BURO HAPPOLD

LSHTM Tavistock Place 1

Fire Statement

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Revision P01

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Executive Summary

Buro Happold Fire Engineering has been appointed by London School of Hygiene & Tropical Medicine (LSHTM) to provide a Stage 2 fire strategy for the existing LSHTM Tavistock Place Building taking into consideration the changes to the building as a consequence of changing the use of the space from mainly office spaces to flexible teaching spaces.

This fire statement is intended as a supporting document to be provided as part of the planning application submission for the scheme.

The fire strategy is primarily based on the recommendations contained within BS 9999:2017. Where the design of the building does not meet the recommendations given in the standard, quantitative or qualitative engineering assessments have been made to demonstrate compliance with the relevant functional requirements of Part B, Building Regulations 2010.

The existing TP1 building is located by Tavistock Place in London. Building comprises 5 floors, including ground floor and basement. Currently building comprises mostly office spaces, as part of the works flexible teaching spaces and associated break out and social learning spaces form the main use of the building.

This report outlines the fire safety strategy for the building, which comprises the following features.

Means of Escape

- Escape provisions are based on a simultaneous evacuation strategy, see Section 2.1.
- The building is used predominantly as teaching space and therefore has been designed for A2 risk category, see Section 2.2
- The building is provided with five escape stairs – two internal protected stairs serving all levels, one external stair serving the upper levels only, and two external stairs in lightwells serving the basement level, see Section 2.7.

Internal Fire Spread (Linings)

- Surface spread of flame classifications to be in accordance with BS 9999, see Section 3

Internal Fire Spread (Structure)

- Where any changes are carried out within the building that influence structural elements, they should be designed to achieve current fire safety guidance i.e. ensure the structural elements achieve 60 minutes fire resistance (loadbearing) as a minimum, see Section 4.1.
- Fire hazard rooms should be enclosed in fire resisting construction, see Section 4.2.
- A compartment floor, achieving 60 minutes fire resistance, to be provided between the basement and the ground floor, see Section 4.2.

Active Systems

- An automatic fire detection and alarm system is to be provided throughout the building, see Section 5.1.
- Fire suppression is not required to achieve Building Regulations compliance, however, an automatic water mist suppression system is provided in the data centre in the basement for property protection purposes, see Section 5.2.

External Fire Spread

- TP1 is an existing building, and no changes of use are being proposed therefore, where no changes are proposed to the external faces of the building the external fire spread assessment of the building does not require revision. Where changes are proposed – extension of Stair 3 to serve the roof and provision of infill at upper levels these have been revised and no protection is required to limit the fire spread between buildings, see Section 6.1.
- The external face of the new infill should be provided with fire protection where the construction is within 1800mm from the external staircase, see Section 4.5.
- To the rear of TP1, where the new TP2 has been built recently, the provisions for fire spread between the two building are provided on TP2 rather than TP1, see Section 6.1.

Access and Facilities for the Fire Service

- The entire Southern elevation of TP1 is accessible to a fire pump appliance via Tavistock Place Road which satisfies the code recommendation for 15% of the perimeter to be accessible to a fire pump appliance, see Section 7.1.
- There is a fire hydrant within 90 m of the reception entrance on the intersection of Tavistock Place with Marchmont Street, see Section 7.4.

Fire Safety Management

- A significant part of the fire safety regimes within any building is the standard and quality of fire safety management.
- This report is not the 'fire safety management policy and procedures document', which is required as part of the 'responsible person's' statutory compliance with the Regulatory Reform (Fire Safety) Order 2005.
- This fire strategy assumes Level 2 management i.e. a basic level of management that satisfies the minimum requirements of legislation, see Section 8.

Next Steps

- It is recommended that LSHTM's fire officer be consulted.

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1 Introduction

1.1 Aim and Scope of the Report

Buro Happold Fire Engineering has been commissioned by London School of Hygiene & Tropical Medicine (LSHTM) to develop a Stage 2 Fire Strategy for the LSHTM Tavistock Place 1 redevelopment. The primary focus of this strategy is to provide the key information to demonstrate how the functional life-safety requirements of the Building Regulations 2010 will be met for the proposed refurbishment.

