategy, e.g., stay put, simultaneous evacuation, progressive horizontal or phased evacuation.

The above requirements will be met; the location of the Premises Information Box is to be confirmed by the design team.

For further information reference should be made to BS9991 Clause 48 and "Code of Practice for the Provision of Premises Information Boxes in Residential Buildings" published by the Fire Industry Association (FIA).

4 Active Fire Protection Systems

4.1 Fire Detection and Alarm

4.1.1 Flats/ Amenity and Plant

The base code compliant evacuation process is a stay put 'defend in place' evacuation strategy for the residential areas. This means that the only occupants who evacuate are the occupants who are directly affected by the effects of fire. The remaining occupants remain within their apartments unless asked to evacuate by the fire service.

To support a stay put evacuation strategy, BS9991 recommends a BS5839-6 fire detection and alarm system to be provided to individual flats and a BS5839-1 fire detection and alarm system (Category L5) to the common corridors only to activate smoke control and not to raise alarm.

For the social and common spaces, the minimum fire detection and fire alarm system would be a manual system.

However, as an enhancement over the minimum standards, it is proposed to provide a Category L1 fire detection and alarm system designed and installed in accordance to BS5839-1. This will be installed throughout the whole building.

This allows the system to be fully addressable and to provide the building manager or remote monitoring centre with notification to a potential fire in any flat or common area.

This will provide a suitable level of protection provided that it is configured to support the evacuation strategy (stay put) which will require variations from a standard Category L1 system, such as e.g.

- Omission of manual call points in student residential accommodation areas (common corridors) due to the stay put strategy which does not require communal activation/alarm.
- Omission of sounders in common protected corridors serving flats etc. to support stay put strategy.

Note: The omissions above are to allow the stay put strategy to work effectively as the purpose of detection within the common corridors is only to active smoke control and not to provide signal of a fire.

Note: The system will need to be ratified and designed by a fire detection and alarm specialist and ensure it follows the principles noted within this report.

Note: The MEP design will allow for vibrating pillows / pads within bedrooms to provide suitable alert facilities for individual occupants who have hearing impairments (i.e. where required by individual PEEPS).

Note: The building will be managed 24/7.

The detailed cause and effect will be developed by the system specialist. But as a principle, studios and cluster flats are to adopt a stay put policy. For the amenity areas off residential corridors, the same approach is to be adopted. For ground floor and the 23rd floor where residential accommodation is not provided, on activation of detection, the whole floor will sound and evacuate.

A separate emergency evacuation alert system to BS8629 will be provided for use by the fire service.

4.1.2 Commercial Units

The commercial / co-work unit within the footprint of the main building should be provided with a link to the residential common system to provide early warning to the building management team and the remote monitoring centre.

The system category will be subject to fitout design but should include automatic detection.

4.2 Emergency Evacuation Alert System

In addition to the fire detection and alarm system provided within the building, a separate Evacuation Alert System in accordance with BS8629 will be provided for use by the fire service.

A summary of recommendations is noted below but will be ratified by the fire detection and alarm designer:

- Within each flat, at least one evacuation alert sounder should be provided.
- The sound pressure level of the alarm signal at each bedroom door should be at least 85dB(A).
- The sound pressure level within other habitable rooms should be at least 60dB(A).
- Facilities should be incorporated in accordance with BS8629 to enable additional devices to alert peoples who are deaf or hard of hearing.
- Cable and wiring will meet BS8629.

This will incorporate an additional evacuation alarm control & indicator EACI panel and alarm sounders with strobe.

4.3 Emergency Lighting and Signage

Emergency lighting will be installed in accordance with BS 9991 Clause 40, so that on the failure of the normal lighting the emergency lighting will allow occupants to escape safely by:

- Providing means of locating and identifying escape routes and signage.
- Providing suitable means of escape.
- Allowing safety measures to be carried out effectively.
- Providing adequate cover to high-risk task areas.
- Allowing people to safely evacuate away from the building.

For a full detailed listing of locations BS5266 should be consulted but as an indication:

Table 5: Indicative Emergency Lighting Locations

Areas Requiring Emergency Lighting
All common escape routes from residential accommodation which includes common corridors and the escape stairs ^{Note1} .
Amenity and Social spaces.
Windowless accommodation.
Electricity and generator rooms.
Switch room/ battery room for emergency lighting.

Note 1: Escape stair lighting will be on a separate circuit from the electricity supply to any other part of the escape route.

Illumination should also be provided to key areas where specific tasks as to be carried out and at focal points; an indicative list is provided below as a guide; for the full listing and planes of reference for specialist areas please consult BS5266-1: 2016.

Table 6: Indicative Specific Lux Levels

Location	Response Time [S]	Minimum Illuminance [Lx]	Minimum Duration	Reference Plane
Plant Rooms & Switch Rooms	5	15	Full rated – building duration	In plane of visual task
Fire Alarm Control and Indicating Equipment	5	15	Full rated – building duration	In plane of visual task
Panic Bars or Security devices	5	5	Full rated – building duration	Horizontal on plane of panic bar / vertical at wall mounted signage and security devices.

Escape and other fire safety signage will also be provided in accordance with BSISO 3864-1: 2011 and BS5499-4: 2013.

Fire doors will have signage as detailed in Section 8.5 below.

4.3.1 Wayfinding Signage

It is proposed to provide wayfinding signage, see Section 3.5 for the requirements.

4.4 Automatic Water Fire Suppression System (AWFSS)

Under Regulation 37a, AWFSS will be provided to all parts of the building.

This will need to be reviewed and addressed by the project team in conjunction with a specialist adviser to confirm specific design parameters to provide effective protection.

The following information is informative; compliant systems and design assumptions will need to be ratified with the Specialist AWFSS Designer as they would be deemed the 'Competent Person' as stated in BS9251: 2021 and BSEN 12845: 2015+A1:2019.

Where no specific provision is mentioned in this section regarding any particular aspect of the system reference will be made to BS9251:2021 & BSEN 12845: 2015+A1:2019.

Note: In accordance with BS9991, AWFSS will be provided within the ancillary areas, amenity areas etc. in accordance with either BS9251 or BSEN 12845: 2015+A1:2019.

4.4.1 Residential Areas

The residential areas that contain flats and common corridors are to be provided with AWFSS in accordance with BS9251 Category 4.

The following points should be noted when designing the system:

- **Duration of Supply** - As the buildings exceed 50m, BS9991 notes potentially increasing the sprinkler system design duration of operation, beyond minimum durations.
- **Hydraulic Calculations** - For very tall buildings consideration should be demonstrated in relation to the subdivision of the system into hydraulic stages.
- **Additional Resilience** - Clause 4.2.4 from BS9251 regarding resilience measures should be considered. Latest guidance within Approved Document B (England) notes where a sprinkler system is installed to satisfy Part B of the Building Regulations, it should be provided with additional measures to improve system reliability and availability.

Sprinkler specialist to confirm requirements noted above.

4.4.2 Communal Amenity / Ancillary Areas/ Commercial

As noted in BS 9251:2021, to enable a BS 9251 system to be used throughout the building, the communal and ancillary spaces should be limited to compartments with a maximum floor area of 100m².

Based on the areas measured from the architect's plans, the largest communal/ ancillary compartments serving the residential areas are the communal amenity space at Level 07 (circa 93m²), the cycle store (circa 73m²) and the sprinkler tank and pump room (circa 71m²). All are currently below the 100m² limit and a BS 9251 system can therefore be used throughout.

The commercial / co-work unit is currently (circa 130m²) and therefore exceeds 100m² as the design develops, a BS EN 12845 system will be incorporated to those areas. **Design team to confirm final compartment areas or confirm a compartment line will be provided to ensure compartments are less than 100m².**

The category and all hydraulic calculations should be confirmed by the AWFSS designer.

4.5 Evacuation Lifts

BS9991 recommends at least one evacuation lift should be provided for each escape stairway.

There is a small set of steps to the bike store, this stair does not serve residential accommodation (flats) therefore no evacuation lift is proposed.

On this basis, each stair will be provided with an Evacuation lift. The design and operation of the evacuation lifts will be in accordance with BSEN 81-20 & BSEN 81-76. A summary of recommendations is noted below, for full recommendations see Clause 7.4 from BS9991.

- Class B evacuation lifts are required due to height
- A temporary waiting space for an evacuation lift will be provided within the evacuation lift lobby and provided with an Emergency Voice Communication [EVC] system.

Note: the EVC system is separate from the evacuation lift communication system that is described within BSEN 81-76.

- **Design team to confirm management strategy for the building. if the building is not managed 24/7 then the evacuation lifts need to be suitable for remote or automatic evacuation. Design team to confirm presence of 24 / 7 management on site who can operate evacuation lift.**
- The evacuation lift will be clearly signed at the evacuation exit floor.
- As the stair is expected to be protected by smoke control provisions in the common corridor, the evacuation lift lobby will also be afforded the same minimum level of protection as the stairs. However, since the evacuation lift lobby provides a temporary waiting area, some means of ventilating the evacuation lift lobby should be provided to minimise the exposure of occupants to smoke and heat. For more information on the smoke control provisions see Section 4.6 below.

Note: This may be an extension of the ventilation provision in the corridor protecting the stair, or a separate additional ventilation provision that is compatible with those provided in the corridor.

- There will also be a means to minimize the effect of water penetration into the lift well. For more information see Annex G from BS9991 for keeping lifts free from water.
- The lobby will only have access to the following:
 - Escape stair.
 - Other passenger or firefighters' lifts.
 - Adjoining corridor (either ventilated or unventilated); and
 - Service risers (that do not contain motorised equipment or similar with a potential to malfunction and cause fire) and distribution boards. As these are also firefighting lobbies, no service risers communicate with the lobbies.
- The recommended minimum dimensions for the evacuation lift lobby are noted in the figure below.

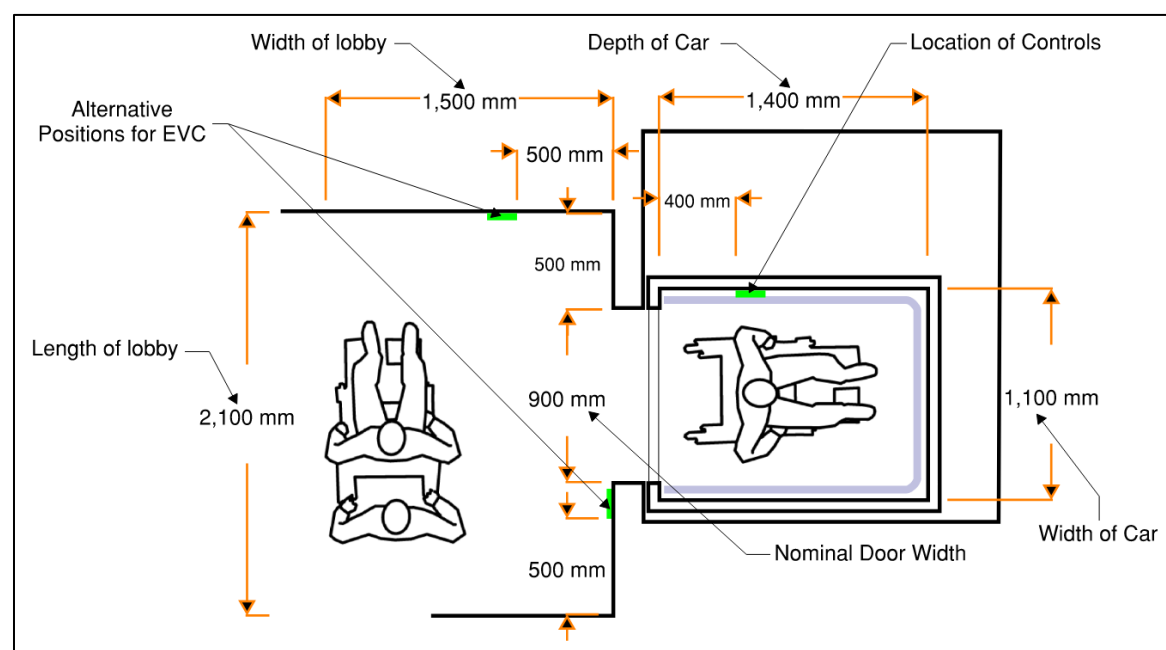


Figure 24: Dimension of Lift Lobby

4.6 Smoke Ventilation

4.6.1 General Requirements

Design, installation, commissioning and maintenance of smoke control systems will be carried out in accordance with BS7346-8. Any equipment selected to realise the smoke control design should be in accordance with F.5 of BS9991.

Ventilation is required to the common corridors, firefighting / evacuation lift lobby and the stair for both means of escape and firefighting to maintain the staircase and firefighting / evacuation lift lobby free of smoke.

Ventilation requirements vary depending on the height of the building, which in this case is circa 69.5m to the top occupied storey.

Table 3 from BS 9991 confirms that a mechanical shaft system with a performance based design, or a pressure differential system, is suitable for all building heights. Given the height of Ty Cambria, a mechanical smoke ventilation system is therefore required to the common corridors and lobbies.

The communal corridors/lobbies are therefore required to be ventilated by one of the following:

- A mechanical smoke ventilation system (conforming to the following section) that is fitted in the protected lobby or protected corridor and an automatic openable vent that is sited at a high as level practicable on the top storey of the stairway and having a minimum aerodynamic free area of 0.7m².

Note: Due to the height of the building additional ventilation into the stair may be necessary at low level to prevent stack effect. This is subject to Smoke control design and CFD.

- A pressure differential system.

The figure below shows the recommended arrangement for stairs close together as per Figure 7 of BS 9991. This arrangement is relevant to Ty Cambria as Stair 1 and Stair 2 are adjoining.

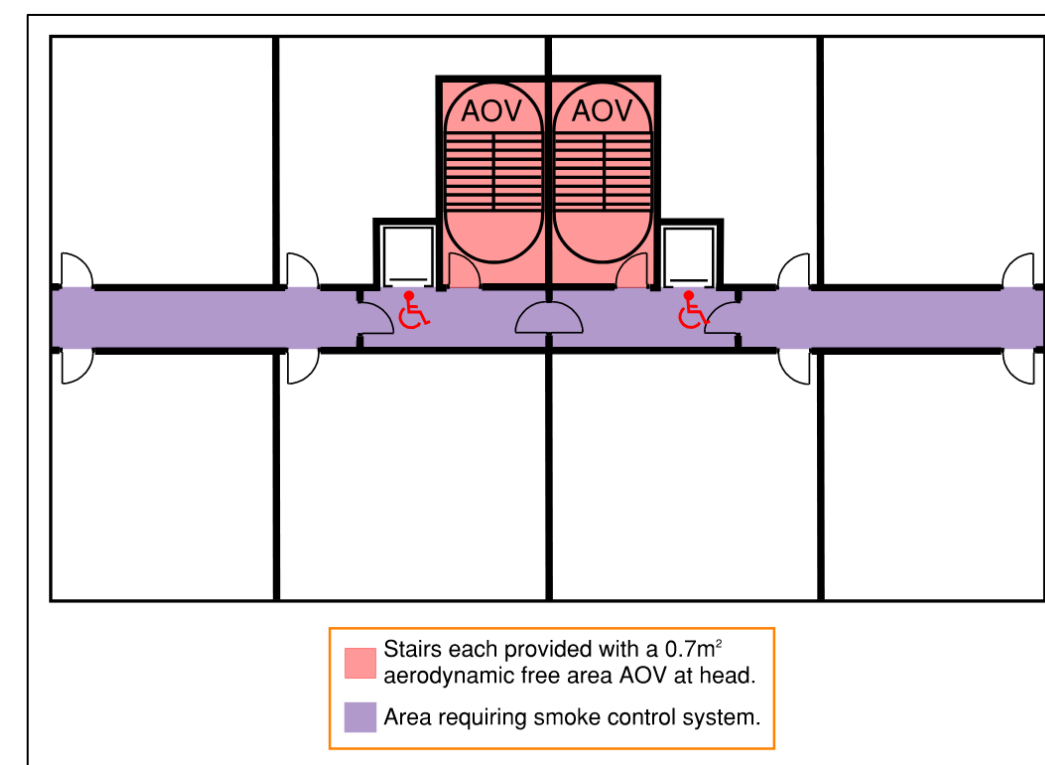


Figure 25: Smoke Control Principles

The minimum requirement for smoke control to the stairs based on guidance is an AOV at the head of each stair with 0.7m² aerodynamic free area as shown in the figure above. **However, at this stage this is indicative and the specific requirements need to be determined based on the smoke control design as a whole and CFD modelling will be required to demonstrate suitable performance.**

As discussed in the section above, all lifts will be firefighter/evacuation lifts and will be used for evacuation of disabled persons and on this basis separate lobbies are being provided to both the firefighting staircases.

As the building exceeds 30m in height, it is proposed to install a mechanical smoke ventilation system to extract smoke and hot gases from the common corridors via the shafts identified as SSH 3 and SSH 4 in the common corridors. Natural inlet shafts, identified as SSH 1 and SSH 2, are incorporated within the evacuation lift lobbies and serve primarily as make-up air inlets for the mechanical system.

In accordance with BS9991:2024 Clause 7.4.4, lift lobbies must be protected from smoke ingress to the same minimum standard as stairwells, ensuring that occupants awaiting rescue or lift access remain in a place of relative safety. By introducing make-up air into the lift lobbies, the extract system promotes airflow away from these areas, helping to maintain them free of significant smoke contamination.

The ventilation system will be designed in accordance with BS9991 including Annex F, in particular F5.1.4 for mechanical ventilation systems. As part of the ventilation provisions, the ventilation provided to the lift lobbies via natural inlet shaft is an extension of the ventilation provisions in the corridors.

The smoke control system must be designed by a specialist. As noted above, CFD modelling (quantitative analysis) will be required to demonstrate the performance of the system. The CFD modelling parameters and acceptance criteria are to be formally agreed prior to undertaking the modelling. In accordance with BS 9991 the modelling is required to take account of seasonal climatic effects on the building as outlined in BS EN 12101-13. Given the height of the building, the modelling will also need to consider stack effect, and the potential need for additional low level ventilation into the stairs. **CFD parameters and acceptance criteria to be agreed with the AHJ.**

4.6.2 Ancillary Smoke Ventilation

There is ancillary and communal accommodation communicating with the stair, the evacuation lift lobby or the common corridor serving the flats. These areas are noted below:

- Ground Floor – Entrance Lobby
- Ground Floor – Cycle Store
- Ground Floor – Bin Store, Sprinkler Tank and Pump Room
- Level 01 – Water / Plant Rooms
- Level 07 – Communal Amenity
- Level 23 – Communal Amenity and Water / Plant Room

The communal amenity spaces will be lobby protected and the mechanical systems serving the above ground residential floors will be utilised to ventilate these areas.

In accordance with BS 9991 Clause 13.2 and Table 1, the protected lobbies serving the ancillary and communal accommodation require 1m² of ventilation, reduced to 0.4m² on the basis that automatic sprinkler protection in accordance with BS 9251:2021 is provided throughout the building. The ventilation may be permanent or provided by an AOV. Permanent ventilation exhausts are to be located at least 1800mm from any final exit.

