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1 INTRODUCTION

1.1 Scope

Affinity Fire Engineering (UK) Ltd has been engaged by Arax Properties to develop a Fire Statement in support of a planning application for Euston House, 24 Eversholt Street, London NW1 1AD.

The primary objective of this statement is to provide high level advice at this early stage on how an acceptable level of life safety may be achieved commensurate with the Functional Requirements of the Building Regulations 2010 for means of egress (B1), internal fire spread structure (B3), external fire spread (B4) and firefighting access (B5) only.

1.2 Primary Legislation

The Building Regulations 2010 is the Statutory Instrument which seeks to ensure that the policies set out in the Act are implemented. The Functional Requirements of the Building Regulations 2010 may be met in one of two ways; compliance with an accepted design guidance (i.e. British Standards or Approved Documents), or through a fire engineered approach.

In this instance the primary design guidance adopted for this fire strategy is **BS 9999** (1).

Where deviations from the prescriptive recommendations are proposed these have been identified these will be assessed as part of a fire engineered approach. All fire engineered solutions will be justified by following the general methodology proposed within **BS 7974** (2)**.**

2 ARCHITECTURAL REVIEW

2.1 Location

The site is an existing office building located at 24 Eversholt Street adjacent to Euston Station, London (see **Figure 1**).

Figure 1: Euston House site.

2.2 Development Description

The site comprises ground plus 8 storeys above ground of offices, 1 roof plant space and 1 basement level of office and back of house spaces.

The proposals for the site comprise:

- Extending the floorplate at Levels 7 and 8, which is to be for office use (Use Class E).
- Removing the existing atrium roof at Level 1 and introducing a new atrium roof above Level 9 (i.e. forming a new atrium from Ground to Level 9).
- Providing a terrace at roof level (Level 9). Based on this Level 9 will become the topmost occupied floor.
- Providing balconies at Level 1 to 8.
- Providing a new cyclist entrance at Lancing Street with associated plant at roof level.

The site is provided with two escape stairs, which will need to be extended to serve all levels from basement to Level 9, as highlighted in blue in the below figures.

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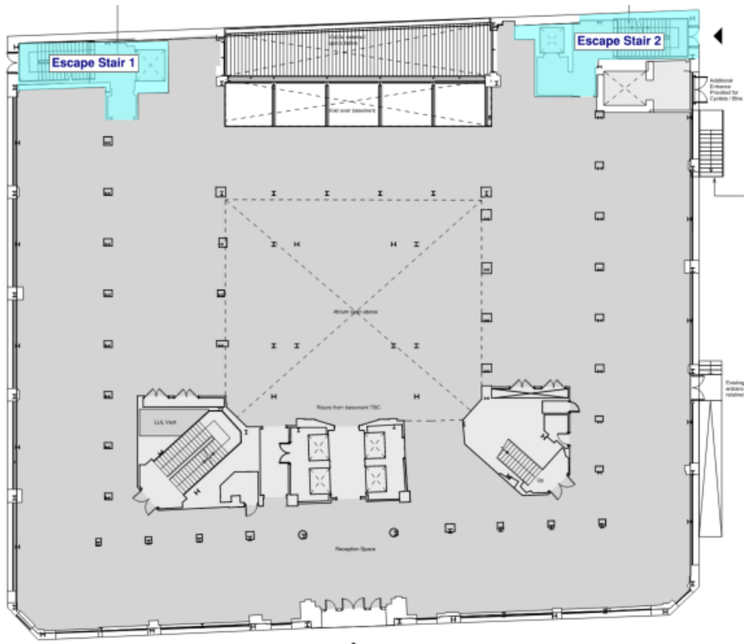