This fire statement is intended as a supporting document to be provided as part of the planning application submission for the scheme.

The objective of this strategy is to provide a risk proportionate approach that balances occupant needs with an uplift in fire precautions. The strategy is based upon the information supplied and is determined based on there being one-seat of fire in the building at any one time. Asset and property protection are not explicitly stated as design objectives and as such have not been considered within this fire strategy.

1.2 Design Framework

In order to conform to the functional life safety requirements of the Building Regulations 2010 for the purpose of achieving life safety objectives, this fire strategy is in accordance with the recommendations given in BS 9999, 'Code of practice for fire safety in the design, management and use of buildings', 2017[1].

In the existing condition the fire strategy for TP1 was based on the recommendations of Approved Document B, however, to provide a coherent approach to fire safety between TP1 and TP2 buildings the fire precautions related to TP1 has been designed in accordance with the recommendations given in BS 9999.

1.3 The London Plan

The London Plan sets out the mayor's overall strategy for development in London to meet with the requirements of the Greater London Authority Act 1999 and the Town and Country Planning (London Spatial Development Strategy) Regulations 2000.

The London Plan is legally part of each of London's Local Planning Authorities' Development Plan and must be taken into account when planning decisions are taken in any part of Greater London. As per London Plan Guidance the works for TP1 are considered minor development.

The Plan is divided into chapters covering items such as housing, transport, infrastructure, and building design. Each chapter comprises a number of policies intended to deliver the Plan's overall objectives for that specific aspect. Fire safety is covered under Policy D12 in Chapter 3. Means of escape for mobility impaired persons is also covered under Policy D5(B5).

As per London Plan Guidance minor developments should comply with London Plan Policy D12A, the following should be achieved:

1.3.1 London Plan D12 Fire Safety - A

In the interests of fire safety and to ensure the safety of all building users, all development proposals must achieve the highest standards of fire safety and ensure that they:	
1) identify suitably positioned unobstructed outside space: *a) for fire appliances to be positioned on.* *b) appropriate for use as an evacuation assembly point.*	*Section 7* *Section 2.142.14*
2) are designed to incorporate appropriate features which reduce the risk to life and the risk of serious injury in the event of a fire; including appropriate fire alarm systems and passive and active fire safety measures	*Section 2* *Section 5* *Section 4* *Section 6*
3) are constructed in an appropriate way to minimise the risk of fire spread.	*Section 4* *Section 6*
4) provide suitable and convenient means of escape, and associated evacuation strategy for all building users.	*Section 2*
5) develop a robust strategy for evacuation which can be periodically updated and published, and which all building users can have confidence in.	*Section 2*
6) provide suitable access and equipment for firefighting which is appropriate for the size and use of the development	*Section 7*

1.4 Building Description

The TP1 building is located in the London Borough of Camden on Tavistock Place Road (15-17 Tavistock Place). It is understood that the building and was redeveloped in 2010 under the Building Regulations 2000, as amended 2006.

The building has 5 storeys including a basement level, a ground floor and 3 upper storeys with the topmost occupied storey (the third floor) being approximately 9.8 m above ground level. The existing building was originally designed around a courtyard, however, with the addition of TP2, the North side of the building was demolished leaving TP1 as a U-shaped building. The main part of the which is adjacent to Tavistock Place which connect to an East Wing and a West Wing. At ground level there are two passageways through the TP1 building: one to the West side of the building that leads from Tavistock place to the courtyard at the back of the building; and, another to the East side of the building that leads from Tavistock Place to the main entrance of TP2 behind.

The building is currently primarily used as office space although there is a Café at ground level and a Data Centre in the basement. As part of the redevelopment most of the office spaces will be redesigned as teaching spaces and social/learning spaces. The ground floor of the West wing will continue to be used as a Café. The basement level will be shared between teaching and social learning spaces and plant rooms/store rooms.