Design team to confirm the location of the permanent ventilation exhausts.

4.6.3 Smoke Shafts

4.6.3.1 General

Any smoke shaft that penetrates a fire compartment should have at least the same level of fire compartmentation as that which has been breached.

The extract systems when discharging on the roof should be at least 5m from any inlet systems.

4.6.3.2 Construction

Smoke control shafts should be constructed from Class A1 materials.

Note: *It can be desirable to fully render brick or blockwork shafts, or to line brick, blockwork or flexible wall construction shafts with a DW144 steel duct.*

All shafts/ducts should leak not more than 3.8 m³/h/m² of the surface area of the shaft/duct at 50 Pa negative pressure and should be smooth and flush internally.

If smoke control ducting is used as an alternative to a smoke control shaft, it should conform to BSEN 1366-8.

The Smoke Control Association has provided more onerous requirements on smoke shafts as outlined within 'SCA Statement on Smoke Shaft Construction Materials, Issue 1; 2024-05-03'. SCA guidance recommends that the materials and products used for smoke control ducts and shafts are tested in accordance with the test standards referred to in BSEN 12101-7 for multi-compartment smoke control ducts which is BSEN 1366-8. BSEN 1366-8 covers air leakage, integrity, insulation, maintenance of cross-sectional area and mechanical stability under pressure, characteristics which are detailed within BS EN 13501-4. The shafts should be appropriately smoke sealed [S] to stop migration of the smoke around the building but additionally the SCA recommends a pressure rating for each scenario [Leakage rates and pressure scenarios would be included in CFD modelling for mechanical systems] the pressure regimes below are recommended:

- Pressure; 500 Pascals for natural systems.
- Pressure; 500 / 1000 / 1500 Pascals for mechanical systems, design dependant.

The design team to confirm if they will follow the more onerous requirements outlined in the SCA guidance.

4.6.3.3 Smoke Shafts for MSVs – Additional Requirements

Where mechanical ventilation is provided, the mechanical smoke shafts will depressurise the corridors/lobbies and remove any smoke in the area. The mechanical smoke control system will need to follow the principles within Annex F from BS9991. Where the mechanical smoke ventilation system uses a shaft, it will meet the following principles:

- The smoke shaft should be fully open to the external air at the top and closed at the base.
- The cross-sectional area (free area) of the smoke shaft should be sized according to the requirements of the MSVS but should be not less than 0.6m², with a minimum dimension of 0.6m in any direction.
Note: *The cross-sectional area can vary depending on the height of the shaft and the potential for resistance to flow.*
- The top of the lobby or corridor vent should be located as close to the ceiling of the lobby or corridor as is practicable and should be at least as high as the top of the door connecting the lobby or corridor to the stairway.
- Vents or AOVs opening to outside should be natural smoke ventilators.
- AOVs opening into shafts or ducts should be smoke control dampers.
- No services should be contained within the smoke shaft (including control devices for the smoke shaft, other than actuators and final cable connections).
- Fans, all actuators and controls powered by electricity will need to be provided with a secondary supply, see Section 4.9 of this report.

4.6.3.4 Natural Shaft Serving Evacuation Lift Lobbies

Evacuation lift lobbies should have the equivalent protection as the stair; on this basis the natural smoke shaft needs to achieve a minimum aerodynamic area of 0.7m². This is subject to CFD analysis as the natural shaft will work in tandem with the mechanical smoke exhaust system and may need to be larger.

4.6.4 Smoke Control Vents and Automatic Opening Vents (AOVs)

4.6.4.1 AOVs Opening to Outside

AOVs opening to outside air will need to conform to BSEN 12101-2:2017 and have the correct aerodynamic free area.

The stair AOV at the head requires a minimum aerodynamic free area of 0.7m².

Vents designed to open automatically from the top storey of the stairs will be configured to operate upon smoke detection in conjunction with the mechanical smoke extract system and associated lobby inlet shaft (see specialist design for details).

4.6.4.2 AOVs Opening into Shafts

BS9991 notes the AOVs opening into shafts should be smoke control dampers. See Annex F.5.5 within BS9991 for full requirements. The smoke control ventilators should achieve a geometric free area of 1m².

The smoke control damper leading from the protected corridor and protected lobby adjacent to the stair in the vicinity where the smoke has been detected will be configured to open on the fire floor plus the AOV's at the head of the smoke shafts and closest stair. All other protected lobby smoke control dampers on other floors will be configured to remain closed. Fire and rescue service override controls will not permit multiple lobby vents to be open simultaneously.

Note 1: *This applies whether the vent opens to outside air or into a natural or mechanical shaft.*

Note 2: *The purpose of smoke detectors is to operate the smoke control system, not to raise an alarm. Albeit, the detection will also signal an alert at the fire alarm panel to notify building management.*

The smoke control damper will achieve the same fire performance as the compartment barrier in which they are fitted. For more information on requirements see Annex F from BS9991 and Section 8.6 of this report.

All connections between the smoke detection, vent control panels and actuator mechanisms will be within an environment that provides protection from expected fire conditions.

Where any part of the control mechanism is powered by electricity, a secondary supply will be provided, see Section 4.9.

4.6.5 Smoke Ventilation Summary

Below is a summary table of the smoke control arrangements for the building.

Table 7: Smoke Control Summary

Floor	Ty Cambria	
	Stair 1 / Core 1 (Note 1)	Stair 2 / Core 2 (Note 1)
Roof Level	No occupied accommodation. An AOV is located at the head of the stair. AOVs and inlet shafts are to be at least 5m from the mechanical extract shaft discharges.	No occupied accommodation. An AOV is located at the head of the stair. AOVs and inlet shafts are to be at least 5m from the mechanical extract shaft discharges.
Level 23	Communal amenity and water / plant room lobbies provided with mechanical smoke ventilation. The firefighting / evacuation lift lobby is provided with a natural inlet shaft (Note 2).	Communal amenity lobby provided with mechanical smoke ventilation. The firefighting / evacuation lift lobby is provided with a natural inlet shaft (Note 2).
Level 16 – Level 22	Common corridor accessing the firefighting / evacuation lift lobby provided with a mechanical smoke ventilation shaft (MSVS) within the corridor. The firefighting / evacuation lift lobby is provided with a natural inlet shaft (Note 2).	Common corridor accessing the firefighting / evacuation lift lobby provided with a mechanical smoke ventilation shaft (MSVS) within the corridor. The firefighting / evacuation lift lobby is provided with a natural inlet shaft (Note 2).
Level 15	Common corridor accessing the firefighting / evacuation lift lobby provided with a mechanical smoke ventilation shaft (MSVS) within the corridor. The firefighting / evacuation lift lobby is provided with a natural inlet shaft (Note 2).	Common corridor accessing the firefighting / evacuation lift lobby provided with a mechanical smoke ventilation shaft (MSVS) within the corridor. The firefighting / evacuation lift lobby is provided with a natural inlet shaft (Note 2).
Level 08 – Level 14	Common corridor accessing the firefighting / evacuation lift lobby provided with a mechanical smoke ventilation shaft (MSVS) within the corridor. The firefighting / evacuation lift lobby is provided with a natural inlet shaft (Note 2).	Common corridor accessing the firefighting / evacuation lift lobby provided with a mechanical smoke ventilation shaft (MSVS) within the corridor. The firefighting / evacuation lift lobby is provided with a natural inlet shaft (Note 2).
Level 07	Common corridor accessing the firefighting / evacuation lift lobby provided with a mechanical smoke ventilation shaft (MSVS) within the corridor. The firefighting / evacuation lift lobby is provided with a natural inlet shaft (Note 2).	Common corridor accessing the firefighting / evacuation lift lobby provided with a mechanical smoke ventilation shaft (MSVS) within the corridor. The firefighting / evacuation lift lobby is provided with a natural inlet shaft (Note 2).
Level 02 – Level 06	Common corridor accessing the firefighting / evacuation lift lobby provided with a mechanical smoke ventilation shaft (MSVS) within the corridor. The firefighting / evacuation lift lobby is provided with a natural inlet shaft (Note 2).	Common corridor accessing the firefighting / evacuation lift lobby provided with a mechanical smoke ventilation shaft (MSVS) within the corridor. The firefighting / evacuation lift lobby is provided with a natural inlet shaft (Note 2).
Level 01	Common corridor accessing the firefighting / evacuation lift lobby provided with a mechanical smoke ventilation shaft (MSVS) within the corridor. The firefighting / evacuation lift lobby is provided with a natural inlet shaft (Note 2).	Common corridor accessing the firefighting / evacuation lift lobby provided with a mechanical smoke ventilation shaft (MSVS) within the corridor. The firefighting / evacuation lift lobby is provided with a natural inlet shaft (Note 2).

Floor	Ty Cambria	
	Stair 1 / Core 1 (Note 1)	Stair 2 / Core 2 (Note 1)
Ground	Cycle store, bin store and plant lobbies opening into the stair / evacuation lift lobby provided with 0.4m² permanent ventilation or mechanical equivalent. The firefighting / evacuation lift lobby is provided with a natural inlet shaft (Note 2).	Entrance lobby provided with 0.4m² permanent ventilation or mechanical equivalent. Corridor serving bike store, gym will be provided with mechanical smoke shaft. The firefighting / evacuation lift lobby is provided with a natural inlet shaft (Note 2).

Note 1: The specialist smoke control designer should confirm the principles, shaft numbers, AOV requirements, locations and size to include in the fire strategy. This will require CFD modelling to demonstrate the system performs as required.

Note 2: In line with Clause 7.4.4, Note 1 from BS9991 this is an extension of the ventilation provisions in the corridors.

4.6.5.1 Smoke Control Summary

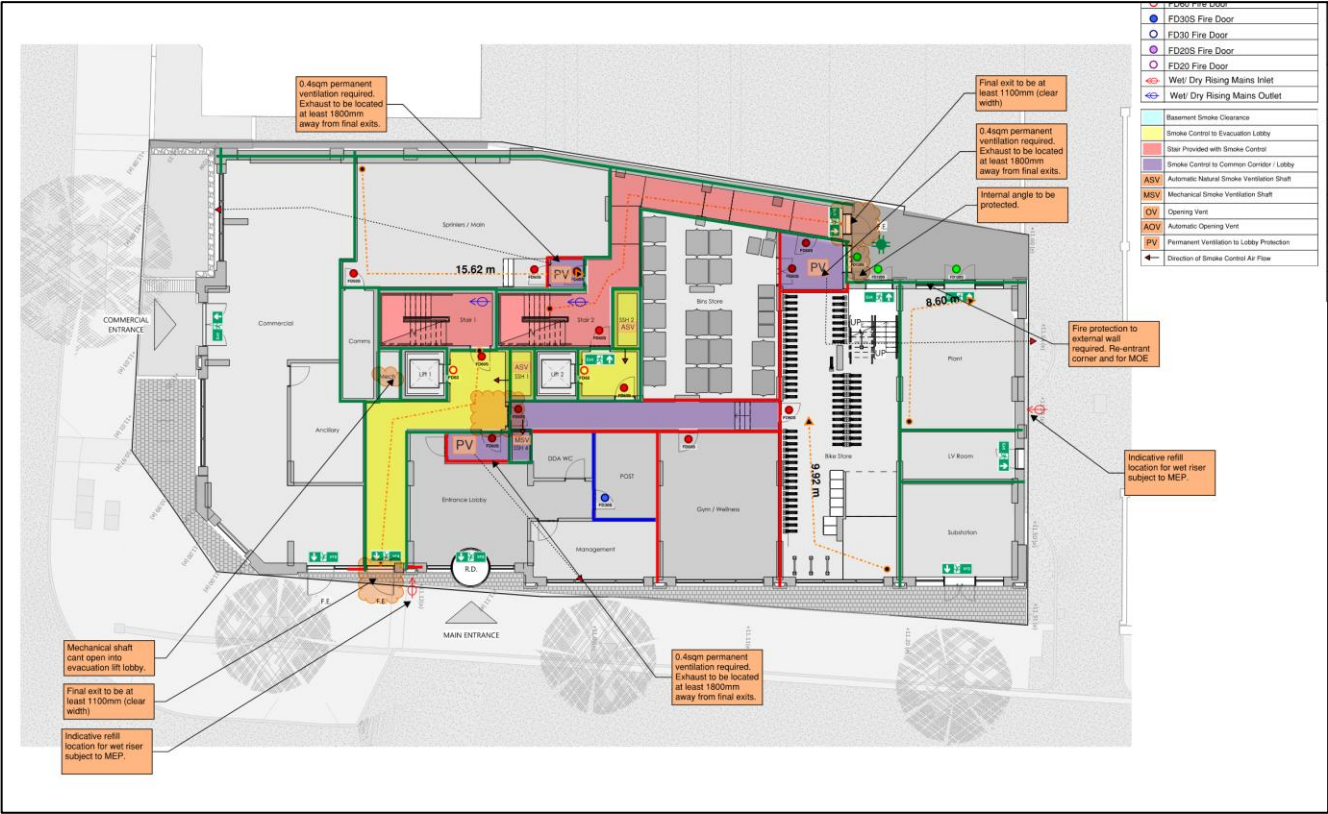


Figure 26: Ground Floor Smoke Control Summary

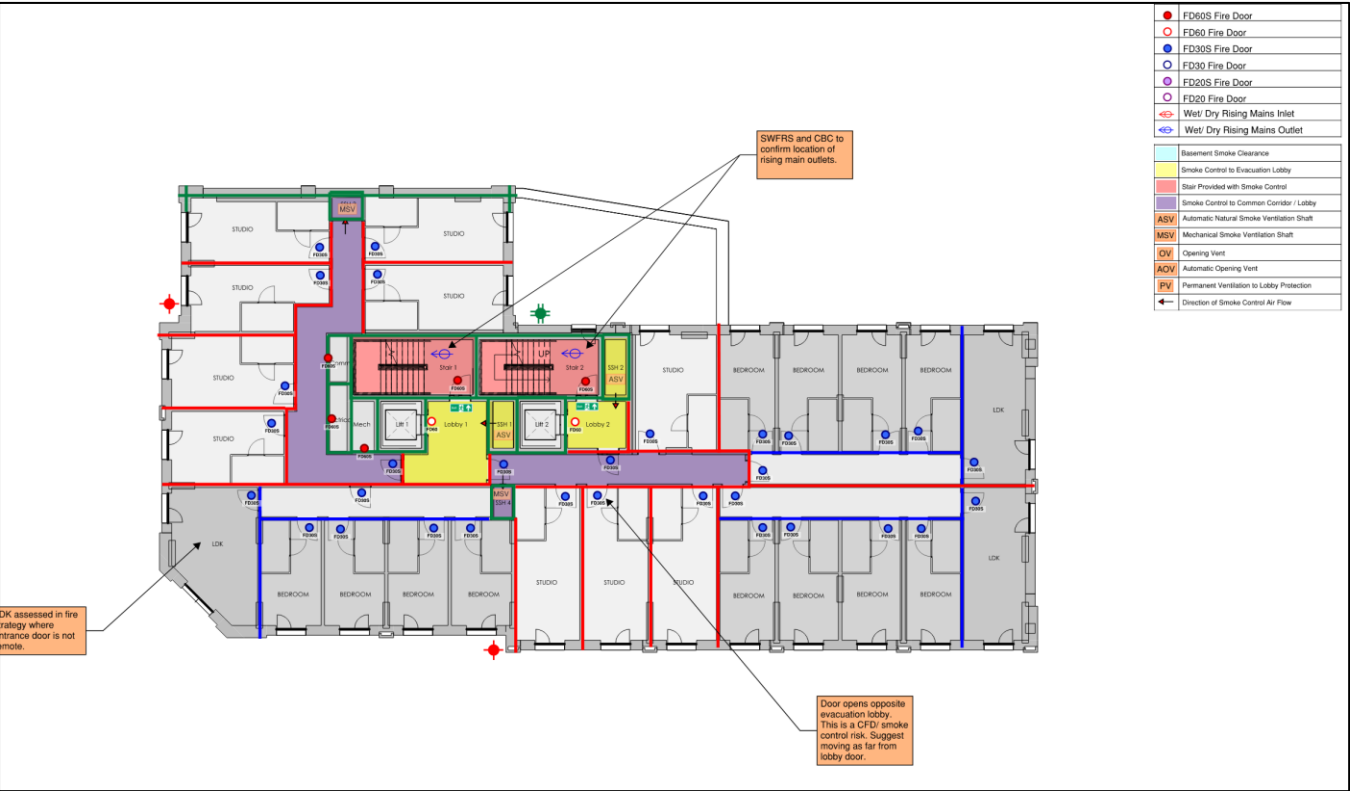


Figure 27: Typical Upper Smoke Control Summary

For a summary of all floors see Helios SKs.

4.7 Fire and Smoke Dampers

The provision of dampers is discussed within Section 9.4.2.

4.8 Category B Protective Devices

It is recommended that the cooking appliances within the cluster flat LDKs, the studio flats and the communal amenity spaces if cookers are installed are provided with a Category B Preventative Cut Off Device to BS EN 50615. BSEN 50615 describes three categories of protective device:

- Category A – Device for extinguishing and simultaneous power cut-off of the appliance.
- Category B - Device for preventive power cut-off of the appliance.
- Category AB - Device for preventive power cut-off of the appliance, followed by extinguishing if flame occurs.

The protective device is effective only for fires on the hob and is not intended to protect against fires in the oven or in places adjacent to the cooker. It is noted the building wide suppression system would cover the adjacent areas. A Category B device may give some protection against fires originating in other (non-cooking) materials left on the hob, however this will depend on the nature and quantity of materials.

A Category B device shall switch-off the appliance before a fire originates and an audible warning of at least 65 dB measured 1m distance in accordance with EN54-3 shall be generated until the user resets the alarm. Thus, the system is more proactive than a suppression system.

The temperatures are set by BSEN 50615:2015 for preventive cut off devices i.e., the standard BSEN test data notes smoking of any oil would occur pre auto ignition of the test oil sample i.e., setting off the audible alarm. At this point the BSEN for Preventative cut off device's notes:

- Category B devices shall switch-off the appliance before the flames start and an audible warning of at least 65 dB measured 1 m distance in accordance with EN 54-3 shall be generated until the user stops the alarm, for example by pressing a button, or the temperature of the oil starts to decline.
- The device will cut off power to the cooktop before the oil temperature reaches 330°C (before fire starts). The sunflower oil shall not ignite within 10 minutes after the power to the cooktop has been cut.

At this point there is no fire on the premise auto ignition has not occurred, on this basis the tenability limits are not relevant as essentially the temperatures over 60°C are within the cooking pan.

The key benefit with these devices is they are designed to prevent a fire starting so they are a proactive device; these devices are widely accepted by statutory authorities where it is proposed to remove the fire rated enclosure to the cooking facilities subject to fitting of Category B device complying with BSEN 50615.