Figure 2: Ground Floor – final drawing still under development

Figure 3: Basement Level – final drawing still under development

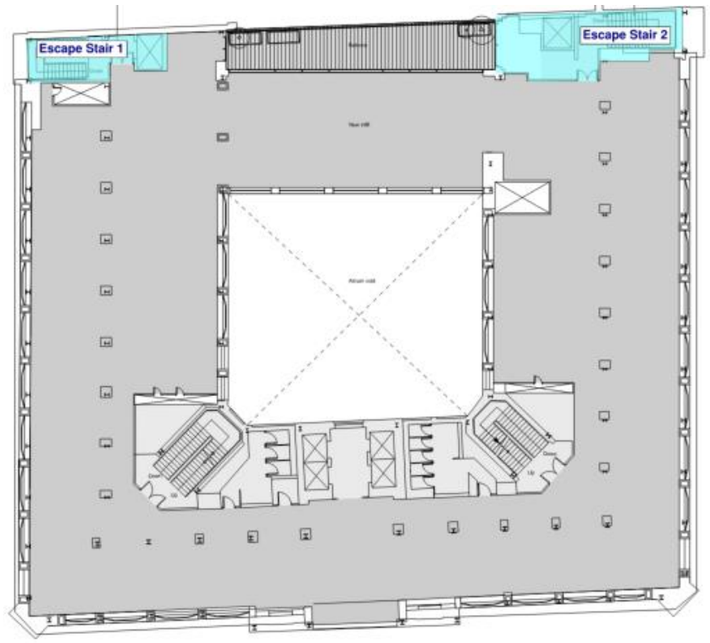

Figure 4: Typical Upper Floor– final drawing still under development

2.3 Building Heights

Table 1 show a summary of the principle building heights.

Table 1: Building Heights – to be confirmed via survey

Overview
1. Height of topmost storey = 31.3m [A]
2. Total building height ≈ 34.3m [B]
3. Firefighting access height = 31.3m [C]

Note [A] The topmost storey height is measured from Ground Floor on lowest side of building to upper floor surface of topmost occupied floor. This measurement is used for automatic fire suppression, structural fire resistance and combustibility.

Note [B]: Total building height, which is measured from mean ground level to mean roof level. This measurement is used for reaction to fire properties of the external surface of the facade. This measurement needs to be confirmed by the Architect as there is no elevation currently showing the building height including the Level 09 plant rooms.

Note [C]: Firefighting access height, which is measured from fire-fighting access level to the height of the top-most storey. This measurement is used for firefighting access.

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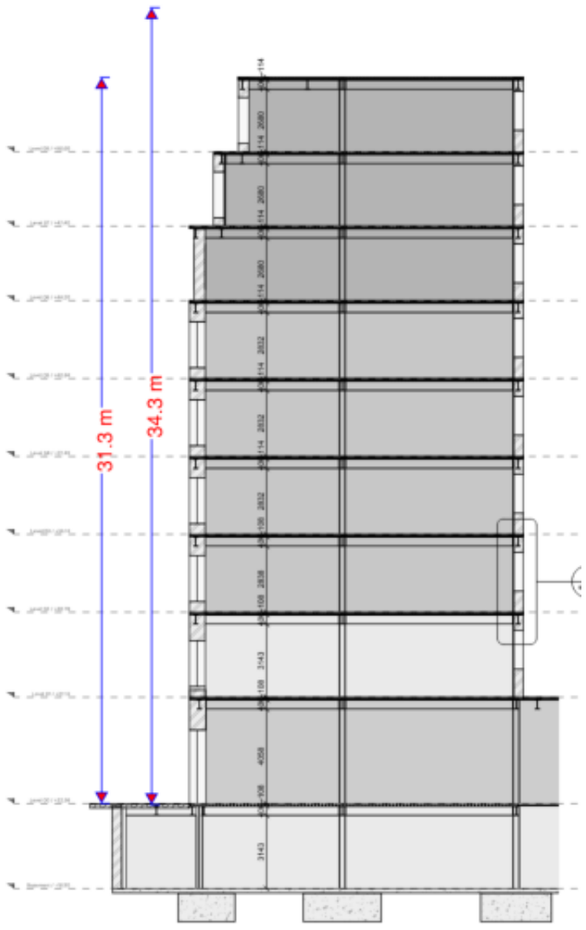

Figure 5: Building Heights.

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3 ATRIUM STRATEGY

The atrium is to be designed as per recommendations of Figure C.3 from BS 9999 (1) for atrium buildings taller than 30m adopting simultaneous evacuation (see **Section 4.4**):

- The atrium is to be enclosed in fire resisting and smoke retarding construction at all levels other than Ground Floor (see **Section 6.1**)
- The site is to be fitted with sprinklers throughout (see **Section 5.2**).
- The atrium is to be provided with mechanical smoke clearance (see **Section 8.5.1**).

  The fire load at Ground Floor (atrium base) is to be controlled to limit the heat output of the fire to 2.5MW convective heat flux. This is to be achieved by providing sprinklers or, where areas cannot be effectively protected by sprinklers, by controlling the combustible content of the area, as per recommendations of Clause B.7.2 of BS 9999 (1).