There are five escape stairs serving the building, as shown in Figure 1—1:

- Stair 1 is an existing protected escape staircase in the centre of the building that serves all storeys, including the basement level;
- Stair 2 is an external escape stair that serves the above ground storeys which will replace an existing stair located on the East elevation of the West Wing of the building. The stair was added when the TP2 building was erected;
- Stair 3 is an existing internal accommodation stair in the Southeast corner of the building that was converted into a protected escape stair that serves all above ground storeys in the building. This has been done during the TP2 works;

[1] BS 9999 (2017): Code of practice for fire safety in the design, management and use of buildings

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- Stairs 4 and 5 are external stairs that serve the basement level only.

The entire South elevation of the building is accessible by a fire appliance from Tavistock Place Road.

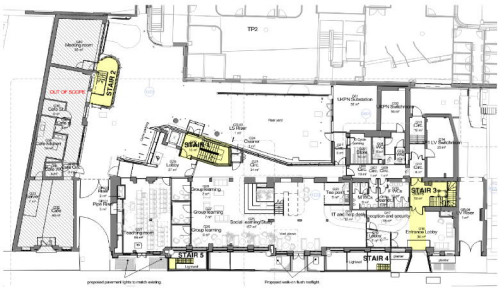

Figure 1—1 Stair Numbering

Note: Reception area to be reduced to less than 10m2 and furniture to be non-combustible.

1.5 Approving Bodies

Approval for the following fire strategy will need to be agreed with the following stakeholders:

- The Building Control Body;
- London Fire Brigade (LFB);
- LSHTM; and,
- The Building's Insurers.

1.6 Fire Safety Management

A significant part of the fire safety regimes within any building is related to the standard and quality of fire safety management.

This report is not the fire safety management policy and procedures document required as part of the 'responsible person's' statutory compliance with the Regulatory Reform (Fire Safety) Order 2005.

In determining the fire safety design measures, the assumptions on the quality of fire safety management to be put into place by the client to meet statutory requirements have been clarified.

The fire strategy cannot completely rely on technology to ensure life safety, and thus a positive effort on the part of management is essential to meet the objectives set out in the Fire Strategy.

It is recommended that a **Level 2** fire safety management system, as defined by BS 9999, is achieved in the building. Level 2 demonstrates good practice with a basic level of management that satisfies the minimum requirements of legislation.

Details of the required management for the risk profile are provided within the report in Section 8.

1.7 Regulatory Reform Order

Responsibility for complying with the Regulatory Reform (Fire Safety) Order rests with the 'responsible person'. In a workplace, this is the employer and any other person who may have control of any part of the premises, e.g. the occupier or owner.

The fire safety strategy developed herein is not a risk assessment under the Order but will form part of the information used by the 'responsible person' in developing their risk assessments.

1.8 Documents Referenced

This report is based on drawings prepared by Rivington Street Studio Architects.

Table 1—1 Documents Referenced

Created by	Document Name/Number	Description	Rev	Date
Rivington Street Studio	TP1-RSS-00-B01-DR-A-1210	Lower Ground Floor Plan	D05	28/09/23
Rivington Street Studio	TP1-RSS-00-GF-DR-A-1202	Ground Floor Proposed Plan	D03	28/09/23
Rivington Street Studio	TP1-RSS-00-01-DR-A-1212	First Floor Proposed Plan	D06	28/09/23
Rivington Street Studio	TP1-RSS-00-02-DR-A-1213	Second Floor Proposed Plan	D06	28/09/23
Rivington Street Studio	TP1-RSS-00-03-DR-A-1214	Third Floor Proposed Plan	D05	28/09/23
Rivington Street Studio	TP1-RSS-00-R02-DR-A-1206	Roof Proposed Plan	D03	19/05/23

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2 Means of Escape

2.1 Evacuation Strategy

The TP1 building operates a simultaneous evacuation strategy whereby upon activation of the fire alarm system all occupants of the building will evacuate at the same time.

NOTE: Double knock approach to be discussed with the Client. Kepple Street operates on double knock approach whereas TP2 operates on simultaneous evacuation strategy.