This is on the basis it is intended to have the effect of eliminating the risk for a cooking fire as a 'Preventative Cut off Device' is tested so that it will shut off the device prior to flames occurring.

As stated earlier the provision of Category B system will ensure that a fire is prevented as a result of misuse of cooking appliance or from flammable material left on the hob.

4.9 Power Supplies

All power supplies, electrical wiring and control equipment will be protected against the effects of fire for an appropriate period. Power and control cables will be installed in accordance with Clause 21 of BS9991, BS8519 and BS7671:2018 + A2:2022 [Including corrigendum May 2023]. The primary power source is taken from the public electricity supply, with secondary power being supplied from an alternative supply such as:

- Life safety generator.
- Independent high voltage supply fed from an independent utility primary network substation to that feeding the primary supply.
- Uninterruptible power supply (UPS) according to the electrical load requirements.

The output from the secondary power supply will be enough to satisfy the maximum demands of the system. Design team to confirm secondary power supplies.

A secondary power supply is required for essential fire safety measures and will be in accordance with Clause 21 from BS9991, e.g.:

- Fire detection and alarm system.
- Smoke ventilation systems.
- Lighting for staircases and wayfinding system within staircase.
- The rest of emergency lighting and illuminated signage.
- AWFSS: BS9251 system.
- AWFSS: BSEN12845 system.
- Firefighters / evacuation lift provisions.
- Fire and smoke dampers

Note: The systems shall comply with their respective British Standards regarding secondary power supplies. The list above is not exhaustive.

The power supplies, electrical wiring and control equipment will be protected by a building fabric enclosure that offers protection against fire and water damage for not less than the minimum times noted in the table below.

The minimum fire resistance of building electrical switch room enclosures are noted below.

Table 8: Minimum Fire Resistance of Building Electrical Switch room Enclosures

Room	Fire Resistance (REI) of Enclosure (Minutes)					
	Depth of Basement		Height of Floor of Top Occupied Storey Above Ground Level			
	>10m	≤10m	≤5m	>5m ≤18m	>18m ≤30m	>30m
LV or ELV Switch room	90	60	30	60	120	120
HV Switch room or Transformer Room	120	120	120	120	120	120

5 Horizontal Means of Escape

5.1 Flat Types

The building comprises studio flats and cluster flats. Each is discussed below.

5.1.1 Open Kitchens

BS9991 recommends where the escape route from a habitable room is through a living area containing a kitchen that is not located within a separate enclosure, the following recommendations should be met:

- All rooms in the dwelling, except for any exclusions described in BS9251 or BSEN 12845, should be provided with a sprinkler system confirming to BS9251 or BSEN 12845.
- The dwelling should be provided with a Category LD1 fire detection and alarm system in accordance with BS5839-6.
- All cookers with a fixed connection should be located as far away from the escape route as practicable:
 - The edge of the cooking appliance should be not less than 1800mm from the escape door, a door to an adjoining habitable room or a means of escape route to an escape door.
 - All egress routes from habitable rooms to the escape doors from the dwelling should not be less than 900mm in width. No fixed obstructions should be located within the 900mm escape route.
 - A gap of 300mm should be provided between the leading edge of the door from the space containing the cooking facilities and the 1800mm zone from the cooking appliance.

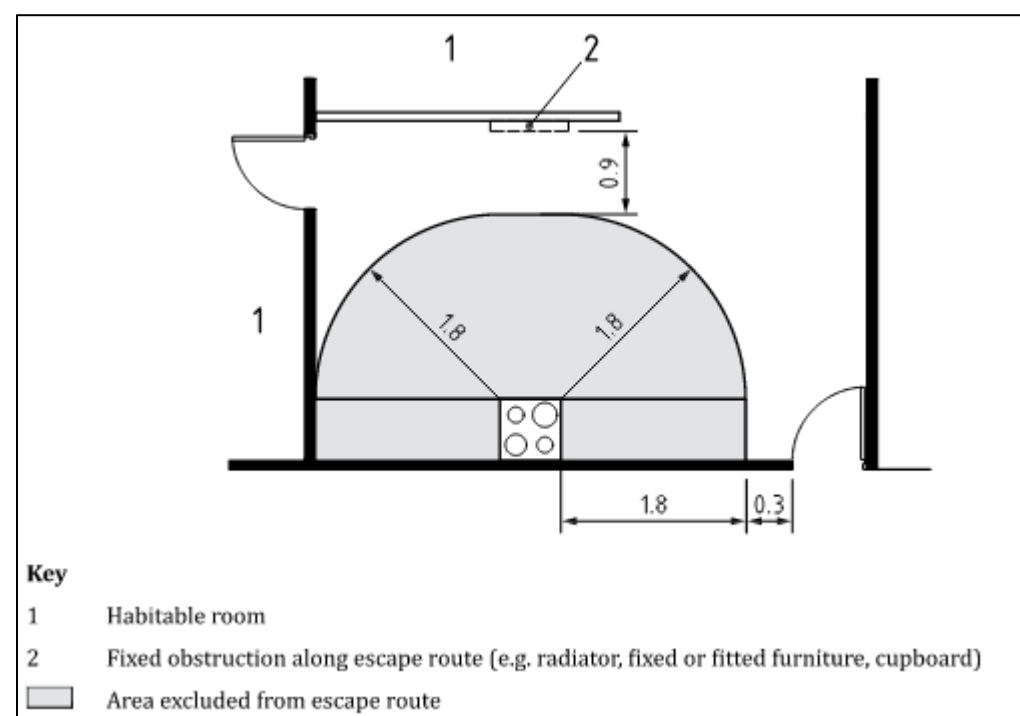


Figure 28: Open Kitchen Guidance

The studio flats have open kitchens within the single habitable space and the clusters have protected entrance hallways and therefore the above guidance is not applicable. However, Helios recommends all cookers can achieve 1800mm zone.

5.1.2 Flats with Restricted Travel Distance

The studio flats are single room dwellings with an open kitchen and an en-suite. They are treated as flats with a restricted travel distance in accordance with BS 9991 Clause 8.4.2 a) and Figure 16 a) rather than as open plan flats. The maximum travel distance within the flats is 20m with the inclusion of AWFSS and a Category L1 fire detection and alarm system. Each flat will be separated from other accommodation by a minimum of 60 minutes fire resistance (REI60) with FD30S door with self-closing device.

5.1.3 Cluster Accommodation

The cluster flats comprise a shared living / kitchen / dining space (LDK) and bedrooms, accessed from an internal protected hallway within the cluster. Each cluster flat is designed in accordance with BS 9991 Clause 8.7 and Figure 23.

- Each cluster will be separated from the remainder of the building by construction having at least 60 minutes fire resistance, with an E 30 Sa4 or FD30S fire door at the cluster entrance.
- The internal corridor serving the rooms of each cluster will have at least 30 minutes fire resistance (REI30)
- The LDK should be separated from the remainder of the cluster flat by 30 minutes fire resistance (REI30) and be at the remote end of the flat.
- The doors to the bedrooms and the LDK accessed from the internal protected corridor will be self-closing E 30 Sa4 or FD30S fire doors.
- Cupboard and service duct access from the cluster corridor will be separated by E 30 Sa4 or FD30S fire doors.
- Travel distance within the internal corridor of each cluster will not exceed 15m in a single direction, on the basis that sprinklers in accordance with BS 9251:2021 are installed throughout the cluster, or 35m where escape is possible in more than one direction.

The travel distances marked on the Helios sketches within the clusters are within these limits.

In the cluster flats the shared LDK contains the cooking facilities and is located adjacent to the cluster entrance door in order to make the smoke control design work within the common corridor e.g. no flats opening into evacuation lift lobby and compliant travel distances in common corridor.

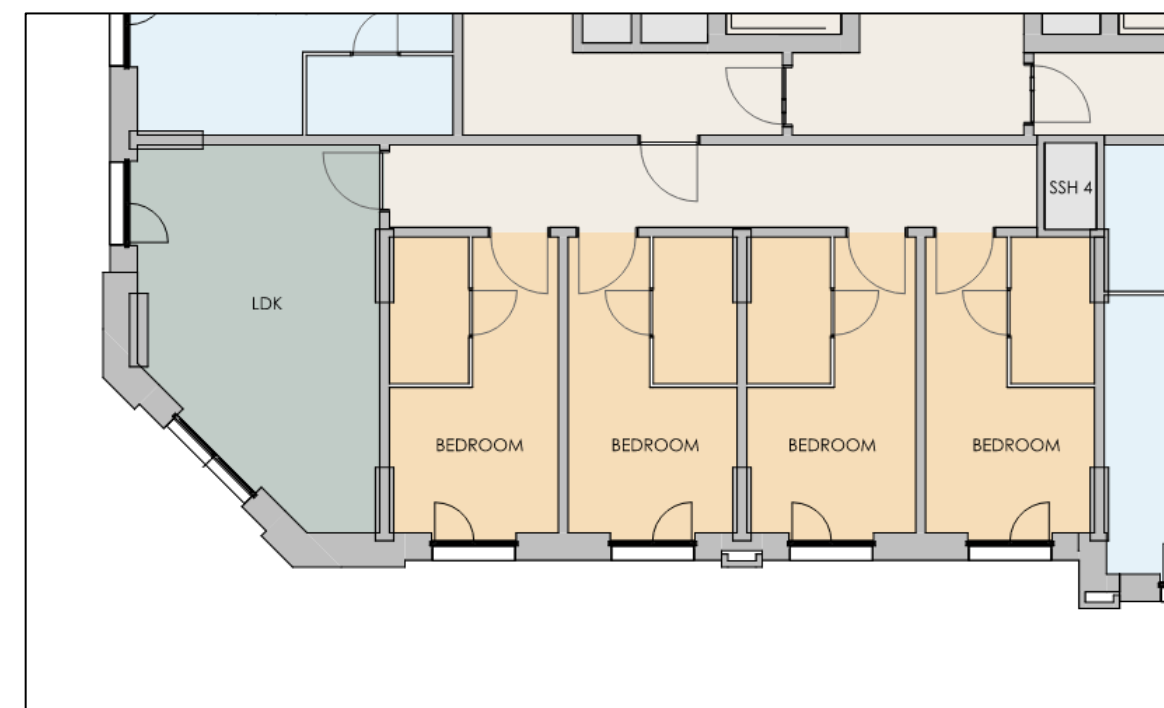


Figure 29: Cluster Flat

In addition to the minimum safety requirements required within the building that includes high compartmentation, sprinklers to all flats to control the growth of the fire and a Category L1 fire detection and alarm system to provide earliest warning to occupants. This arrangement is considered acceptable as the following mitigation is proposed:

- A Category B preventative cut-off device to BS EN 50615 with audible warning to each cooking appliance within the LDK;
- A door screecher is proposed to the LDK where the entrance door is not located at the remote end. This is to reduce the likelihood of door wedging.

This arrangement is to be agreed with the AHJ.

5.1.4 Balconies

The studio and cluster flats are not provided with balconies. There are communal external terrace areas at the following levels:

- Level 07 – communal terrace of circa 105m² formed over the roof of the lower part of the building
- Level 23 – communal terrace of circa 32m²

Annex E from BS9991, states 'All balconies should be guarded with a protective barrier conforming to BS6180.'

The external terraces should be constructed in accordance with Annex E from BS9991. For more information on the construction of terraces see Section 11.8 of this report.

Clause E.5 from Annex E within BS9991 notes

Balconies, terraces and roof gardens that are used as a common amenity and have a travel distance exceeding 18 m should have an alternative escape route. The travel distance for the alternative escape route should be not greater than 45 m.

Single direction escape routes from a terrace should be into either:

- a protected stairway; or
- a protected corridor meeting the recommendations for travel distance given in Clause 7, measured from the door of the terrace to a stair enclosure.

The Level 23 terrace is accessed directly from the adjoining communal amenity space and the protected corridor.

The Level 07 terrace is accessed via the communal amenity space and not directly from a protected lobby or protected corridor.

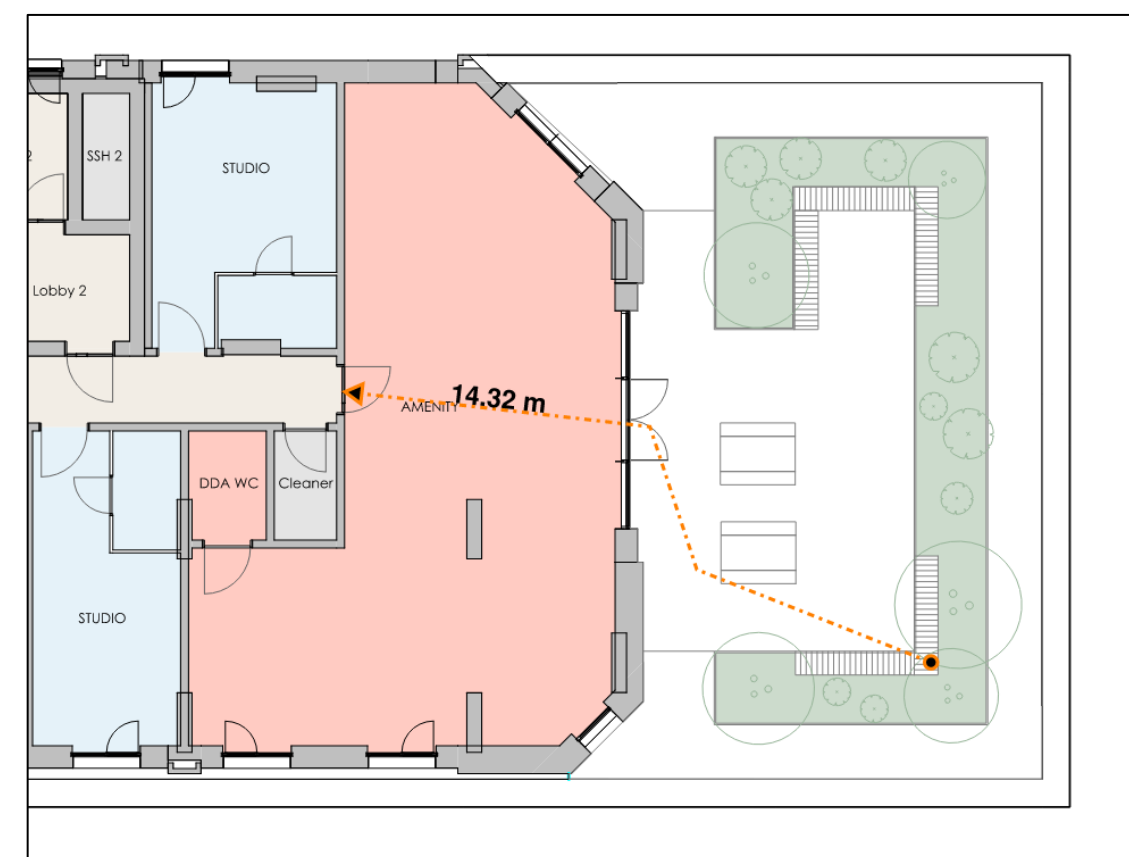


Figure 30: Level 07 Communal Amenity and Terrace

However, the arrangement is considered to meet the functional requirements of the Building Regulations as;

- The travel distance from the terrace to the protected common corridor is within the 18m single direction limit for a communal terrace given in Annex E.5, and the onward travel distance in the common corridor is within the limits given in Clause 7.
- The separation between the terrace and the communal amenity space is predominantly glazed, so occupants on the terrace have a clear view into the amenity space and of the exit route.
- The communal amenity space is provided with automatic detection and is fully sprinklered, and is a single compartment of circa 93m² with no other accommodation opening into it.
- Sounders and beacons will be provided to the terrace so that occupants receive early warning of a fire within the amenity space.

This will need to be agreed with the AHJ.

5.2 Travel Distances

5.2.1 Travel Distances

The table provides a summary of the maximum allowable travel distances in accordance with BS9991.

Table 9: Maximum Travel Distances

Area		Single Direction of Travel	Multiple Directions of Travel
Flats (studio flats)		9m (With AWFSS and Category LD1 system this can be extended to 20m)	NA
Cluster accommodation – internal corridor		9m (15m where sprinklers to BS 9251:2021 are installed throughout the cluster)	35m
Common corridor		7.5m increased to 15m with Smoke control and AWFSS	30m Can be increased to 45m with Smoke control and AWFSS
Evacuation lift lobby		7.5m	No Maximum Limit
Communal roof garden		18m	45m
Ancillary areas	Engineering services installation rooms	9m in room 18m to nearest storey/ final exit	18m in room 45m to nearest storey/ final exit
	Transformer, switch gear rooms		
	Refuse store		
	Bike store	9m	45m
Communal lounges and common amenity		18m	45m
Roof		60m	200m

5.2.2 Residential Summary

The travel distances marked on the Helios sketches within the studio flats, the cluster flats and the common corridors meet the recommendations noted in the table above.

5.2.3 Ancillary Accommodation Summary

The limits in the table above are met for the communal amenity and ancillary spaces. **As the plant room layouts develop, travel distances must be kept in line with the above limits.**

5.2.4 Roof Areas

Design team to confirm roof access and terrace management strategy. There is no occupant access to the main roof.

5.2.5 Commercial

The commercial unit has been assessed under a B1 risk profile from BS9999 with the inclusion of AWFSS, this allows 24m in a single direction and 60m in two directions as the commercial unit escape is independent from the main building e.g. does not share escape with the residential building. Travel distances are within limitations for the shell and core. Fit out design to ensure travel distances are not exceeded.

5.3 Exit Width Requirements

5.3.1 Clear Exit Widths

For the purposes of this report, the width of a doorway is the clear width of the opening between the door leaf and frame (or projecting building hardware or the width between two opening door leaves in the case of double doors) assuming that the door leaf is free to open 90° or more.

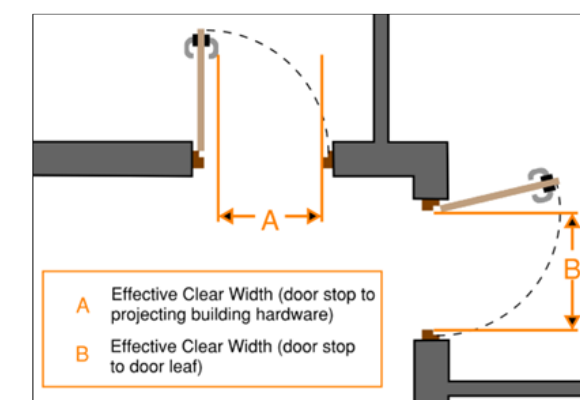


Figure 31: Example of Clear Width

Note: It will be ensured that structural openings for doors on escape routes take account of the impact of door frame, door leaves and associated ironmongery.

5.3.2 Residential Required Exit Widths

A stay put policy is provided within the building, therefore a minimum clear width of 850mm should be provided to all doors on common escape routes as per BS9991.

There is the facility for further evacuation of the residential areas should this be deemed necessary by the fire and rescue service. This would be done floor by floor.