4 MEANS OF EGRESS

4.1 Risk Profile

As part of the approach taken from BS 9999 (1), a risk profile of the premises is to be established, which will form the basis of the fire safety design of the building or area in question. The risk profile comprises of assessing the occupancy characteristic and the fire growth rate.

Table 2: Risk Rating for Application of BS 9999

Building Element	Occupancy Characteristic	Fire Growth Risk
Office areas and Roof Terrace/Plant	A - Awake and familiar	1 – Slow [A]

Note [A]: given the provision of sprinklers (see **Section 5.2**)

4.2 Basement

It should be noted that the basement has not been taken into account in means of egress assessment detailed in the following sections. This assessment will be updated once drawings showing in detail the existing basement back of house and office areas will be made available.

4.3 Population Assessment

The following population assessment is based on a floor space factor of 8m^2/person, as per Architect's design. This fire strategy is based upon the following worst-case population usage:

Table 3: Population Assessment

Level	Population (Persons)
Ground Floor	170
1st Floor to 8th Floor (Typical Floor layout)	1008 (126 persons per floor)
Total	1178

Note: Level 09 has not been considered in the population assessment as it only comprises plant spaces and a terrace. Therefore, the occupancy of these spaces is only transient.

4.4 Evacuation Strategy

In this site, a 'simultaneous evacuation' strategy has been adopted where upon hearing a continuous alarm, all staff and visitors evacuate the site without delay. Details of the fire detection and alarm system can be found in **Section 5.1.**

4.5 Means of Escape

4.5.1 Travel Distances

All travel distances to the nearest final exit or protected egress route are assessed as meeting the following travel distance recommendations:

Table 4: Maximum Design Travel Distances

Risk Profile	Single-Way Travel Distance (m)	Multiple-Way Travel Distance (m)
A1	26	65

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Figure 6: Travel Distances – Ground Floor – final drawing still under development

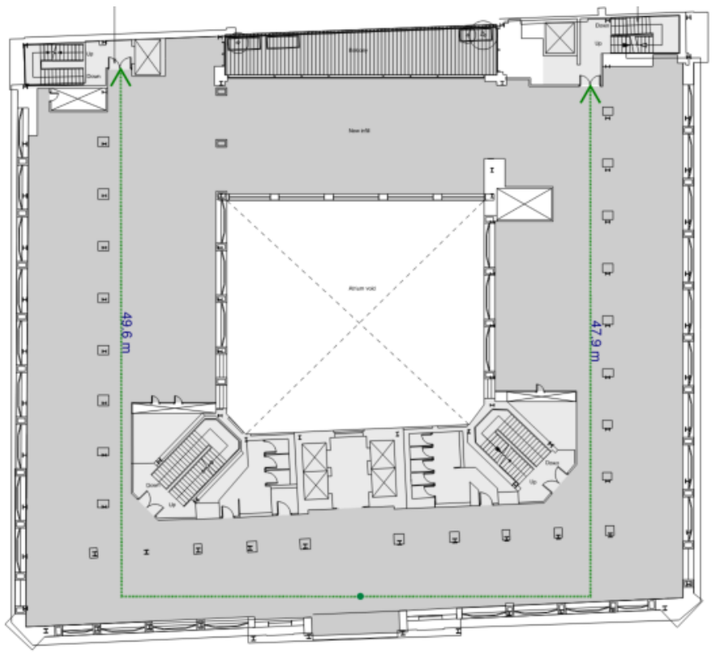

Figure 7: Travel Distances – Typical Upper Floor Level – final drawing still under development