2.2 Risk Profile

2.2.1 Occupancy Characteristic and Fire Growth Rate

The main risk profile that has been used for the building is A2: occupants are awake and familiar with the building and the fire growth rate is medium.

The risk profile for the higher risk areas, such as storage rooms and plant rooms, is classified as A3: occupants are awake and familiar with the building and the fire growth rate is high.

2.3 Number of Escape Routes

BS 9999 recommends at least two escape routes for each floor in case one is not accessible due to fire. The minimum number of exits from a room, tier, or storey is as per Table 2—1. Where there are more than 60 people in any location there will be a minimum of two escape routes with doors arranged to open in the direction of escape. In addition, escape doors will be in line within section 2.11.

Table 2—1 Minimum Number of Escape Routes

Maximum Number of Persons	Minimum Number of Escape Routes/Exits
60	1
600	2
More than 600	3

2.4 Benefits from Enhanced Fire Detection and Alarm

For buildings with fire detection and alarm system enhanced from what is the minimum required based on the risk profile, the code guidance allows a 15% increase to maximum travel distances and a 15% reduction to the door, corridor and stair width.

As described in Section 5.1, an L2 fire detection and alarm system will be provided throughout the building. On the basis that the main risk profile in the building is A2, required minimum level of fire detection and alarm system within the building is level M, i.e. a manual system. Therefore, the benefits from system enhancements are applied.

2.5 Inner Rooms

Inner rooms, i.e. a normally occupied room from which the only escape route is through another room (the access room), should be avoided where practicable. Inner, inner rooms, i.e. rooms where the access room itself is an inner room, are not permitted by BS 9999.

There is currently number of inner rooms in the building, e.g. store rooms at the south side of the building and prayer rooms in the basement, store rooms and plant rooms at the east site of the building at the upper levels. These rooms will be provided with linked detection and alarm systems such that the occupants of the inner room are alerted to a fire in the access room as early as possible and as such this is reasonable. There are two store rooms in the basement accessed from the prayer rooms that are currently inner-inner rooms which are not permitted by the code guidance. It is currently proposed for these to be provided with linked detection and alarm system and be locked shut and for the combustible content to be controlled. This approach is in line with the Building Control comments.

2.6 Horizontal Evacuation

2.6.1 Escape Away from Voids

An escape route should not be within 4.5 m of an opening between floors unless the direction of travel is away from the void or there is an alternative escape route that does not pass within 4.5 m of the open connection.

The escape route at first floor is within the 4.5m from the open stair, however occupants are always provided with an alternative escape route away from the void. This is considered reasonable.

2.6.2 Travel Distances

Maximum travel distances are based on BS 9999 and depend on the assigned risk profile. Due to the provision of an L2 automatic fire detection and alarm system the travel distance limits can be increased by 15%.

Table 2—2 Travel Distances Limits

Area	Risk Profile (Reduced by one level due to the provision of AWFSS)	Maximum Travel Distance, including 15% due to AFD [m]	
		One direction	More than one direction
Basement to Third Floor	A2	25.3	63.2
Higher risk areas (plant rooms and store rooms)	A3	20.7	51.7

Travel distances are currently within the above limits.

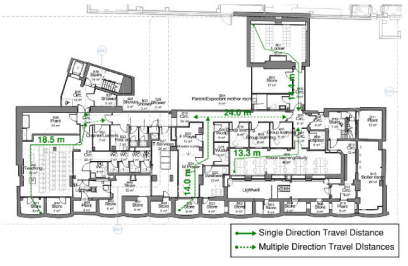

Figure 2—1 Travel Distances Basement

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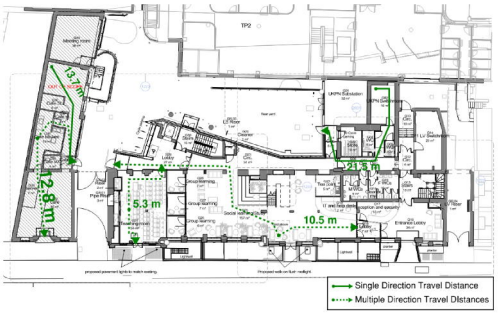