A check has been undertaken on a worst-case floor. Assuming the largest residential floor plate (circa 745m² at Levels 01 to 06) is fully occupied, and applying the measured unit mix of studio flats and four bed cluster flats, the floor is estimated to contain in the order of 25 bedspaces. BS 9991 Clause 5.1.2 notes a minimum width of 4.1mm per person for final exits sized for simultaneous escape. On a floor-by-floor managed evacuation the required clear width is therefore well below the 850mm minimum, and 850mm clear width is provided to all doors on the common escape routes.

BS9991 recommends all common corridors for evacuation will not be less than 1200mm clear width.

All doors will have an effective clear width of not less than 850mm for accessible escape. Where double doors are provided at least one leaf will achieve 850mm.

5.3.3 Ancillary Required Exit Widths

For the smaller ancillary areas where the occupancy of each space will be less than 60 a minimum width of 850mm is acceptable.

Based on the current number of escape routes and the exit door swings, the communal amenity spaces at Level 07 is limited to 60 occupant and require a minimum clear width of 850mm. The total occupancy of the floor does not require larger exit widths than 850mm.

Level 23 amenity spaces combined should not exceed more than 60 occupants due to door swings into the evacuation lift lobby. The plant areas will not exceed 60.

The ground floor entrance lobby and gym / wellness suite are served by exits achieving not less than 850mm clear width. The Helios sketches note that the ground floor final exits are to achieve not less than 1100mm clear width to suit the firefighting stair requirement. **Design team to confirm final exit widths.**

The commercial unit occupancy is limited to 60 based on a single exit and requires a minimum clear width of 850mm.

5.4 Inner Rooms

An inner room can be at risk if a fire starts in the access room. An inner room arrangement will therefore not be provided unless all of the following conditions are met:

- The occupant capacity of the inner room does not exceed 60 (30 where the occupants require assistance escaping).
- The inner room is not a bedroom.
- The inner room is entered directly from the access room.
- The escape route from the inner room does not pass through more than one access room.
- The travel distance from any point in the inner room to the exit(s) from the access room does not exceed the distances from BS9991.
- The access room is not a place of special fire hazard and is in the control of the same occupier as the inner room.

There are inner rooms within the scheme, with the provision of automatic fire detection, these are considered to meet guidance.

There are no inner rooms present within flats or cluster flats.

5.5 Dead Ends

There are dead ends within the common corridors serving flats. See guidance (Section 4.6) above for requirements.

5.6 Escape Routes – General

5.6.1 Protected Common Corridors

Protected common corridors are used for escape and due the means of escape arrangement the corridor is enclosed within a minimum of 60 minutes fire resistance (REI60). The fire walls and doors should also reduce the likelihood of cold smoke penetrations.

5.6.2 Protected Lobbies

Protected lobbies are provided between ancillary accommodation and protected escape routes. These are noted below with the equivalent protection.

Table 10: Protected Lobbies

Floor	Area	Fire Resistance Requirement	Fire Door Requirement
Level 23	Communal Amenity and Water / Plant Room	REI60 to common corridor	FD60S
Level 07	Communal Amenity (dead end condition)	REI60 to lobby	FD60S
Level 01	Water / Plant Rooms (dead end condition)	REI60 to lobby	FD60S
Ground	Bin Store	REI60	FD60S
	Gym / Wellness	REI60 to common corridor	FD60S
	Entrance Lobby	REI60 to lobby	FD60S
	Sprinkler Tank and Pump Room	REI60 to lobby	FD60S

Note: Protected lobbies and their ventilation are provided to meet BS 9991 Clause 13.1 a) and Clause 13.2, Table 1. Ventilation of 0.4m² is applicable on the basis that automatic sprinkler protection to BS 9251:2021 is provided throughout the building.

5.6.3 Evacuation Lobbies

Evacuation lift lobbies on the ground floor have been enclosed within 120 minutes fire resistance (REI120) based on Helios recommendation to provide the most robust protection on route to a place of ultimate safety. On the upper floors the evacuation lobbies are enclosed within 60 minutes fire resistance (REI60) as per BS9991.

5.6.4 Non-Protected Corridors

Non-protected corridors are used for means of escape but are not protected corridors. The corridors provide some defence against the spread of smoke in the early stages of a fire, even though not designated to have fire resistance. The non-fire rated partitions will be taken up to the soffit of the structural floor above, or to a suspended ceiling and openings into rooms from the corridor will be fitted with doors, which need not be fire doors.

5.6.5 Cross Corridor Protection

With the provision of evacuation lobbies additional cross corridor doors are not necessary.

5.6.6 Exits

Doors on escape routes (whether or not the doors are fire doors) will either not be fitted with lock, latch or bolt fastenings, or be fitted only with simple fastenings that can be readily operated from the side approached by all people (including disabled and elderly) making an escape. The operation of these fastenings will be readily apparent and openable without the use of a key and without having to manipulate more than one mechanism.

Similarly, where a secure door is operated by a code, combination, swipe or proximity card, biometric data or similar means, it will also be capable of being overridden from the side approached by people making their escape.

Any means of escape door which is provided with electrically powered locks will return to the unlocked position under any of the following conditions:

- On operation of the fire alarm.
- On loss of power or system error.
- On activation of a manual door release unit (Type A) conforming to BSEN 54-11 positioned at the door on the side approached by people making their escape. Where the door provides escape in either direction a unit will be installed on both sides of the door.

5.6.7 External Escape Routes

Where an external escape route is beside an external wall of the building, in line with BS9991 external wall should be of fire resisting construction in both of the following zones:

- Within 1800mm of the escape route.
- Up to 1100mm above the surface of the escape route.

Exit of Stair 2 is into a narrow external escape route. On this basis it is proposed to fire rate the external elevation to 120 minutes upto 1800mm from ground floor level to assist with mobility impaired escape as well as firefighters. See the figure below for instances of external escape route protection.

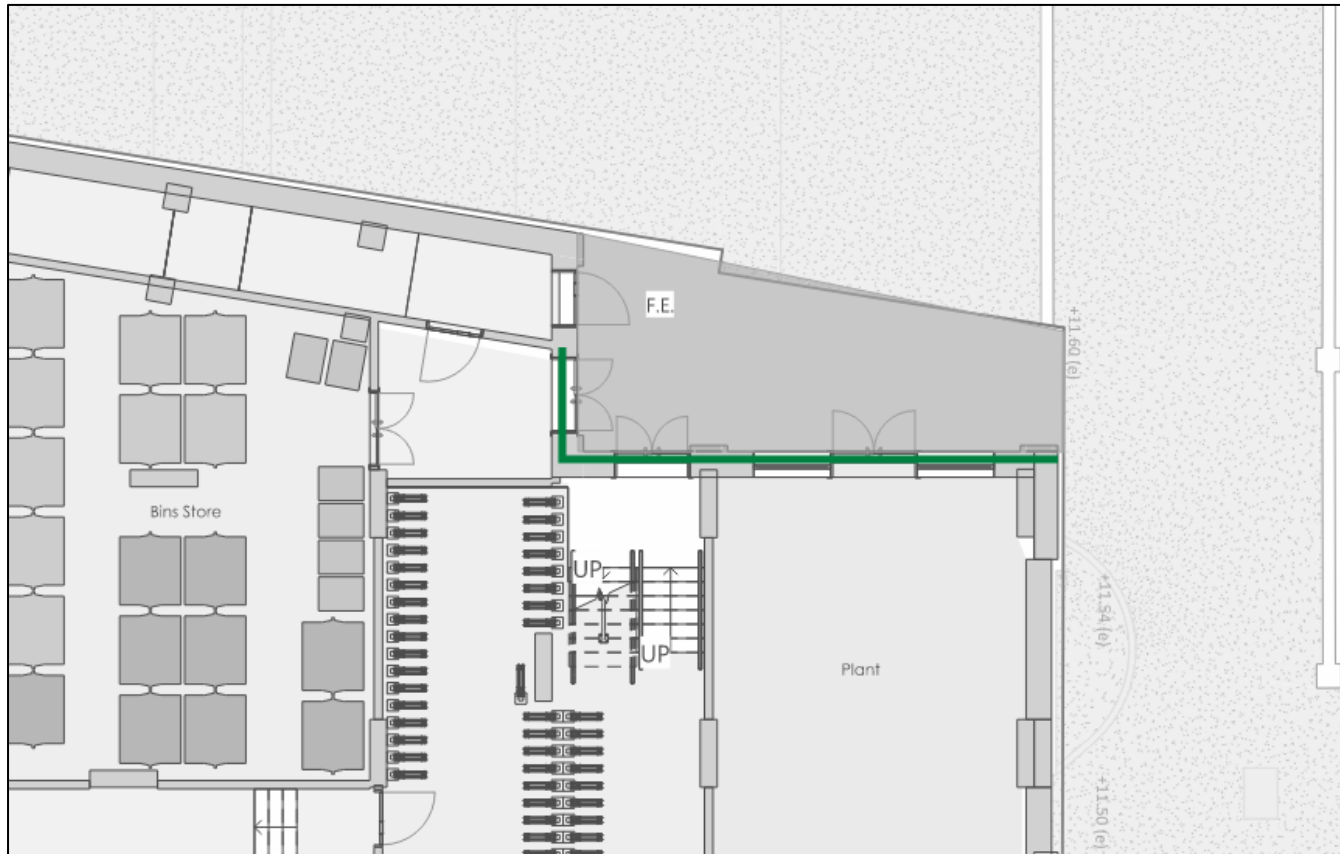


Figure 32: External Escape Routes

5.6.8 Services Running Horizontally within Common Corridors

In relation to services that are distributing via the common corridors [Not firefighting / evacuation lift lobbies) the services should either be separated from the corridor by a minimum of REI 60 fire protection from both directions effectively removing the services from the corridor; or the services should meet all of the following criteria:

- The exposed surface of the material/product used is Class B-s3, d2 or better.
- The supports and fixings in the cavity are Class A1.
- Any pipe insulation system is Class B-s3, d2 or better.
- Any electrical wiring in the cavity is laid in metal trays or metal conduit.

5.6.9 Assembly Points

The location of assembly areas is to be defined by the end users Fire Risk Assessment. This will take into account their management structure, resources, and local restrictions and if they have a current policy that they need to adhere to.

These areas should not be located where they may obstruct fire service operational personnel or their access to the development.

6 Vertical Escape

6.1 Vertical Escape

The proposed development is provided with two stairs, Stair 1 and Stair 2, both of which are designed and constructed as firefighting stairways and both of which serve all storeys. The stairs are adjoining and will be separated by imperforate construction in accordance with BS 9991 Clause 10 b).

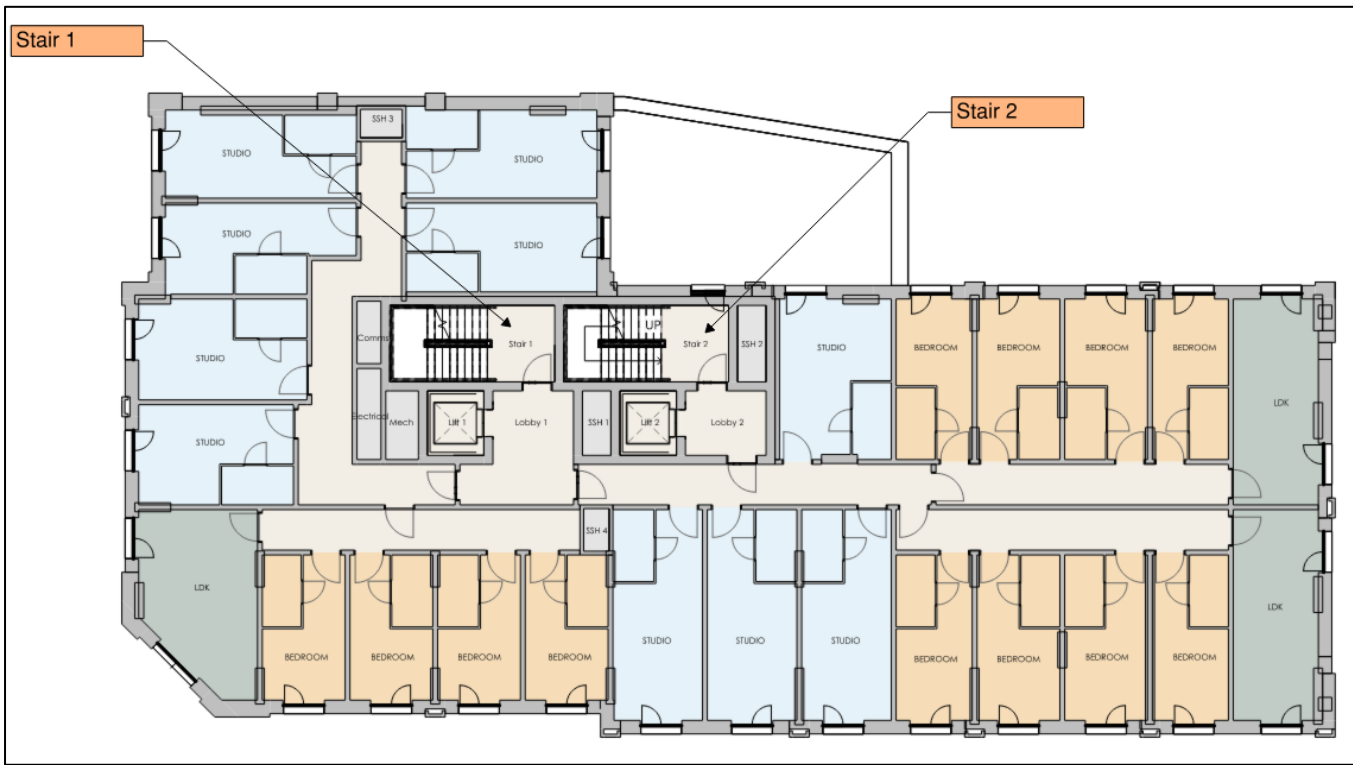
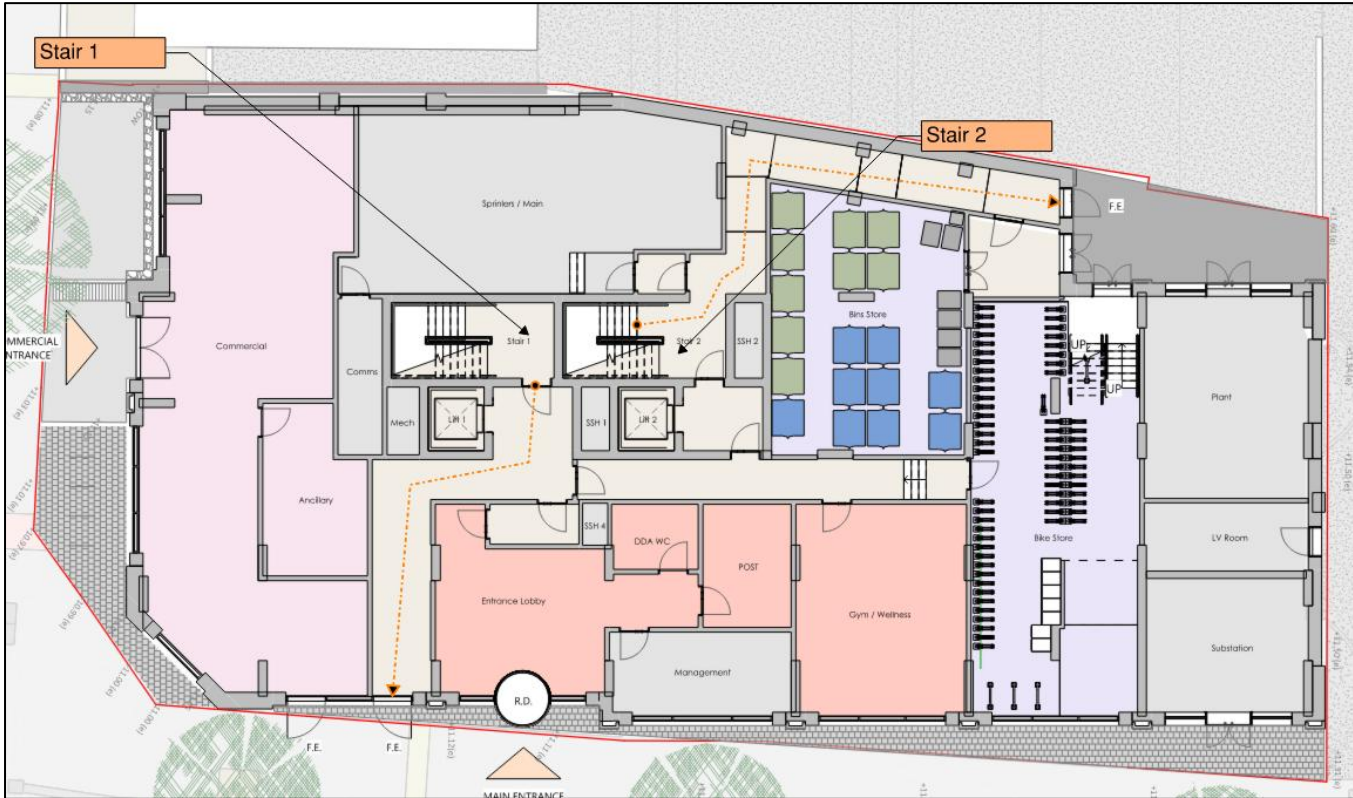


Figure 33: Stair Locations

6.2 Vertical Clear Widths

The stairs from the residential floors require a minimum clear width of 1100mm in accordance with BS9991 for firefighting. **Design team to confirm clear width of stairs being provided.**

The fire service can manage the evacuation of each floor of the building. Based on the measured unit mix, the maximum predicted occupancy of the worst-case floor is in the order of 25 bedspaces, plus up to 60 occupants where a communal amenity space is present on the same floor.

BS 9991 Clause 5.1.2, Note 5 gives a formula for calculating stair capacity. Applying the recognised form of that expression, $P = 200w + 50(w - 0.3)(n - 1)$ where w is the stair width in metres and n is the number of floors served, a 1100mm stair serving 23 floors above the final exit has a capacity of circa 1100 persons. On the basis that both stairs have protected corridors and lobbies with smoke control, discounting a stair is not necessary.

Table 11: Minimum Required Stair Widths – Residential

Stair	Proposed Clear Width	Number of Floors Served	Stair Capacity (persons)
Stair 1	1100mm ^{Note 1}	23 above the final exit	Circa 1100
Stair 2	1100mm ^{Note 1}	23 above the final exit	Circa 1100

Note 1: The minimum clear width for a firefighting stair is 1100mm. The stairs will be designed in accordance with Clause 9 and Clause 46.3.5.1 of BS9991.

Each stair provides an escape capacity of circa 1100 occupants, giving circa 2200 in total, which is considerably more than is required for a floor-by-floor managed evacuation.

6.2.1 Final Exit Routes from Stairs

Stair 1 final exit is via the evacuation lift lobby and discharges onto East Grove. Stair 2 has direct access to outside and discharges onto Trinity Court.