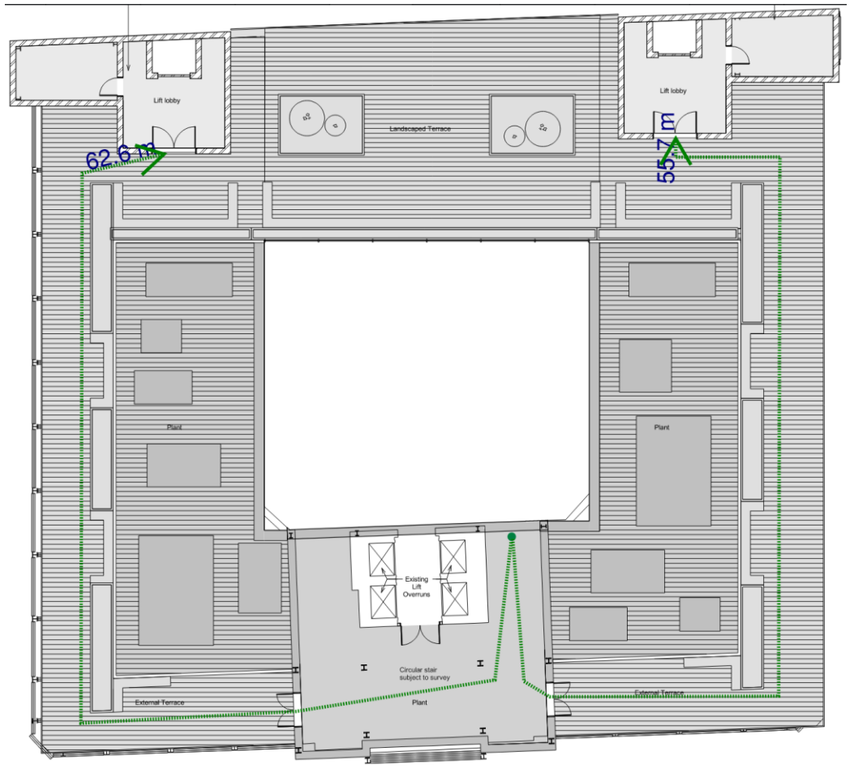

Figure 8: Travel Distances – Rooftop Plant Space – final drawing still under development

4.5.2 Storey Exit Capacity

The following assessment is made of horizontal egress capacity and, except where noted below it has been determined that the egress routes from the site afford sufficient egress capacity relative to the population assessment made in **Table 3**.

Table 5: Horizontal Egress Capacity – existing exit widths to be confirmed via survey

Level	Risk Profile	Available Exit Widths (mm), Once Largest Exit Is Discounted	Width Factor (mm/person)	Exit Capacity (persons)	Occupancy (persons)	Satisfied?
Ground	A1	1 x 1400 [A]	3.3	424	226	Yes
Levels 1 to 8	A1	1 x 1200	3.3	363	168	Yes

Note [A]: door needs to open direction of escape in the event of evacuation.

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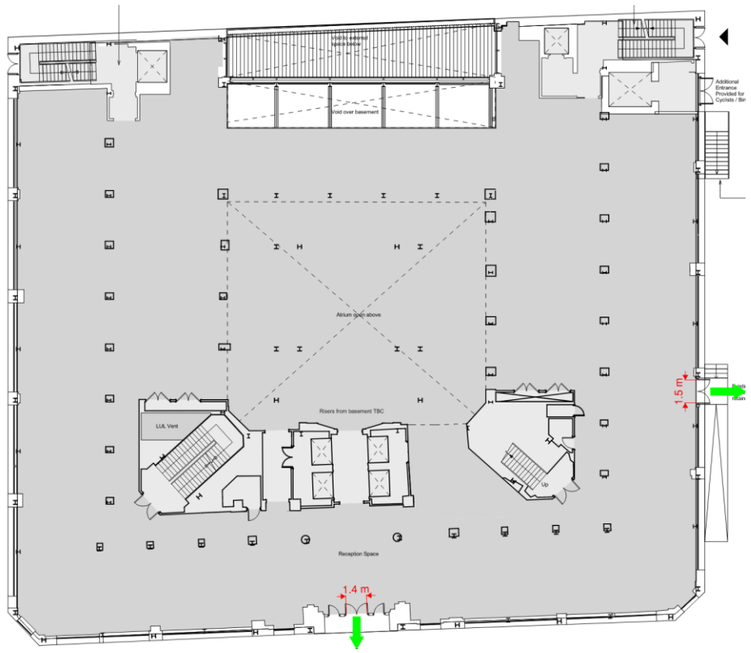

Figure 9: Ground Floor exits considered in the horizontal egress capacity assessment – final drawing still under development