Figure 2—2 Travel Distances Ground Floor

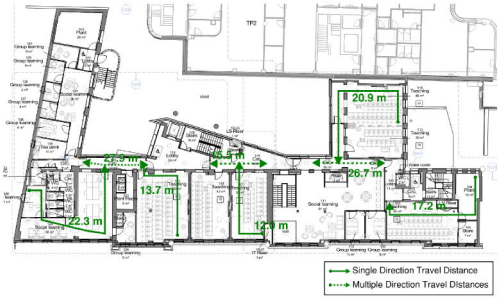

Figure 2—3 Travel Distances First Floor

Figure 2—4 Travel Distances Second Floor

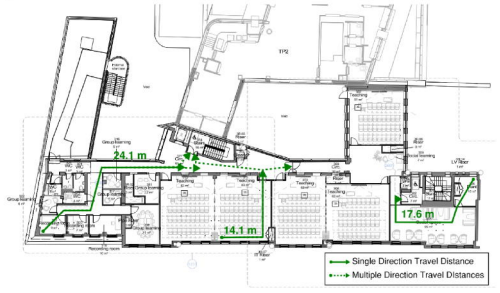

Figure 2—5 Travel Distances Third Floor

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2.6.3 Escape Widths

Table 2—3 gives the minimum clear exit width for each of the risk profiles taking into account a decrease of 15% due to provision of an automatic fire detection and alarm system. These are subject to an absolute minimum width of 800 mm, or 850 mm if unassisted wheelchair users are expected.

Table 2—3 Door Widths

Area	Risk Profile	Exit Width [mm/person]
Basement to Third Floor	A2	3.06
Higher risk areas (plant rooms and store rooms)	A3	4.10

Note:

- The recommended clear width of doors leading onto an escape route is 1,050 mm. The effective width used in the capacity calculation for a door narrower than 1050mm is 500mm;
- When calculating the horizontal capacity of a storey, the largest exit will be discounted due to it potentially being blocked by fire; and
- The absolute minimum width of corridors is 1,200 mm, or the width required for the capacity, whichever is greater.

2.6.4 Horizontal Capacity

In Table 2—4 the capacity per floor is given with consideration of the minimum exit widths, given in Table 2—3. In the calculations the largest exit is discounted in accordance with code guidance (denoted by strikethrough text). The effective exit width is the lesser of the stair entry door and the stair width.

The ground floor capacity includes the horizontal capacity for people evacuating via the stairs at final exit level from merging flow, see Section 2.9.

Escape via Stair 4 and 5 have not been considered for capacity calculations, see 2.7.1. These can be used as alternative means of escape to the primary escape routes - Stair 1 and 3.

Table 2—4 Horizontal Storey Capacity

Floor	Escape Routes	Capacity per Floor [persons]
Third	1 x 850 mm exit to Stair 1 1 x 850 mm exit to Stair 2 ~~1 x 920 mm exit to Stair 3~~	326
Second	2 x 850 mm exit to Stair 1 [1] 1 x 850 mm exit to Stair 2 ~~1 x 920 mm exit to Stair 3~~	326 [2]
First	2 x 850 mm exit to Stair 1 [1] 1 x 850 mm exit to Stair 2 ~~1 x 920 mm exit to Stair 3~~	326 [2]
Ground (Excl. West Wing)	Merging flow with Stair 3 [3] ~~1 x 1100 mm exit to West underpass~~	196[4]
Ground (West Wing)	~~1 x 1200 mm exit to Tavistock Road~~ 1 x 870 mm exit to underpass	163
Basement	~~1 x 810 mm exit to Stair 1~~ [3] 1 x 1010 mm exit to Stair 3 [3]	81 [5]

Note 1: Lobby is provided with two entrances. The horizontal exit should be considered as lesser of two lobby door width, stair door width or stair width. With door lobby being 850mm wide considering both doors in the calculations is considered conservative. Both doors can't be affected by fire at the same time.

Note 2: With lobby to stair 1 dividing the floorplate in two separate areas the capacity of each area (to the left of the lobby and to the right of the lobby) should not exceed 163 persons. The total capacity is therefore limited to 326 persons.