There are no merging flows to the staircases indicated as the means of escape strategy is stay put. The final exit routes/doors are to be at least as wide as the minimum required clear stair width (1100mm).

As noted in Clause 5.1.2 of BS9991, the doors on the final exit routes from the stairs will be provided with a clear width suitable for general circulation and meeting inclusive design access requirements.

6.3 Vertical Escape Routes – General

6.3.1 Firefighting Stair

The firefighting stair will be enclosed within 120 minutes fire resistance.

6.3.2 Escape Stair

The escape stair will be enclosed within 120 minutes fire resistance.

6.3.3 Evacuation/ Firefighters lifts

The evacuation and firefighters' lifts will be enclosed within 120 minutes fire resistance.

6.3.4 Protected Shaft

Protected shafts will be enclosed within 120 minutes fire resistance (the same fire resistance as the elements of structure).

6.3.5 Fire Protection to Internal Angles on External Walls

Where a protected stairway or corridor projects beyond, is recessed from or in any way forms an internal angle of not more than 135° to the adjoining external wall of the building, then the distance between any unprotected area in the external enclosures to the building and any unprotected area in the enclosure to the stairway will be at least 1800 mm.

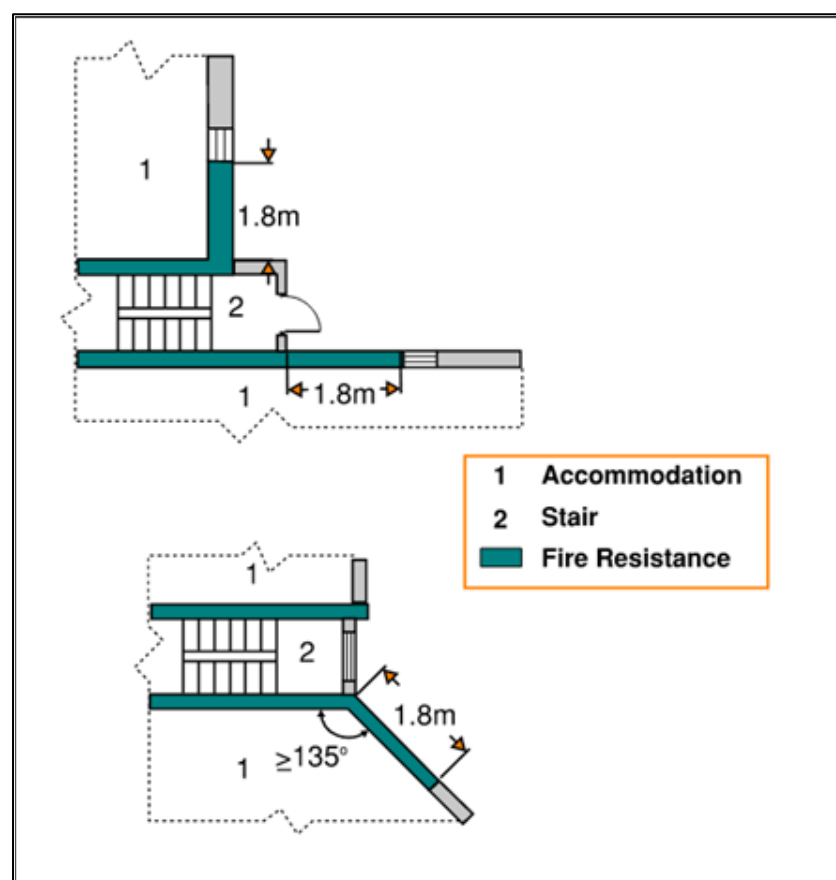


Figure 34: Re-Entrant Corner – Protected Escape Stair

It should be noted that the firefighting stairs require additional fire protection than a protected stair. Where a firefighting shaft is sited against an exterior wall, if any glazed area or opening in the exterior wall of the firefighting shaft is less than 500mm from the junction of the firefighting shaft with the exterior wall, then the fire resistance of the external wall immediately adjacent to the glazed area or opening should be not less than 1 h from both sides for a horizontal distance of 500mm.

Where there is an internal angle $<135^\circ$, the wall should be fire rated to 120 minutes for a distance of 5m. See the figure below for an example.

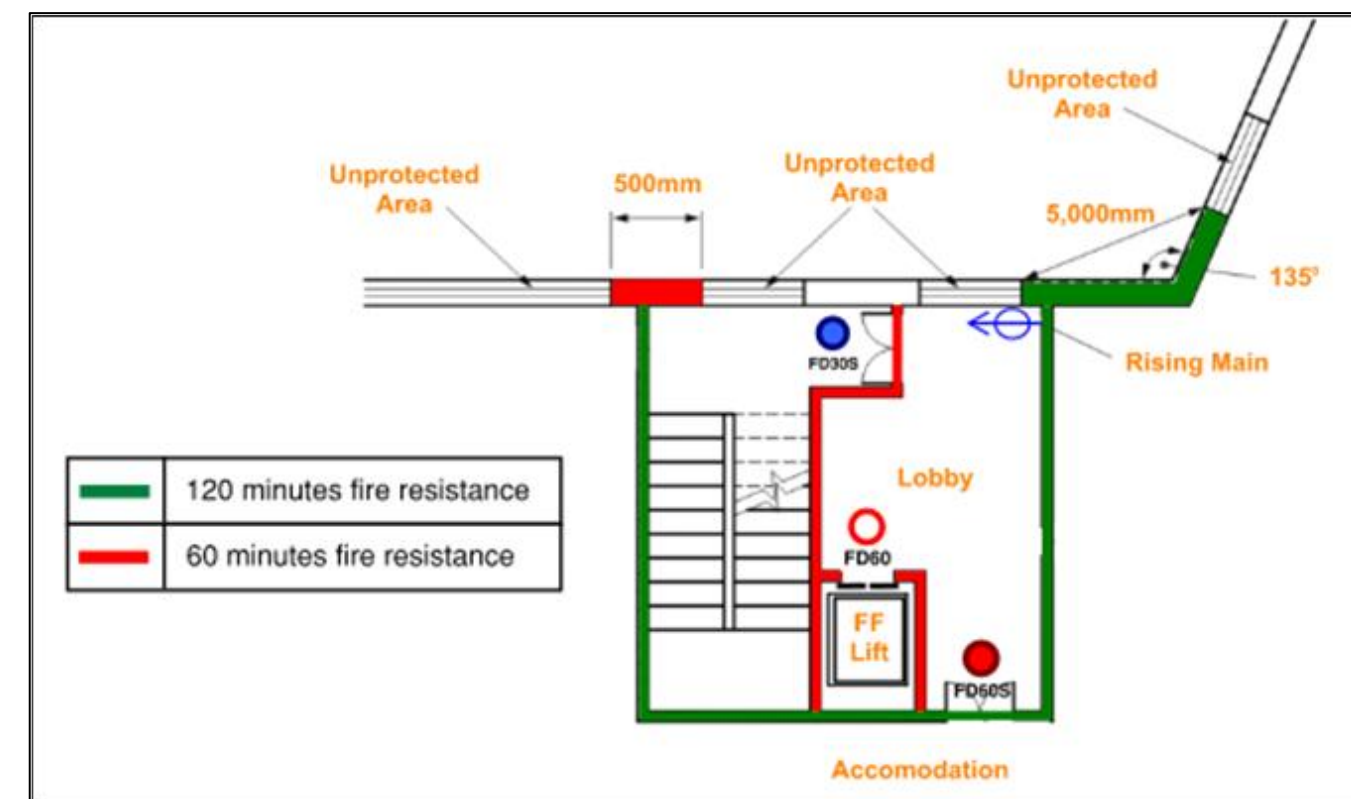


Figure 35: Firefighting Shaft External Wall Fire Resistance Requirements

The above apply to both stairs.

6.3.6 Smoke Ventilation to Stairs

The head of the stairs will be provided with an AOV as part of the mechanical smoke control design. See Section 4.6 for more information.

6.4 Accessible Means of Escape

BS9991 requires every stair to be provided with at least one evacuation lift. All final exits and storey exits are expected to have level thresholds or ramps.

The proposed layout includes two firefighting / evacuation lifts, an evacuation lift lobby to each stair and smoke control to the lift lobbies. A temporary waiting space is provided within each lift lobby at each level above ground, which provides the option for the fire service to initiate a managed evacuation under their control.

Each temporary waiting space is to be fitted with an Emergency Voice Communication (EVC) system. The EVC system will comply with BS5839-9:2021 and consist of Type B outstations which communicate with a master station located in accordance with Clause 12.6 of BS5839-9.

As noted in BS9991 'it is the responsibility of the premises management to assess the needs of all people to make a safe evacuation when formulating evacuation plans.'

'This evacuation plan will not rely on the assistance of the fire and rescue service. This is an important factor that will be considered in the building design.'

Special management procedures might be required where it is reasonably foreseeable that the proportion of disabled people in a building will be relatively high.

The cause and effect and management of this evacuation will be clarified with the end user / management. **Design team to confirm the preferred operation of the evacuation lifts e.g. 24/7 management, remote evacuation or automatic.**

7 Internal Fire Spread – Linings

7.1 Internal Linings

The interior wall and ceiling surfaces in a building may have a significant influence on how fast a fire may develop. Building Regulations requires 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.

For the purposes of classification, the following are deemed to be walls and ceilings:

- Walls:
 - The surface of glazing (except glazing in doors).
 - Any part of a ceiling that slopes at an angle of more than 70° to the horizontal.
 - Exclusions to walls can be found within BS9999 (BS9991 refers out to BS9999).
- Ceilings:
 - The surface of glazing.
 - Any part of a wall that slopes at an angle of 70° or less to the horizontal.
 - Underside of gallery.
 - Underside of a roof exposed to the room below.
 - Exclusion to ceilings can be found within BS9999 (BS9991 refers out to BS9999).

The surface finishes will satisfy the following classifications shown in the table below when tested under the European Classifications (in accordance with BSEN 13501-1:2018).

Table 12: Wall and Ceiling Lining Requirements

Location	European Class
Circulation spaces within dwellings	C-s3, d2
Other circulation spaces, including common areas of blocks of apartments	B-s3, d2
Small rooms of areas not more than 4m ²	D-s3, d2
Small rooms of area not more than 30m ² in non-residential accommodation	D-s3, d2
Other rooms	C-s3,d2

Note: When a classification includes 's3, d2' this means that there is no limit on the production of smoke or flaming droplets/particles.

7.2 Rooflights and Lighting Diffusers

No rooflights or diffusers are present in design other than automatic opening vents to the stairs. The AOV will need to meet requirements set out within Section 4.6.

8 Internal Fire Spread – Structure

8.1 Elements of Structure

The top habitable storey height within the proposed Building is more than 30m in height. The recommended fire resistance for elements of structure with the provision of sprinklers is 120 minutes.

The following are excluded from the definition of elements of structure:

- Lowest floor of the building.
- External walls, such as curtain walls or other forms of cladding, which transmit only self-weight and wind loads and do not transmit floor load.

8.2 Minimum Fire Resistance Requirements

The minimum required fire resistance for the structural elements of the building based on the use and height of the building.

Table 13: Minimum Fire Resistance Requirements

Part of the Building	Minimum Provisions When Tested To The Relevant Parts Of BS476 Or Relevant European Standard (Minutes)			Method of Exposure
	Load-Bearing Capacity [R]	Integrity [E]	Insulation [I]	
Structural Frame, Beam or Column	120	N/A	N/A	Exposed Faces
Load-Bearing Wall	120	N/A	N/A	Each Side Separately
Compartment Floors	120	120	120	From Underside
Compartment Wall	120	120	120	Each Side Separately
Compartment Walls Enclosing Flats	60	60	60	Each Side Separately
Enclosure to Ancillary Accommodation	See Section 8.4 (REI)			Each Side Separately / From Underside
Roofs:	120	120	120	From Underside
External Fire Spread: Any part less than 1000mm from a point in the relevant boundary Any part more than 1000mm from the relevant boundary ^{Note 1} Any part adjacent to an external escape route or stair	120	120	120	Each Side Separately
	120	120	15	From Inside the Building
	30	30	N/A	From Inside the Building
Re-entrant Corners / Maintaining Compartmentation	Same as the compartment wall it serves (REI)			Each Side Separately
Firefighting Stair	120	120	120	Each Side Separately
Firefighting/ Evacuation Lift Lobby (Ground Floor)	120	120	120	Each Side Separately
Firefighting/ Evacuation Lift Lobby (Upper Floor)	60	60	60	Each Side Separately
Firefighting Lift	120	120	120	Each Side Separately
Protected Shafts (stairs, risers, lifts etc)	120	120	120	Each Side Separately

Part of the Building	Minimum Provisions When Tested To The Relevant Parts Of BS476 Or Relevant European Standard (Minutes)			Method of Exposure
	Load-Bearing Capacity [R]	Integrity [E]	Insulation [I]	
Protected Lobbies	See Section 5.6.2 (REI)			Each Side Separately
Cross Corridor Door Protection	60	60	60	Each Side Separately
Cavity Barriers	N/A	30	15	Each Side Separately / From Underside
Fire Stopping/ Fire Barriers	See Section 9 for more information (EI)			Each Side Separately / From Underside

Note 1: This does not apply to permitted unprotected areas as indicated within Section 12 of this Fire Safety Strategy report.

8.3 Compartmentation

All floors are compartment floors. It is recommended the roof is constructed as a compartment floor.

Each studio flat and each cluster flat will be an independent compartment with 60 minute walls and 120 minute floors, except where they abut protected shafts or firefighting shafts, where the higher fire resistance will prevail. Within each cluster flat, the internal protected entrance hallway will have 30 minutes fire resistance to each room off the hallway.

Ancillary accommodation will be compartmentalised from the remaining building with appropriate fire resistance.

All shafts will be considered as protected shafts and will require the same fire resistance as the elements of structure unless considered a firefighting shaft or requires higher fire resistance as described within Section 8.4.

8.3.1 Junctions with Compartment Walls and Roof

A compartment wall will be taken up to meet the underside of the roof covering or deck, with appropriate fire stopping where necessary at the wall / roof junction to maintain continuity. To reduce the risk of a fire affecting both compartments a zone of roof 1.5m wide on either side of the wall will have a covering of B_{ROOF(t4)} (European class) on a substrate or deck of A2-s3, d2 or better. If roof supports pass through the wall, fire protection to these may be required for a distance of 1500mm to delay distortion at the junction.

It is recommended the roof is constructed as a compartment floor and therefore 1500mm would be provided inherently.

8.3.2 Fire Protection to Internal Angles on External Walls

To ensure adequate levels of compartmentation are maintained where an adjacent compartment is recessed or protrudes from the rest of the building elevation and creates an internal opposing recessed angle, suitable fire protection will be provided to the opposing compartment faces to maintain adequate compartmentation.

There is a requirement for external walls to protected stairway/ firefighting stairs which has been identified within Section 6.3.5. In addition to this there is a risk of fire and radiated heat spread between adjacent compartments externally where there is an internal angle present.

In addition to the stair internal angle requirements, there are re-entrance corner requirements between flats and between flats and protected common corridors. Fire resistance for the internal angle protection will meet the same fire performance as the compartmentation or stair it is protecting.

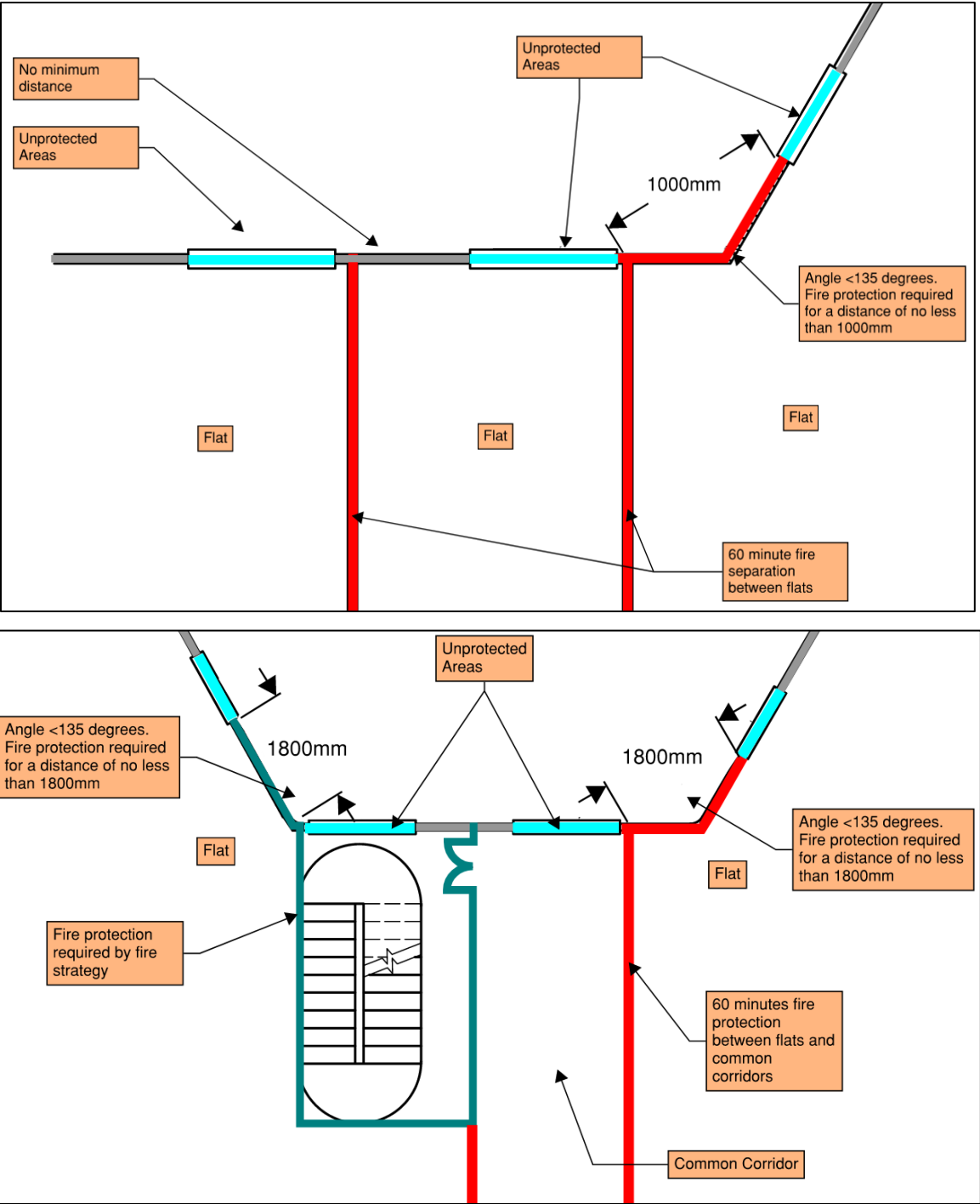


Figure 36: Compartment Re-Entrant Corners

The above figure provides a typical example; however, fire resistance requirements vary depending on the level of fire resistance:

- For compartments between studio or cluster flats requiring 60 minutes – 60 minutes and 1m.
- For non-protected spaces to studio or cluster flats – same fire resistance as the wall and 1m.
- For flats or other spaces to common corridors – same fire resistance as wall and 1800mm.