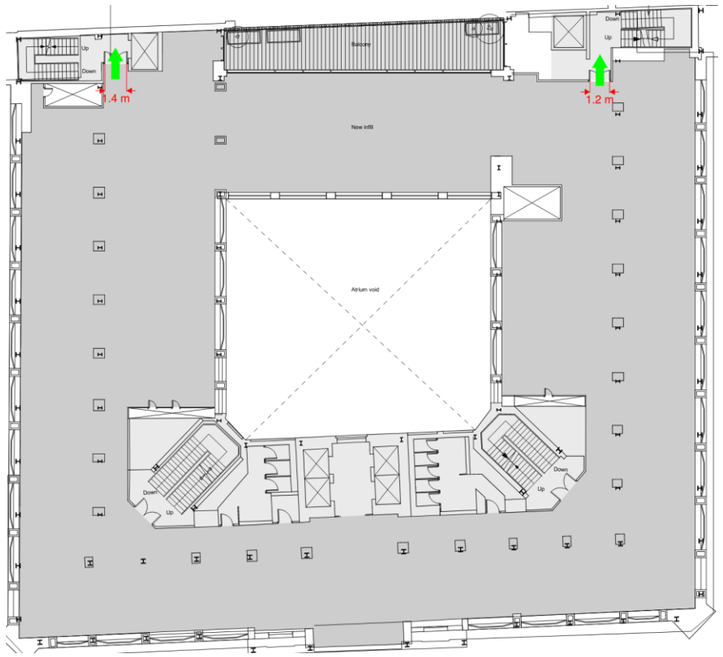

Figure 10: Typical Upper Floor Level (1 to 8) available exits considered in the horizontal egress capacity assessment – final drawing still under development

4.6 Above Ground Vertical Egress Capacity

The egress capacity from the stairs on the upper levels are assessed as meeting the recommendations of BS 9999.

Table 6: Above Ground Vertical Egress Capacity

Stair	Width [A] (mm)	Number Of Floors Served	Width Factor (mm/person)	Max Capacity Of Stairs (persons)	Total Capacity Of Stairs (persons)	Capacity Per Floor (persons)	Satisfied (Yes/No)
Stair 1	1000	9	1.5	666	1332	148	**Yes**
Stair 2	1000			666			

Note [A]: the width of the existing stairs is based on measurements taken on the architect's drawings. The width needs to be confirmed via surveys on site.

4.7 Egress of PRMs

To provide a suitable means of egress for Persons of Reduced Mobility (PRMs) to a place of safety, the following considerations are made:

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- A disabled refuge is to be provided at all levels within each firefighting shaft. Each refuge is to be provided with a free space no less than 900mm x 1400mm and be provided with an Emergency Voice Communications (EVC) system in accordance with BS 5839-9 (3).
- Each firefighting shaft is provided with a firefighting lift that can also be used as an evacuation lift. Evacuation lifts are to meet the recommendations of BS EN 81-76. The requirements for the firefighting lift are as mentioned in **Section 8.1.3.**

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5 ACTIVE FIRE SAFETY SYSTEMS

5.1 Fire Alarm and Detection Systems

As per recommendations of BS 9999 (1) for atrium buildings, a Category L2 automatic detection and alarm system should be provided, designed and installed in accordance with BS 5839 – 1 (4).

5.2 Automatic Fire Suppression

It is recommended that the site be provided with sprinklers in accordance with BS EN 12845 (5).

6 PASSIVE FIRE SAFETY SYSTEMS

6.1 Fire Resistance Levels

It is assessed that the following fire resistance levels satisfy the requirements of BS 9999. Key elements are specified in **Table 7** below.

Table 7: Minimum Periods of Fire Resistance.

Location	Minimum Periods of Fire Resistance in Minutes (R/E/I)	Minimum Standards of Fire and Smoke Rating for Doors
Structural Frame, Load Bearing Walls, Beams Or Columns	120/120/120	N/A
Floors	120/120/120	N/A
Compartment Walls	120/120/120	N/A
Enclosing Stairs	120/120/120	FD60S / E60S$_a$
Enclosing Lift Shaft	120/120/120	FD60 / E60
Fire Fighting Shafts	120/120/120	FD60S / E60S$_a$
Separation Between Firefighting Stair And Lobby	60/60/60	FD30S / E30S$_a$
Separation Between Firefighting Lift And Lobby Or Stair	60/60/60	FD30 / E30
Enclosure Around Atrium At Levels 1 to 8	30/30/30	N/A

6.2 Compartmentation

As the site is greater than 30m to the top most storey, each floor shall be required to be provided as a compartment floor. It is also noted that the atrium is to be compartmented from the rest of the site other than Ground Floor.

7 EXTERNAL FIRE SPREAD

7.1 Fire Spread to Boundary

There is no need to assess the risk of fire spread to the relevant boundary to meet Building Regulation B4 as this risk will be no greater than that of the existing site based on the following:

- Sprinklers have been proposed to the site as per **Section 5.2**. These are designed to restrict the size of any fire.
- As stated in Clause B.8 of BS 9999 (1) in sprinklered atrium buildings the area of fire involvement is likely to be reduced to such an extent that the potential for fire spread to adjacent buildings can be regarded as being comparable to that of an equivalent sprinklered non-atrium building.
- The site will retain its original office usage, therefore the fire load in the site will not increase.