In addition to this there are requirements to protect the internal angles of stairs and common escape routes. See Section 6.3.5 for more information. However, fire resistance requirements for protection vary depending on the level of fire resistance:

- Firefighting stairs internal angle – 120 minutes for 5000mm.
- Firefighting stair meeting wall 60 minutes for 500mm.

8.4 Ancillary Accommodation

Areas of ancillary accommodation will be separated from the remainder of the building by appropriately fire rated construction.

Table 14: Fire Resistance Requirements for Ancillary Accommodation

Ancillary Accommodation	Minimum Provisions When Tested To The Relevant Parts Of BS 476 Or Relevant European Standard (Minutes)			Method of Exposure
	Load-Bearing Capacity [R]	Integrity [E]	Insulation [I]	
Plant room	120	120	120	Each Side Separately
Life safety plant room	120	120	120	Each Side Separately
LV or ELV	120	120	120	Each Side Separately
HV rooms	120	120	120	Each Side Separately
Refuse room	60	60	60	Each Side Separately
Laundry	30	30	30	Each Side Separately
Staff room/ changing/ rest room	30	30	30	Each Side Separately
Storerooms	30 ^{Note 1}	30 ^{Note 1}	30 ^{Note 1}	Each Side Separately
Comms rooms/ IT server	60	60	60	Each Side Separately
Cycle Store	60	60	60	Each Side Separately

Note 1: Where the store cupboard opens into the residential corridor the fire performance has been increased to 60 minutes.

Note: any openings in the required construction will be protected by doors having a similar standard of fire resistance and capable of resisting the passage of smoke at ambient temperature.

8.5 Fire Doors

Fire doors will be either classified in accordance with BSEN 13501-2 or have evidence that they have the relevant fire resistance when tested in accordance with BS476-22.

Note: This does not include lift landing doors which will be tested in accordance with BS EN 81-58.

Where a fire door also needs to provide smoke control to resist leakage at ambient temperatures it has the suffix S or Sa4. Recommendations for fire doors has been taken from Table 15 from BS9991.

Table 15: Fire Door Requirements

Position of Door	Tested to BS476-22	Tested to BSEN 1634-1
Firefighting / Evacuation Lift Lobby (Ground Floor)	FD60S	E60 Sa4
Firefighting / Evacuation Lobby (Upper Floor)	FD30S FD60S – Between Lobbies	E30 Sa4 E60 Sa4 – Between Lobbies
Firefighting Stair	FD60S	E60 Sa4
Firefighters Lift	FD60	E60
Entrance to Studio Flats and Cluster Flats	FD30S	E30 Sa4
Other Compartment Lines	The same rating as the wall in which it is sited with a smoke seal fitted	
Ancillary Accommodation	The same rating as the wall in which it is sited with a smoke seal fitted	
Cross corridor	FD30S	E30 Sa4
Protected Lobbies	See Section 5.6.2	
Cluster Flat Bedroom and LDK Doors off the Cluster Internal Corridor	FD30S	E30 Sa4
Risers	FD60S	E60Sa
Smoke Control Damper	The same rating as the wall in which it is sited with a smoke seal fitted	

Note: All fire doors on escape routes will be self-closing except for doors into ancillary accommodation (plant, stores, risers etc) that will be kept locked shut and provided with appropriate signage.

A fire door that is needed to resist the passage of smoke at ambient temperature conditions (the fire doors with the S or Sa against them) will either.

- Have a leakage rate not exceeding 3m³/h per metre, when tested in accordance with BS746-31.1 with the threshold taped and subjected to a pressure of 25 Pa: or
- Meet the classification requirement of Sa when tested in accordance with BSEN 1634-3 and BSEN13501-2.

Note: Smoke leakage control can be applied to non-fire-resisting doors.

Threshold gaps for timber doors will be in accordance with BS8214. The gaps between the fire door and frame will be in accordance with manufacturer tests and BS8214. Generally, the gaps will not exceed 3mm unless accompanied by test information from the manufacturer.

Note: Threshold gaps for all other door types are to be based on the principles set out in BS8214.

8.5.1 Doors on Escape Routes

Where hold-open devices are used they will be installed in accordance with BS9991. Hold-open devices can be either, fusible link (not applicable within protected escape routes), an automatic release mechanism which is linked to the fire alarm or be a delayed closing device with a delay adjusted not to exceed 25 seconds.

8.6 Smoke Control Dampers

Smoke control dampers will conform to BS EN 12101-8. They will be tested in accordance with BSEN 1366-10 from both sides in the application proposed. Summary of recommendations from Annex F5.5 within BS9991 noted below.

- Fire Performance: Classified in accordance with BSEN 13501-4 to achieve the same level of fire resistance as the compartment barriers and associated smoke control ducts.
- Classification: Dampers will be classified as V_{ew} (walls, shaft walls, and builders work shafts), H_{ow} (floors), or V_{ed}/H_{od} when used with smoke control ducts, in accordance with BS EN 13501-4.
- Leakage: They will be classified for reduced leakage (S1000).
- Override Functionality: Dampers will be either AA or MA, depending on whether override functionality is allowed during a smoke incident. If override is allowed, they will be MA.
- Operations Classification: Dampers will have a minimum operations classification of C₁₀₀₀₀
- Access Doors: All duct-mounted smoke control dampers will have access doors on both sides unless they are easily accessible from the end of a duct.

9 Fire Rated Elements and Fire-Stopping

9.1 Fire-Stopping

All firestopping works will be carried out by a competent, trained operative from a specialist contractor, in accordance with manufacturer's instructions, to meet the following criteria.

Fire stopping is used for sealing gaps, imperfections or design tolerances between fire resisting walls, floors, and ceilings to restrict the passage of both fire and smoke. Fire stopping will achieve the same fire resistance (integrity and insulation (EI)) as the element into which they penetrate.

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

9.2 Junctions to Fire Rated Elements

All joints between fire rated elements and all openings for penetrations to pass through any part of a fire separating element will be fire-stopped and:

- Kept as few in number as possible.
- Kept as small as practicable; and
- Fire stopped (which in the case of a flue or duct, will allow thermal movement) so that the level of fire resistance of the joint is not less than that of the fire separating element.

9.3 Fire Barriers

If the internal lining of the external wall does not achieve the same level of fire resistance as the required compartmentation; cavity barriers in the external cavity adjacent to compartment walls and floors will be included as fire barriers providing the same level of fire resistance (EI) to maintain the level of compartmentation.

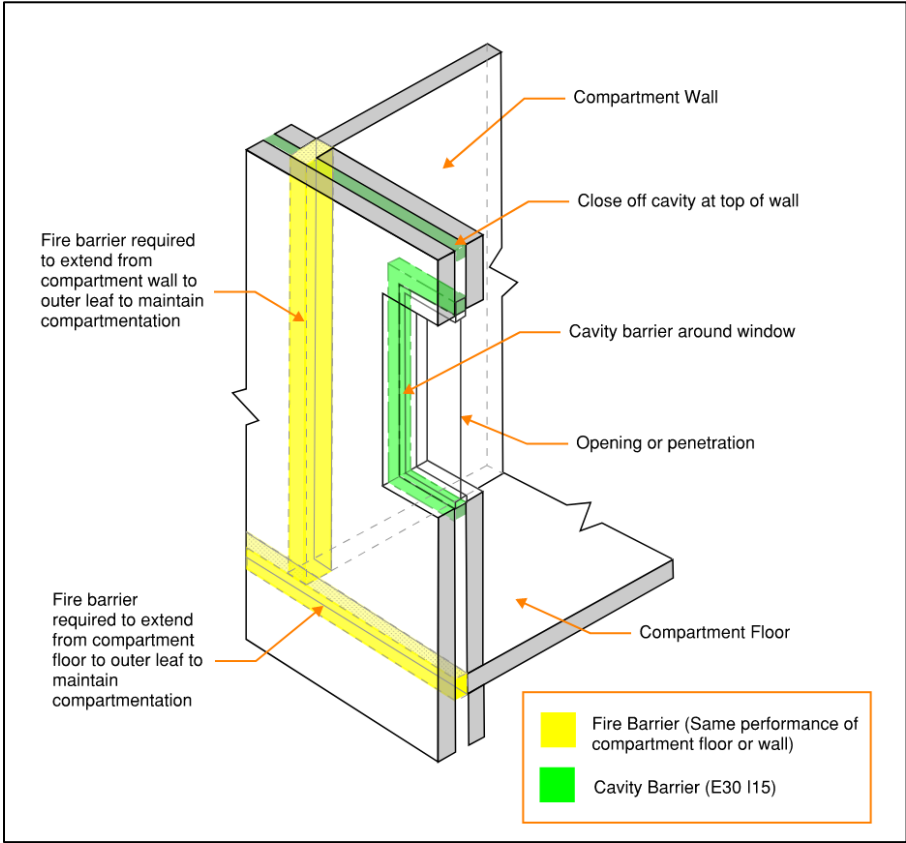


Figure 37: Fire Barrier Example

9.4 Penetrations to Fire Rated Construction

9.4.1 Pipe Penetrations

Pipes that pass through a fire separating element, will meet one of the following provisions.

Note: Please also see Section 27.5 of BS9991 for further details including how to treat small penetrations within 40mm of each other.

9.4.1.1 Proprietary Seals

Provide a proprietary sealing system which has been shown by test to maintain the fire resistance of the wall, floor, or cavity barrier.

9.4.1.2 Restricted Pipe Diameters

Where a proprietary sealing system is not used, fire stopping may be used around the pipe, keeping the opening as small as possible. The nominal internal diameter of the pipe will not be more than the relevant dimension given in the table below.

Table 16: Maximum Nominal Diameter of Pipes Passing Through Compartments

Situation	Pipe Material and Maximum Nominal Internal Diameter (mm)		
	Non-Combustible Material ^{Note 1}	Lead, Aluminium, Aluminium Alloy, uPVC ^{Note 2} , Fibre Cement	Any Other Material
Structure (but not a wall separating an existing and proposed building) enclosing a protected shaft which is not a stairway or lift shaft	160mm	110mm	40mm
Compartment wall or compartment floor between flats	160mm	160 (stack pipe) ^{Note 3} 110(branch pipe) ^{Note 3}	40mm
Any other situation	160mm	40mm	40mm

Note 1: Any non-combustible material which, if exposed to a temperature of 800 °C, will not soften or fracture to the extent that flame or hot gas will pass through the wall of the pipe.

Note 2: uPVC pipes that comply with either BS4514:2001 or BSEN 1329-1:2014. Products of any diameter that fall within the scope of BSEN 1366-3:2021 should be provided with fire stopping.

Note 3: These diameters are only in relation to pipes forming part of an above ground drainage system and enclosed as shown in Figure 44 of BS9991. In other cases the maximum diameters for "Any other situation" apply.

BS9991 recommends where a pipe penetrates a compartment wall or compartment floor, any sleeving will be constructed of Class A1 materials.

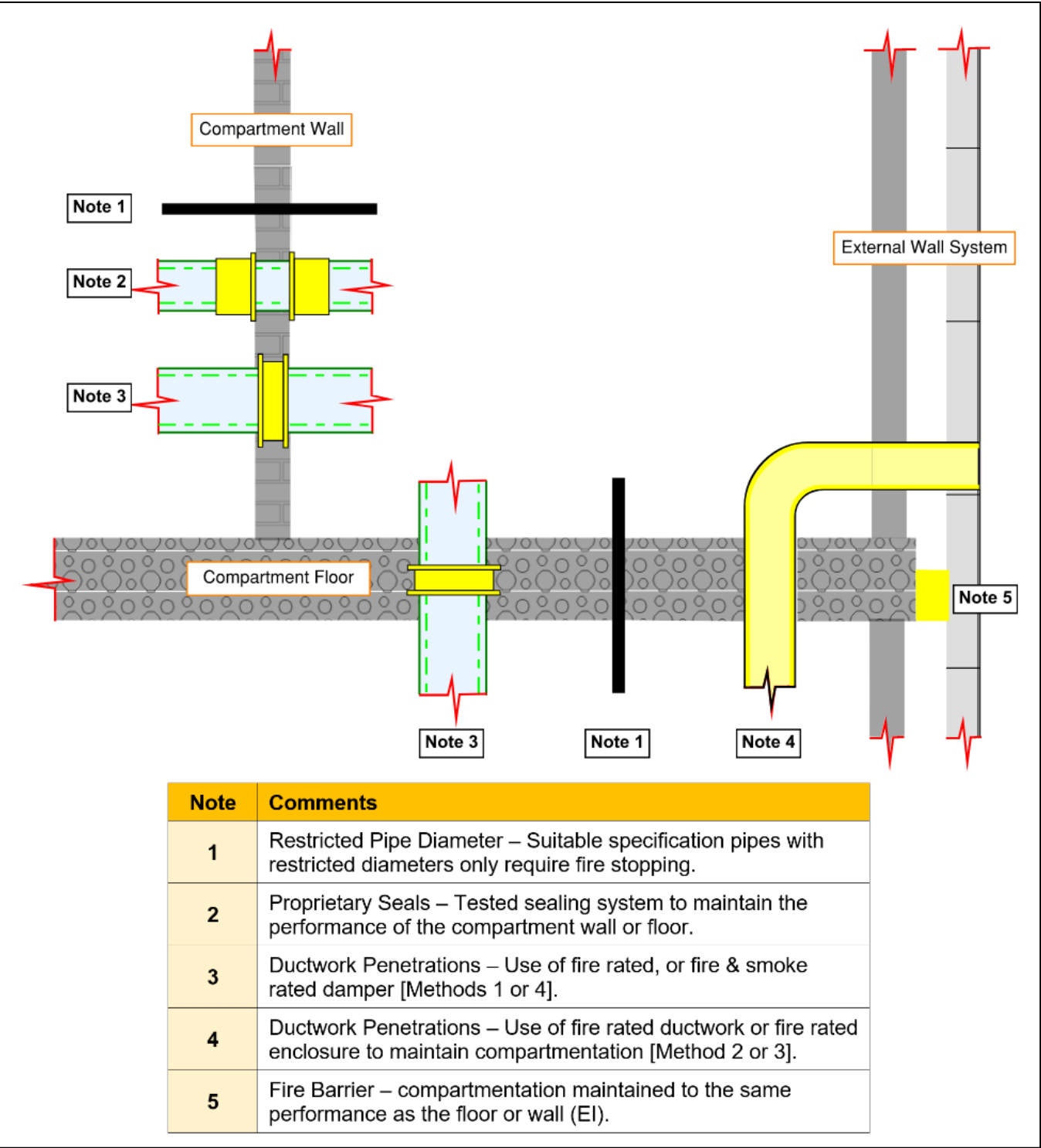


Figure 38: Proprietary Fire Stopping

9.4.2 Ductwork Penetrations

Where services and specifically ductwork passes through a fire separating element to maintain the integrity of the fire resisting element there will be a suitable means of maintaining that integrity, this can be done by the use of fire rated construction or suitable damper installations the suggested four methods of demonstrating compliance are noted below.

It should also be noted that around all penetrations in the fire separating elements including around dampers and ductwork will be suitably fire stopped including every joint or imperfection fit or opening that allow ducts to pass through the element.

The detailed means of maintaining the fire integrity of the building is highlighted in Section 6 of BS9991 and includes the full descriptions and additional information on how to protect the ductwork and air transfer grilles within individual dwellings and systems serving the whole building.

Any ductwork passing through a protected stairway, lobby, or corridor without an opening into that area will be fire resisting. For more information on how to protect the ductwork and air transfer grilles see Section 6 of BS9991 for additional commentary. The requirements for each option are indicated below.

The requirements for each option are indicated below:

Note: Suitable access will be provided for maintenance and inspection of all dampers.

9.4.2.1 Method 1 – Protection Using Thermally Activated Fire Dampers

- This method will not be used where ductwork passes through or serves protected escape routes.
- This method is not suitable for kitchen extract systems.
- Fire dampers will conform to BSEN 15650 and have an E Classification equal to or greater than 60 minutes.

9.4.2.2 Method 2 – Protection Using Fire Resisting Enclosures

- The fire-resisting enclosures will achieve the same fire resistance as the wall/ floor the ductwork penetrates which forms a compartment known as a protected shaft.
- This method can be used in protected escape routes providing the ductwork does not serve the escape route it passes through.
- If any of the rooms that are being served by the ductwork are rooms requiring fire resistance, additional dampers are required. See Method 1 or 4 for the appropriate damper.
- The fire resisting enclosure will be classified EIX in accordance with BSEN 13501-2 (fire exposure from the duct side) (where X is the fire resisting rating (in minutes) of the walls of the protected route).

9.4.2.3 Method 3 – Protection Using Fire Resisting Ductwork

- The ductwork itself forms a protected shaft. The ductwork will achieve the same fire resistance as the wall/ floor the ductwork penetrates. The fire resistance can be achieved by the ductwork material itself, or through the application of protective material.
- This method can be used in protected escape routes providing the ductwork does not serve the escape route it passes through.
- If any of the rooms that are being served by the ductwork are rooms requiring fire resistance, additional dampers are required. See Method 1 or 4 for the appropriate damper.
- The fire resisting ductwork will be classified EISX in accordance with BSEN 13501 (where X is the fire resisting rating (in minutes) of the walls of the protected route).

Note: The supporting hangers will be capable of supporting the ductwork for not less than the period of fire resistance of the ductwork.