Based on the above the extent of any elevation affected by fire will be no larger (and it will likely be smaller) than that of the existing site.

7.2 External Wall and Roof Construction

7.2.1 Surface Spread of Flame

The building height is more than 18m, therefore any new external cladding is to achieve a minimum European of Class B-s3, d2 or better for surface spread of flame.

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7.2.2 Combustibility (External Walls)

The top storey height is more than 18m, therefore any new materials which become part of an external wall (insulation, sheeting boards etc), or any new specified attachment (e.g. balconies), should achieve Class A2-s3, d2 or better.

7.2.3 Cavity Barriers (External Walls)

Cavity barriers are to be provided in the following locations within any new external cavity wall:

- Around all openings through the cavity wall, including but not limited to doors, windows, vents and pipes.
- At the junction of every fire rated wall and the external cavity wall, including but not limited to:
  - Party walls between units.
  - Walls forming protected hallways.
  - Walls forming enclosure of stairwells.
- At the junction between the floor slab and the external cavity wall.
- So as to sub-divide extensive cavities within the external wall such that the maximum dimension within the cavity is 20m.

7.2.4 Roof Coverings

New roof coverings should achieve the classifications in the following table depending on their distance from the relevant boundary. This is the site boundary or, where the elevation faces a public road, the middle line of the road.

Table 8: Classification of Roof Coverings

Distance of Roof (or Part of Roof) to Relevant Boundary (m)	Designation of Roof Covering				
	$B_{Roof}(t4)$	$C_{Roof}(t4)$	$D_{Roof}(t4)$	$E_{Roof}(t4)$	$F_{Roof}(t4)$
<6m	●	○	○	○	○
>6m but <12m	●	●	○	○	○
>12m but <20m	●	●	○	○	○
>20m	●	●	●	●	○

Key:

● **Acceptable** ○ **Not Acceptable**

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8 ACCESS AND FACILITIES FOR THE FIRE SERVICE

8.1 Fire Fighting Facilities

As the height of the site from firefighting access level to the top most storey is greater than 18m the site needs to be provided with firefighting shafts. It has been deemed that a minimum of two firefighting shafts are required for this site as it serves storeys greater than 900m^2 in floor area. Escape Stairs 1 and 2 in **Figure 2** are to be reconfigured to become firefighting shafts and it is recommended both of these are extended to the basement.

Each firefighting shaft is to comprise of the following:

- Firefighting stair
- Firefighting lobby
- Firefighting lift installation
- Dry fire main

8.1.1 Fire- Fighting Stair

Firefighting stairs are to be designed in accordance with BS 5395-1 (7) and must provide not less than 1100mm tread width, handrails may project into the width by 100mm at each side.

Escape Stairs 1 and 2 do not meet the 1100mm minimum recommended limit. However, the clear width of each stair is only limited by a 1000mm wide localised pinch-point, whereas the rest of the stair is more than 1100mm wide. Furthermore, the proposed fire fighting access strategy is an improvement of the existing site, which has no fire-fighting shafts. Therefore, it is deemed that the requirements of Building Regulation B5 is met.

All stairs will be required to be provided with a 1.0m^2 automatically opening vent (AOV) at the head of the stair.

A dry fire main is to be installed in each of the firefighting stairs and is to be designed and installed in accordance with BS 9990 (8). It is to meet the following:

- A dry riser outlet is to be provided on all floors within each of the firefighting lobbies.
- A dry riser inlet is to be sited adjacent the entry point into each firefighting shaft and is to be provided with adequate signage.
- The horizontal pipe run from the dry rising main inlet to the ground floor outlet within the stair is to be less than 18m.
- The hose lay distances from the furthest point within any floor to the dry riser outlet within the firefighting lobbies is to be within 60m in accordance with BS 9999. This recommendation has been assessed to be met in this instance.