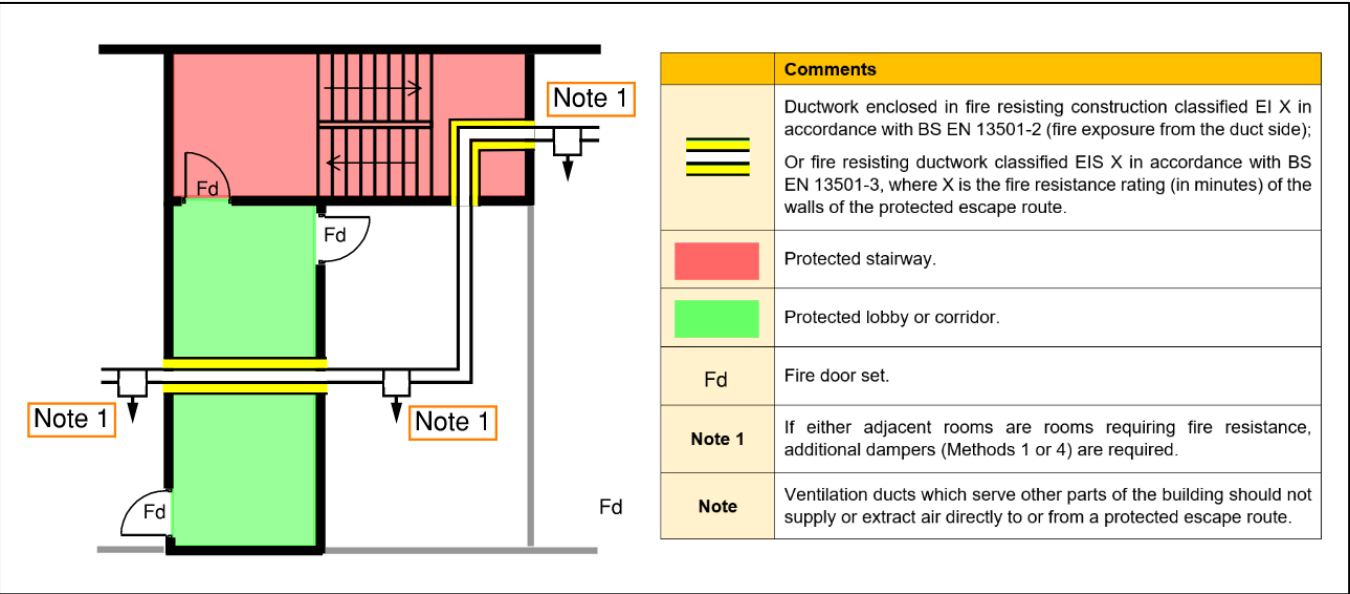


Figure 39: Method 2 or 3 Example

- 9.4.2.4 Method 4 Protection Using Automatically Actuated Fire and Smoke Dampers Actuated by Automatic Fire Detection
- This method may be used for extract ductwork passing through protected escape routes where the ductwork does and does not serve the protected escape route.
 - This method is not suitable for kitchen extract systems.
 - Fire and smoke dampers will conform to BSEN 15650, they will have an ES classification equal to or greater than 60 minutes.

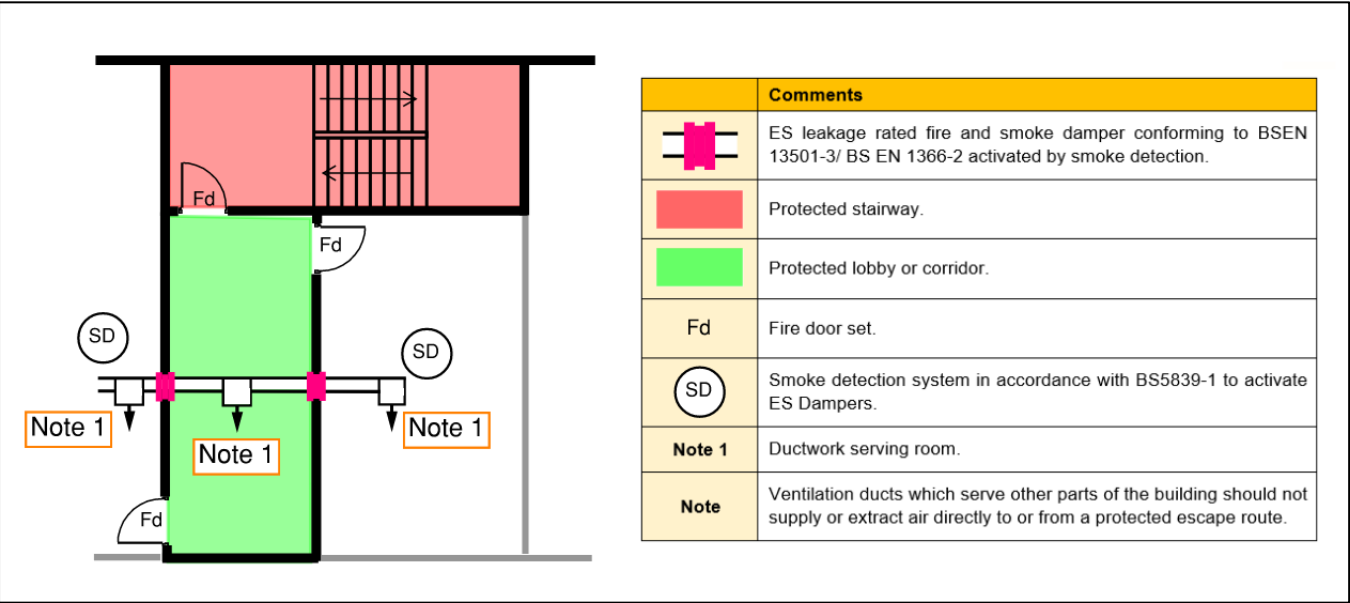


Figure 40: Method 4

9.4.3 Air Transfer Grilles

In general, the installation of air transfer grilles will be avoided in any construction required to be fire-resisting.

Generally, air transfer grilles will not be installed in:

- Elements of construction enclosing compartments, protected shafts, or firefighting shafts.
- Enclosures to protected stairways, protected lobbies, protected corridors.
- Bedroom walls or doors.

Air transfer grilles fitted in any construction or door that needs to be fire-resisting will be of the intumescent type or fitted with fire dampers.

Where these grilles are within the enclosure of protected escape routes, they will incorporate fire and smoke shutters operated by adjacent automatic smoke detectors. Fire and smoke shutters will be in accordance with Method 4. Air transfer grilles located in any fire hazard rooms will be provided with both fire and smoke containment. Any transfer grilles fitted in fire doors will need to be accompanied by a test certificate provided by the door manufacturer.

9.4.4 Exhaust from HVAC Whole Building or Interconnected Dwelling Systems

Exhaust outlets will be positioned such that they:

- Are at least 1.8m away from and do not discharge products of combustion close to final exits or other parts of escape routes.
- Are at least 1.8m away from any element of the building construction that does not meet class A2-s1, d0 or better, or roofing covering that does not meet B_{ROOF}(t4).
- Are at least 1.8m away from and do not enable re-entry of exhaust products back in via air inlet points.

Design team to confirm the permanent ventilation to the cycle store, bin store, plant and amenity lobbies will be more than 1800mm from any final exit and from the doors to the stair and evacuation lift lobby.

10 Concealed Spaces

Concealed spaces or cavities in the construction of the building provide a ready route for smoke and flame spread, especially in voids above and below ceilings/floors. As the smoke or flames would be concealed it presents a greater danger. For more information on concealed spaces see Clause 25 from BS9991.

Cavity barriers will therefore be provided to sub-divide the cavities to restrict the spread of smoke and flame spread and will be provided in the following areas.

- Around openings such as windows, doors and service penetrations and to close off edges of cavities ^{Note 1}.
- At the junction between an external cavity wall and any wall, floor or door assembly which forms a fire resisting barrier.
- At the junction between every compartment floor and compartment wall.
- Within cavities that exceed the distances set out within the table below.

Note 1: Where a Steel Framing Systems (SFS) is used, if the steel supports the structure, fire barriers (to the same fire resistance as the element structure) will be in place of cavity barriers around openings and to close top of cavities to maintain fire protection to the SFS.

Cavities that may exist above or below any fire resisting construction because the construction is not carried to full storey height or, (in case of the top storey) to the underside of the roof covering will be either:

- Fitted with cavity barriers on the line of the partitions (as indicated within the figure below); 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.

Note: it is important to continue compartment walls up through ceilings or roof cavity to maintain the standard of fire resistance. Therefore, the compartment wall will be carried up full storey height to a compartment floor or to the roof. It is not appropriate to complete a line of compartmentation by fitting cavity barriers.

Cavity barriers will also be used to subdivide any cavity within the external wall or inside the building. The maximum dimensions of concealed spaces are indicated within the table below.

Table 17: Maximum Dimensions of Cavities

Location	Class of Surface Exposed	Max Dimension in any Direction
Between a Roof & Ceiling	Any Class	20m
Any other Cavity	Class C-s3, d2 / Class 1	20m
	Any Class	10m

Every cavity barrier will be constructed to at least 30 minutes fire resistance as indicated in Section 8.1 from this report. It may be formed by any construction provided for another purpose if it meets the provisions for cavity barriers. Cavity barriers in a stud wall or provided around openings will follow the guidance from BS9991.

The construction of cavity barriers will be in accordance with Clause 25.2 from BS9991.

The cavity barriers wherever possible be tightly fitted to a rigid construction and mechanically fixed in position. Where this is not possible the junction will be fire stopped. It is possible for door and window frames to be formed as cavity barriers if the frames are constructed of steel of the minimum thickness as appropriate.

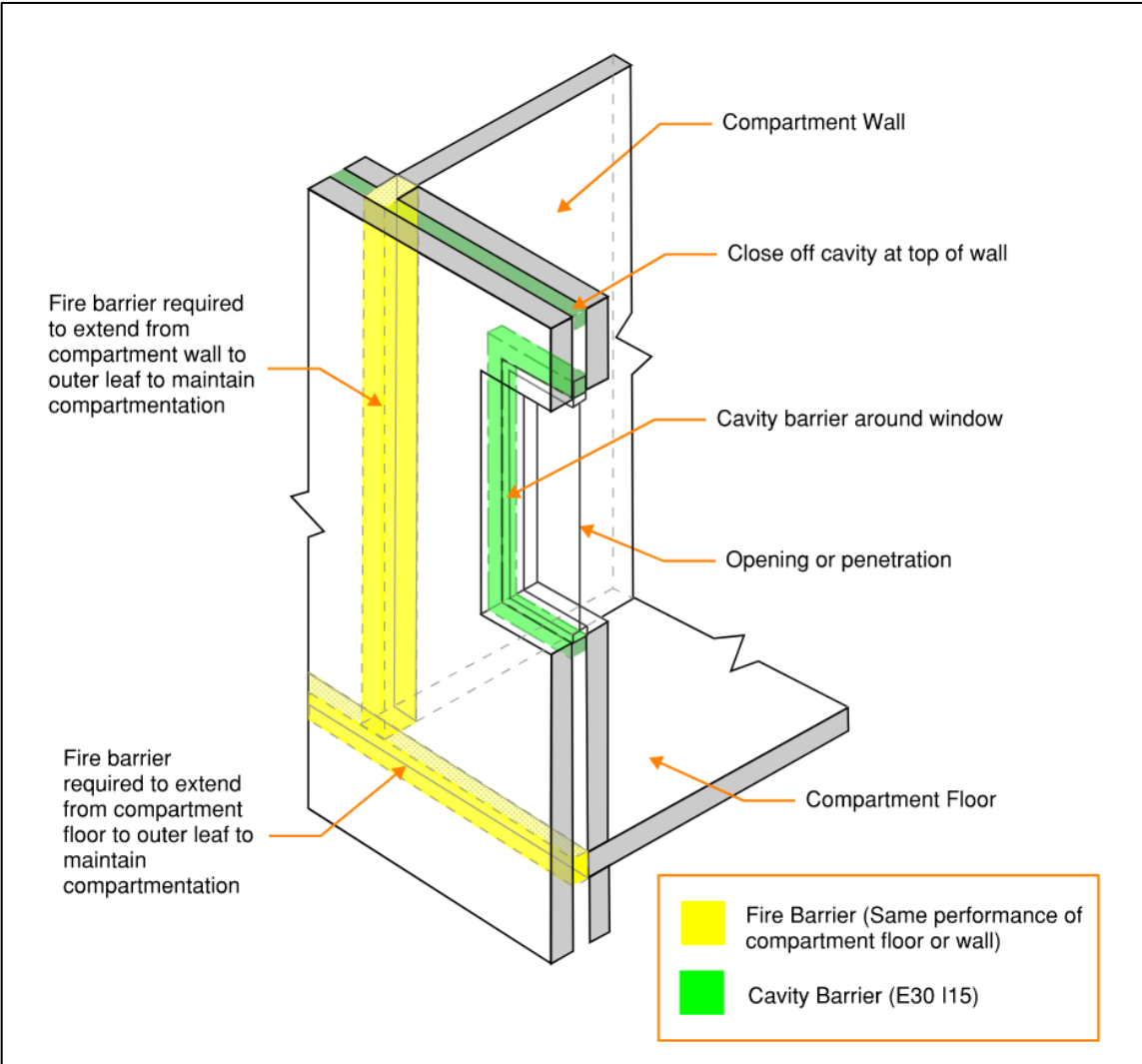


Figure 41: Provision of Cavity Barrier and Fire Barriers

11 External Fire Spread – External Wall and Roof Construction

11.1 General Requirements and Regulations

BS9991 provides specific guidance based on building heights / type of occupancy and proximity to other buildings.

Helios must also assess Regulation 7 of the Building Regulations relating to 'Materials and Workmanship' which outlines the general principals of materials being used being appropriate for the circumstances in which they are used and installed.

This guidance also has specific criteria to be applied for tall 'Relevant Buildings' in excess of 11m and 18m.

Table 18: Relevant Building Requirements – Regulation B4

Requirement Building Regulations B4	
External Fire Spread	
1.	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 position of the building.
2.	The roof of the building shall adequately resist the spread of fire over the roof and from one building to another, having regard to the height, use and position of the building.

Table 19: Relevant Building Requirements – Regulation 7

Building Regulations – Regulation 7 Materials and Workmanship		
1.	Building work shall be carried out -	
	(a)	With adequate and proper material which -
	(i)	Are appropriate for the circumstances in which they are used,
	(ii)	Are adequately mixed or prepared, and
	(iii)	Are applied, used, or fixed so as adequate to perform the functions for which they are designed; and
	(b)	In a workmanlike manner.
2.	Subject to paragraph (3), building work shall be carried out so that materials which become part of an external all, or specified attachment, of a relevant building are of European Classification A2-s1, d0 or Class A1, classified in accordance with BSEN 13501 -1 2007 + A1 2009.	
3.	Paragraph (3) does not apply to	
	(a)	Cavity trays when used between two leaves of masonry;
	(b)	Any part of a roof (other than any part of a roof which falls within paragraph 1v of regulation 2 [6]) if that part is connected to an external wall;
	l	Door frames and doors;
	(d)	Electrical installations;
	(e)	Insulation and waterproofing materials used below ground level;
	(f)	Intumescent and fire stopping materials where their inclusion is necessary to meet the requirements of Part B of Schedule 1;
	(g)	Membranes (will be of Class B-s3, d0 or better);
	(h)	Seals, gaskets, fixings, sealants, and backer rods;
	(i)	Thermal break materials where their inclusion is necessary to meet the thermal performance requirements of Part L of Schedule 1; or
	(j)	Window frames and glass;

Building Regulations – Regulation 7 Materials and Workmanship		
	(k)	The operating mechanism for adjustable solar shading devices;
	(l)	External walls of building that comprise only masonry construction or in which combustible materials are limited to insulation within the cavity of double-leaf masonry walls.
4.	In this Regulation -	
	(a)	A 'relevant building' means a building with a storey (not including roof top plant areas or any storey consisting exclusively of plant rooms) at least 18m above ground level and which -
	(i)	Contains one or more dwellings;
	(ii)	Contains an institution; or
	(iii)	Contains a room for residential purposes (Excluding Hostels, Hotels or Boarding Houses); and
	(b)	"above ground level" in relation to a storey means above ground level when measured from the lowest ground level when measured from the lowest ground level adjoining the outside of a building to the top of the floor surface of the storey.

11.2 Combustibility of External Walls

The building has floors over 18m and would be deemed 'Relevant' as described in Regulation 7 and on that basis all materials which become part of an external wall, or specified attachment, of a relevant building will need to achieve a European Classification A2-s1, d0 or better, classified in accordance with BSEN13501 -1 2007 + A1 2009.

The external walls of buildings as described in Regulation 7(4) of the Building Regulations will achieve the ratings as noted above and additionally assessments made as noted below:

1. External Surfaces – Covered under Regulation 7(4) of the Building Regulations.
2. Materials and Products - Covered under Regulation 7(4) of the Building Regulations.
3. Cavities and Cavity Barriers – Guidance Contained in BS9991.
4. Additionally, Clause 24.2 from BS9991 – All balconies with a storey 11m or more above ground level will be constructed of Class A2-s1, d0 or better.

11.3 External Surfaces – Surface Spread of Flame

The surface spread of flame across the external surface of a wall is based directly on the type of building, proximity to site boundaries, height, and its occupants. These categorisations are used to address specific concerns e.g., taller buildings are more difficult for firefighting and have increased evacuation times; assembly buildings where the occupants are generally unfamiliar with the escape routes have increased evacuation times and where buildings are in close proximity to boundaries etc., they are at risk of rapid fire spread from adjacent buildings.

The surface spread of flame rating will be based on Clause 24.1 from BS9991 and the criteria noted above.

Table 20: External Surface Spread of Flame Provisions

Building Type	Building Height	Less Than 1000mm from the Relevant Boundary	1000mm Or More from the Relevant Boundary
Residential Building	Above 11m	Class A2 – s1, d0 or better	Class A2 – s1, d0 or better

11.4 Materials and Products

Clause 24.1 from BS9991 has specific criteria for buildings that exceed 11m in height, where not otherwise accounted for by legislation, the external wall construction will be of Class A2-s1, d0 or better. Exceptions to this is noted within Section 11.1 of this report.

11.5 Cavities Barriers and Fire Barriers

Cavities in the external walls provide a ready route for smoke and flame spread, additionally the smoke or flames would be concealed and presents a greater danger.

Open state cavity barriers in a horizontal position within rain screen walling should meet the effective closure criteria when tested in accordance with ASFP TGD 19.

Cavity barriers / fire barriers will therefore be provided to sub-divide the cavities to restrict the spread of smoke and flame spread (See Section 9.3 and 10 above).

The cavity barriers wherever possible be tightly fitted to a rigid construction and mechanically fixed in position. Where this is not possible the junction should be fire stopped.

As a cautionary note if specialist cavity barriers are to be fixed to a non-loadbearing wall dependant on the manufacturer of the cavity barriers and the applicable test data; the wall construction in some instances may need to be REI 30.

This is inherent in the majority of the cavity barrier test data where it requires the substrate to be at least the same fire resistance as the cavity barrier and must provide a suitable robust fixing. Additionally, it is generally the standard where cavity barriers should be fixed back to the structural studs as opposed to the weather defence board as noted above. This will be dependent on the manufacturer.

11.6 Roof Coverings

Roof covering refer to the external material layers, not the roof structure as a whole.

The closest boundary is less than 6m metres away the roof covering will achieve a minimum B_{ROOF}(t4).

11.7 Photovoltaic Panel Arrays

Not specifically mentioned in the Building Regulations, if PV arrays are included on the roof areas (although not generally a controlled item), consideration should be given to:

- Locations of inverters and their installation in proximity to combustibles.
- Select PV panels with low fire spread potential.
- Localised shut off for the panels as the DC sections will still be live in sunlight and this can cause issues for firefighting.
- Do not allow mounting systems for PV panels to straddle heat expansion joints.
- Careful planning is required and assessment of substrates when mounting arrays over fire separating construction or fire compartment walls. Where PV panels are proposed the roof should achieve a minimum of B_{ROOF}(t4). It is recommended where possible to have minimum Class A2 – s1, d0 or better insulation and roof coverings (Class A1/ A2-s1, d0).
- The layout of the panels on the roof should be such that areas of panels are separated by panel-free areas so that effective firefighting is possible. This will allow firefighters to open the roof to allow both internal and external attack on a fire. Where there are lines of panels it is recommended a minimum gap between panels of 760mm is maintained. This is double the allowable flame spread distance for B_{ROOF}(t4) (380mm) but also for firefighting. It is recommended every 40m a gap of 760mm is also maintained.