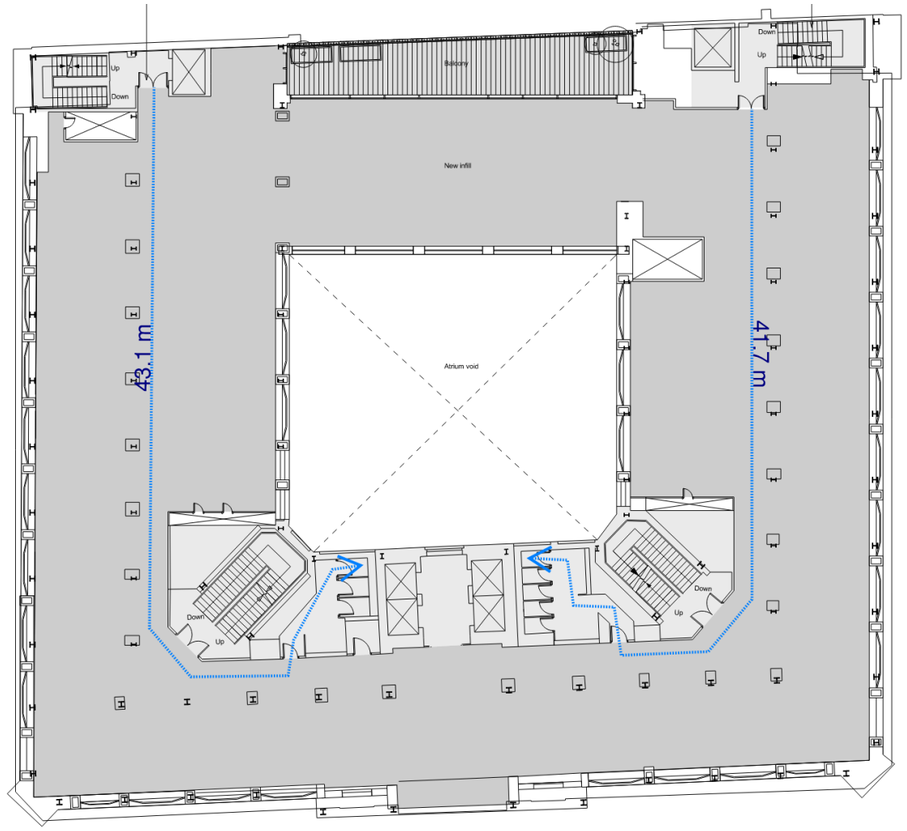

Figure 11: Example of hose lay distance – Typical Upper Level – final drawing still under development

8.1.2 Firefighting Lobby

Fire-fighting lobbies should be provided with facilities for smoke control as per Clause 27.1 of BS 9999 (1). One of the following should be achieved:

- Mechanical smoke shafts meeting the recommendations of Clause 27.1.3 of BS 9999 (1); or
- Natural smoke shafts achieving a minimum free area of 1.5m^2.

8.1.3 Fire Fighting Lifts

The lifts associated with each firefighting shaft should be designed as a firefighting lift in accordance with BS EN 81-72 (9). These lifts will need to meet the following key requirements:

- The lift car is to be no less than 1,100mm wide x 1,400mm deep.
- The clear entrance width to the car shall be no less than 800mm.
- The lift is to be provided with a firefighting switch at Ground Level to be located within 2m of the lift, and at a height of between 1.4m and 2.0m above floor level.

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- The lift is to be provided with secondary power supply.
- The lift core is to be provided with either:
  - Measures to limit the ingress of water into the lift core such as raised thresholds.
  - Measures to limit the accumulation of water in the pit, such as sump-pumps.

8.2 Fire Control Centre

As the site is greater than 30m in height it is recommended to allow for a fire control centre. The following are to be met along with the rest of the recommendations as per Clause 24 of BS 9999 (1):

- The fire control centre should be located at Ground Floor and accessed from the street either directly or via a 120 minutes fire protected corridor.
- The fire control centre should be separated from the remainder of the site by 120 minutes fire-resisting construction and should incorporate facilities to enable it to function as normal during an emergency.

It is noted that guidance does not specify the minimum size of the centre, however a typical floor area is between 15m^2 to 20m^2.

8.3 Fire Vehicle Access

The development is provided with vehicle access, as shown in **Figure 12**. The site is accessed via Doric Way, Eversholt Street and Lancing Street.