- PV is proposed over Compartment Lines – It is recommended the roof is constructed as a compartment floor and with the B_{ROOF}(t4) provisions and Class A1/ A2-s1, d0 insulation, arrangement is considered acceptable.
- PV panels on the roof can prevent the dissipation of heat and smoke; additionally, the spread of the fire may be accelerated by a chimney effect beneath the panels. Careful consideration should be given to breaks within extensive arrays to allow dissipation of heat and smoke. It is recommended that a minimum gap height between the roof and panel of 150mm is achieved, however increasing this will reduce fire spread between panels. *This has been taken from government research - Fire safety: Solar photovoltaic panels on roofs.*

Design team to confirm if PV will be provided.

11.8 Roof Garden/Roof Terrace

Communal external terraces are provided at Level 07 and Level 23. In accordance with Annex E from BS 9991, the following should be met. **Design team to confirm the terrace build-ups and whether soft landscaping, planters or green roof finishes are proposed. Where hard finishes achieving BROOF(t4) are used throughout, the reduction discussed below is not required.**

11.8.1 Construction of Communal Terraces and Roof Gardens

Annex E.4 from BS9991 recommends the following:

- The roof should be constructed as a compartment floor achieving 120 minutes fire resistance.
- Either:
 - The upper surface should have a B_{ROOF}(t4) classification; or
 - Areas such as green roofs, planters, and soft surfaces that do not achieve B_{ROOF}(t4) should be isolated:
 - 3m away from any vertical building façade above the terrace surface; and
 - 0.5m from any other perimeters of the terrace (e.g. Lift overruns) and from rooflights, ventilation openings and other penetrations of the roof.
- Any fire risk or roofed structure on a terrace, such as BBQ stations and enclosed buildings, should be erected on a slab of Class A1 material that also extends at least 1.2m from the edges of such feature.
- Planting structures should be constructed of Class A1 materials.
- Parapets, balustrading should be constructed of Class A2-s1, d0 or better.

Whilst the majority of the principles will follow BS9991 Annex E.4. It is proposed to reduce the proximity of green roofs and planters to vertical building façade from 3m to 1.2m.

The reduction from 3m to 1.2m has been based on the guidance Fire Performance of Green Roof and Walls produced by the Department for Communities and Local Government, August 2013 and principles set out in Annex E.4 in relation to fire risks (such as BBQ stations) only requiring a 1.2m slab of Class A1 materials around the edge of the feature.

The Fire Performance of Green Roof and Walls Government guidance notes:

'In order for additional requirements to be introduced for green roofs or walls, it would need to be demonstrated that there is a reasonable probability that they could ignite and that the fire could spread in such a way that it would cause a breach of the functional requirements of the Building Regulations.'

The conclusions presented in the Government guidance notes:

'In general, the growing medium used in both green roofs and green walls cannot be ignited, and flame spread does not occur. Furthermore, the temperatures obtained at the lowest point in the green roof substrate are not high enough to result in ignition of the materials used below the growing layer.'

This is based on test scenarios and recommendations presented further below.

Therefore, based on the recommendations below it does not consider green roofs a fire risk and achieve the Functional Requirements as set out within the Building Regulations.

- The roof is designed as a compartment floor to prevent the risk of a fire from penetrating the green roof from the underside.
- Roof is B_{ROOF}(t4) to reduce the risk of a fire breaking through the roof into multiple compartments.
- Green GRO guide, German FLL and FM Datasheet 1-35 guidance recommends a distance of 500mm between vertical facades and penetrations and green roofs. The 500mm gap should be constructed of Class A1 ballast with nominal diameter of 20-50mm with a depth of 75mm or A1 paving slabs.

Helios propose a minimum distance of 1.2m border between openings and vertical elements based on BS9991 for fire risk on a roof:

- If the green roof/ planters exceed 40m in length, a fire break of 1m to be applied every 40m using ballast with nominal diameter of 20-50mm with a depth of 75mm or A1 paving slabs.
- Growing medium requires a minimum depth of 80-150mm and organic content less than 50% (recommend 20%) which under the Green GRO Guide is considered BROOF(t4). A minimum of 800mm depth was used within the scale tests which did not ignite.
- Helios recommends automatic irrigation to prevent drying out with an additional hose point.
- Helios propose wet riser to roof elements or at least get within required hose distances from nearest wet riser location.
- All the external walls build up requires a minimum of Class A2-s1, d0 or better which reduces the likelihood of a fire breaching the vertical building façade. If in the event this does occur all the flats are provided with sprinkler protection to reduce multiple compartment fires.
- Selection of plants should be considered to choose high moisture/ low resin content plants where they are within 3m of the vertical building façade.
- No Smoking.
- No BBQs.

Design team to confirm terrace layouts for review.

12 External Fire Spread – Space Separation

To prevent the risk of external fire spread to and from adjacent buildings it is necessary to assess the façade and calculate the maximum area of that façade that is allowed to remain unprotected [Non-Fire Rated] based on the maximum radiating panel that could be involved in a fire.

To calculate the maximum unprotected area, we have used the enclosing rectangle method from BR 187 (second edition) to assess the space separation requirements.

12.1 Relevant Boundaries

When considering the boundary distances for assessing external fire spread between neighbouring buildings 'Relevant Boundary' distances need to be established to accurately calculate the areas requiring protection. There are two types of boundaries which can be considered, these are:

- Site boundary – where the site boundary is adjacent to public roads, pathways, train tracks or waterways the boundary can be extended to the mid-point of that feature.
- Notional boundary – this is an imaginary line drawn between two buildings on the same site.

The redline site boundary is noted below. Elevation 1, 2 and 3 boundaries can be extended halfway across the roads. Elevation 4 redline boundary will be used.

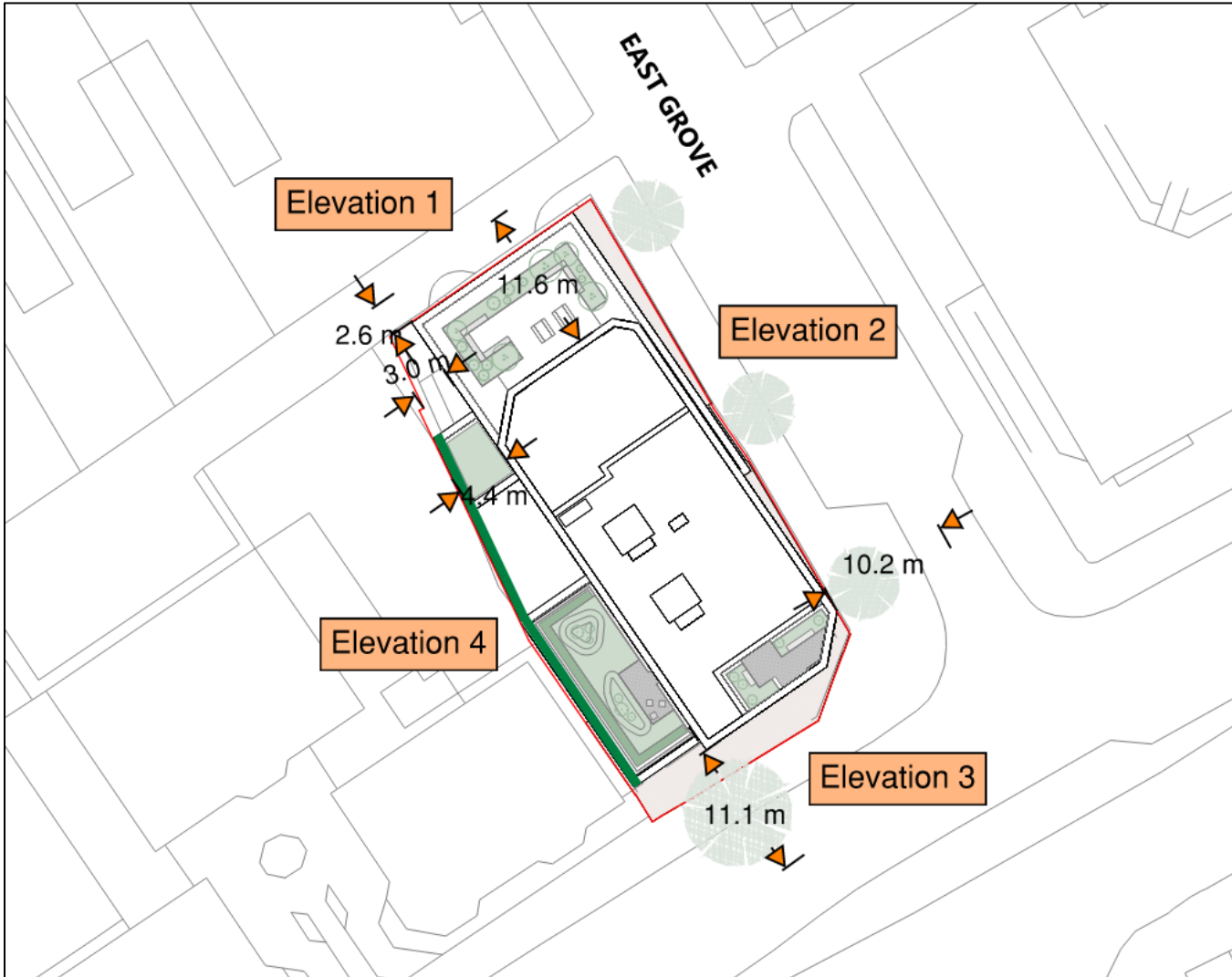


Figure : Site Plan – Relevant Boundaries to be Confirmed

12.2 Space Separation

The allowable amount of unprotected area on the elevations has been calculated by using the BR 187 Enclosing Rectangle method, this method is based on the distance to the relevant boundary and size of the smallest rectangle which encloses all the unprotected areas within a single compartment on each elevation.

Unprotected areas are considered to be the following:

- Any part of the external façade that has a period of fire resistance less than the appropriate level noted within Section 8.2.

The following does not contribute to the unprotected areas:

- Any part of the external wall of a stairway in a protected shaft (same fire resistance as Section 8.2).
- Small, unprotected areas in a fire rated façade in accordance with BS9991.

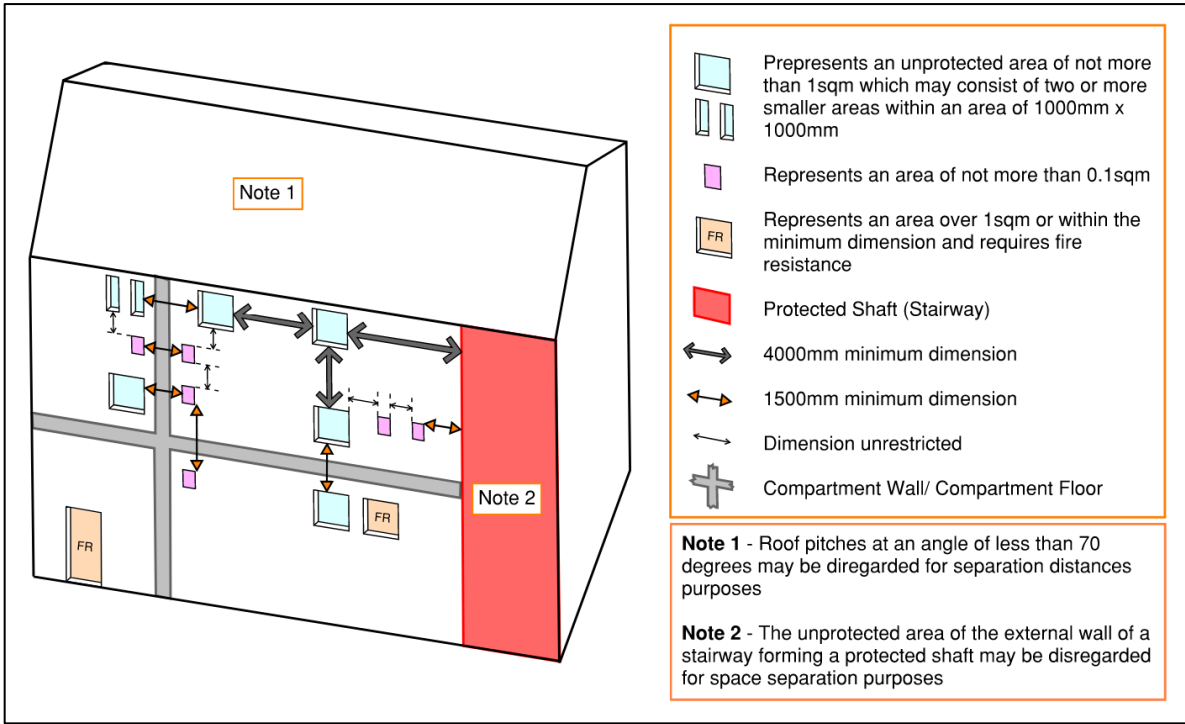


Figure 42: Small Allowable Unprotected Areas

Calculations have been carried out based on the following assumptions:

- Calculations will be based on a radiation intensity of 84 kW/m² for the residential and communal amenity areas and 168 kW/m² for the commercial unit.
- With the provision of AWFSS, the required boundary distance can be halved or unprotected area doubled.
- All elevations are considered to be unprotected. The full height and length of the compartment will be used in the calculations.
- The worst-case compartments will be calculated to start, which will be reflected across all the other compartments on the elevations.
- Compartment floors are provided at all floors.
- Every studio flat and every cluster flat is considered an individual compartment.

12.2.1 Space Separation Calculations

The table below sets out the compartments to be assessed on each elevation.

Table 21: Space Separation Calculations

Elevation/ Compartment Assessed	BR 187 Enclosing Rectangle Dimensions	Radiation Intensity	Required Boundary Distance for 100% UPA Note 1	Actual Boundary Distance	Allowable Unprotected Area	Comments
Elevation 1 – Ground Floor	6m x 9m	84kW/m ²	2.5m	2.6m	100%	No restriction in regards to boundary
Elevation 1 – Upper Floor (Flats)	3m x 9m	84kW/m ²	1.75m	2.6m	100%	No restriction in regards to boundary
Elevation 1 – Upper Floor (Amenity)	3m x 15m	84kW/m ²	2m	11.6m	100%	No restriction in regards to boundary
Elevation 2 (Amenity)	3m x 12m	84kW/m ²	1.75m	10.2m	100%	No restriction in regards to boundary
Elevation 2 – Commercial	6m x 9m	168kW/m ²	3.75m	10.2m	100%	No restriction in regards to boundary
Elevation 3 – Commercial	6m x 21m	168kW/m ²	5.25m	11.1m	100%	No restriction in regards to boundary
Elevation 3 – Residential	3m x 9m	84kW/m ²	1.75m	11.1m	100%	No restriction in regards to boundary
Elevation 4 – Sitting on boundary line	100% protection (REI120) from both sides of the building (indicated green below in figure)					
Elevation 4 – Step back	3m x 6m	84kW/m ²	1.5m	3m	100%	No restriction in regards to boundary

Note 1: The required boundary distance will be halved taking into account the provision of AWFSS for each compartment elevation.

13 Fire Safety Management

13.1 Management Level and Requirements

13.1.1 Management

Fire safety management is an essential factor in achieving and maintaining suitable fire safety measures in premises. The fire safety design guidance assumes a suitable level of fire safety management. For more information see Section 9 from BS9991.

It is assumed that the end user has adequate management structure which means that the management will conform with the minimum requirements the legislation. However, fire risk management documentation is likely to exist at two levels:

- Fire risk management at an organisational level.
- Fire risk management at a premises level.

The fire risk management strategy at an organisational level will define the organisation's fire risk management system, and method of implementing policy.

13.1.2 Fire Risk Management Strategy

The fire safety manager / nominated person to monitor and control management of fire safety will define the organisation's fire risk management system, and method of implementing the overarching policy within a fire risk management strategy. The subsequent bullet points below are not an exhaustive list but highlight some of the key issues that need to be addressed when documenting a fire risk management strategy.

- Fire Risk Assessment – Those responsible for the design and construction of the building will provide fire safety information to the responsible person at the completion of the project or when the building or extension is first occupied. A pre-occupation fire safety assessment will be made in identifying the fire safety strategy provisions have been implemented and if the premise is likely to be fit for occupation. Thereafter, regular fire risk assessments will be undertaken, any alterations / refurbishments to the building will trigger a review of a fire risk assessment in determining if the current fire precautions present are adequate in accommodating the change.
- Resources and Authority – Any resources necessary to implement, maintain and improve the fire risk management system will be determined. In determining the necessary resources, account will be taken of the organisational hierarchy, the role of the fire safety manager and communication and collaboration with other users of the building. In order to ensure robustness, those with fire safety responsibilities will be empowered and given adequate resources to carry out their duties in maintaining the system.
- Fire Safety Training – A sufficient number of staff will be trained in fire prevention, fire protection and evacuation procedures, and be able to use the appropriate extinguishing equipment (and media). This is in order to provide full coverage of the building, with provisions in place for contingencies such as staff absences.
- Control of Work on Site – The means by which the end user / occupier will control work on site will be determined, e.g., repairs to structure, and in particular hot work. A work control system will include clear lines of responsibility communicated to contractors; a permit system which takes in account the risks to relevant persons; logging and work control audit processes; and routing checking and supervision.
- Maintenance and Testing – Processes will be in place for the maintenance and testing of fire safety systems.
- Communication – It is important to determine the need for internal and external communication procedures, this is to ensure that all of those involved in an incident, are provided rapidly and effectively the relevant information. These procedures will include defined lines of communication of significant findings arising from fire risk assessments and will stress the importance of maintaining fire safety information.
- Emergency Planning – Procedures for identifying and responding to unplanned events, potential emergencies / disasters will be established, documented, and maintained. Where fire is concerned, liaison with the fire and rescue service will include emergency shutdown of equipment, effective arrangements for

notifying the fire and rescue service of changes to the occupancy, periods of abnormal occupancy, fire growth characteristics, and another relevant factor. The arrangements will also consider post-incident plan and contingency plan.

- Designing fire risk management into buildings – The management system level proposed will be proportionate to the level of risk arising from the organisation's activities. Confirmation of its suitability will be sought from the owner / end user / nominated representative(s) to ensure that the designer specifies a management system that can be practically and physically managed post-handover.

13.1.3 First Aid Firefighting Provisions

Hand-held first aid firefighting provisions, which are not required under Building Regulations legislation, will be included to satisfy the requirements of the RR(FS)O in accordance with the end user's policies and fire risk assessment. Where provided, a fire point will be located towards each storey exit and suitable facilities associated with identified risks.

For guidance on provision of firefighting equipment reference will be made to BS5306-8:2012.