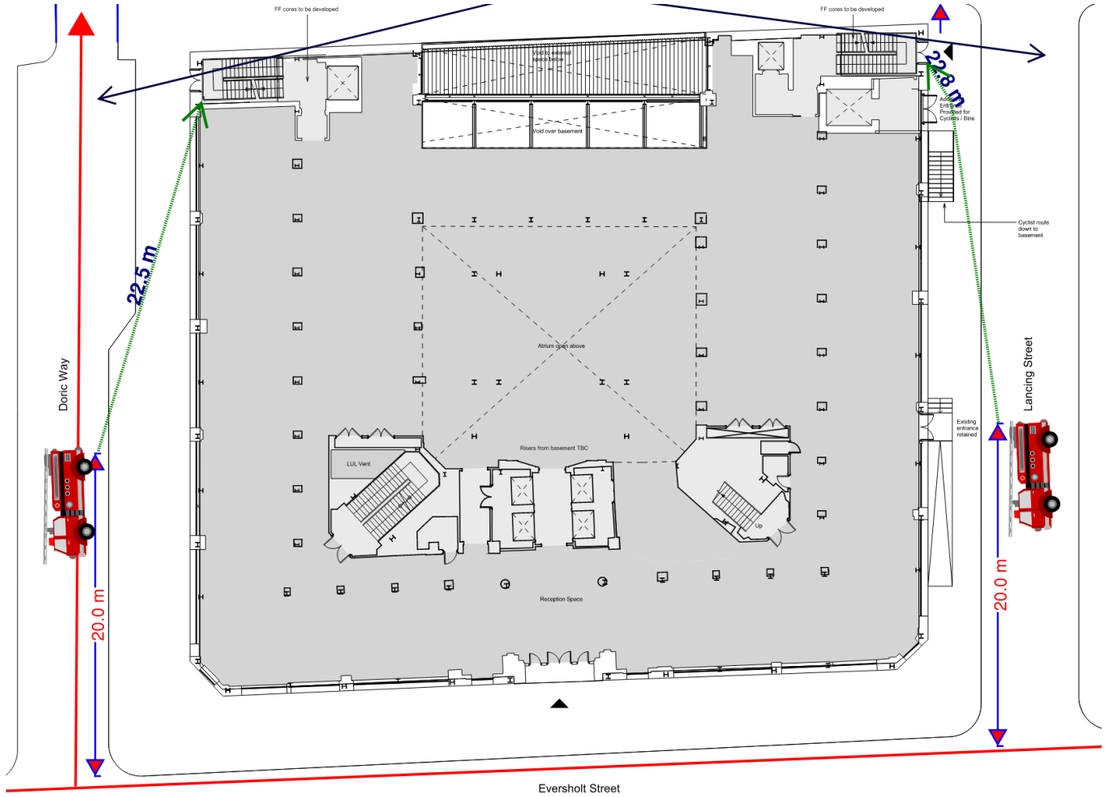

Figure 12: Fire Service Access Routes – final drawing still under development and dimensions to be confirmed via survey

Fire vehicle access roads should meet the minimum access recommendations of BS 9991 as shown in **Table 9** below.

Table 9: Typical access route specifications

Appliance type	Minimum width of roads between kerbs (m)	Minimum width of gateways	Minimum turning circle between kerbs (m)	Minimum turning circle between walls (m)	Minimum clearance height (m)	Minimum carrying capacity (tonnes)
Pump	3.7	3.1	16.8	19.2	3.7	14.0[A]

[A] **Note:** LFB Guidance Note 29 – Access for Fire Appliances recommends that a minimum carrying capacity of a fire tender appliance should be 14 tonnes.

It is not clear at this stage if the hammerhead at the end of Lancing Street is suitable as a turning facility. This needs to be confirmed by the transport engineer as the design progresses.

An alternative approach is to allow fire vehicles to park up to 20m into Doric Way and Lancing Street, which meet the minimum recommended 3.7m clear width. Hose distances to the inlets serving the fire-fighting shafts would be up to 23m,

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which is more than the 18m limit recommended by BS 9999 (1). However, a fire fighting fatigue and hydraulic assessment can be carried out to support the 5m surplus.

8.4 Fire Hydrants

Fire hydrants need to be located within 90m of each dry riser inlet and no more than 90m apart. The location of the existing hydrants should be confirmed by others.

8.5 Smoke Clearance

8.5.1 Atrium

A mechanical smoke clearance system should be provided within the atrium and should achieve at least 4 air changes per hour.

The smoke fans should be in accordance with BS EN 12101-3 (10).

8.5.2 Basement

Each basement fire compartment should be provided with smoke clearance. Each compartment should be provided with one of the following:

- Natural smoke outlets where the combined clear cross-sectional area of all smoke outlets is a minimum of 2.5% of the compartment floor area.
- A mechanical smoke extract system assisted by the proposed sprinkler system (see **Section 5.2**). This should meet the following:
  - It should achieve at least 10 air changes per hour, based on the volume of the largest compartment served.
  - It should be capable of handling gas temperatures of 300°C for not less than 1 hour.

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