Note 3: Horizontal capacity for people evacuating via Stairs 1 and 3 at final exit level is determined from the merging flow, see Section 2.9.

Note 4: The capacity is taken as 196 people escaping via Stair 3 (as per Table 2—7). The merging capacity has been redistributed between ground floor and basement. This is considered the worst case redistribution but it appears to be sufficient for the expected occupancy presented by the Architect. This can be redistributed differently, if required.

Note 5: The capacity is based on the remaining capacity of the merging flow for Stair 3 (77 persons) as per Table 2—7 . This appears to be sufficient for the expected occupancy presented by the Architect. The redistribution of the merging flow capacity can be adjusted if required however the capacity at the basement level will be limited to 81 persons due to merging flow capacity of Stair 1.

2.6.5 Corridors

2.6.5.1 Dead-end Corridors

Dead end corridors greater than 2 m in length should be fire protected. Where the dead-end exceeds 4.5 m long and provides access to a point of choice from where alternative escape routes are available, they should be separated by fire resisting construction as shown in Figure 2—6.

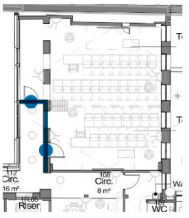

Figure 2—6 Dead-end Corridors

There are a number of dead-end corridors in the TP1 building. Where corridors are an existing condition and no changes are proposed these comply as existing. Where new corridors are proposed, or works are done to the construction of the existing corridors these should achieve EI30 with FD30s doors.

2.6.5.2 Division of Corridors

Where a corridor connects two or more storey exits and is more than 12 m long, it should be sub-divided by fire doorsets located approximately half-way between the two storey exits. Note, the corridor does not need to be divided into 12 m sections; a single division of the corridor is sufficient.

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2.6.6 Roof Escape

It is currently proposed for Stair 3 to be extended to serve the roof level. The route across the roof should be clearly defined and guarded by walls and/or protective barriers to prevent from falling. Travel distances at the roof should be limited to 60m for single direction of travel. This is currently achieved with Stair 3 serving this level.

2.7 Vertical Evacuation

2.7.1 Escape Stairs

The TP1 building is served by 5 escape stairs. Table 2—5 shows the stairs in the building, the floors that they serve, and their clear widths. Figure 1—1 shows the location of these stairs in the building. Stairs 1 and 3 is an internal protected escape stair. Stairs 2, 4 and 5 are external stairs.

Stair 4 and 5 have not been considered for capacity calculations as the width of both stairs is significantly below the recommended width of stair for upward travel, i.e. 1200mm.

Please refer to Section 2.12 for details on the final exits of these escape stairs, and Section 4.3 for details of the extent of fire protection around the external escape stairs.

Table 2—5 Protected Escape Stairs – Storeys Served and Clear Widths

Floor	Stair 1		Stair 2		Stair 3		Stair 4		Stair 5	
	Storey Served	Width [mm]	Storey Served	Width [mm]	Storey Served	Width [mm]	Storey Served	Width [mm]	Storey Served	Width [mm]
Third	⇩	1010	⇩	1100	⇩	1000				
Second	⇩	1080	⇩	1100	⇩	1000				
First	⇩	1010	⇩	1100	⇩	1000				
Ground	⇨	1100[N1]	⇨	1100	⇨	1000	⇨	740	⇨	630
Basement	⇧	1100			⇧	1010	⇧	740	⇧	630

Note 1: The final exit from the stair to external comprises a leaf and half door. The single leaf has a clear width of 850 mm, which is less than the stair width. The clear width of the leaf and half door is more than the required 1000 mm. It should be ensured that the half leaf is not bolted shut such that only the single leaf can open as this will limit the number of occupants that can use this exit.

Stairs should be designed in accordance with BS 5395-1[2] and the absolute minimum width of an escape stair is 1000 mm for downward travel and 1200mm for upward travel. This is not achieved for the stairs serving the basement, however, as this is an existing condition it is considered reasonable

Any internal stair used as an escape route should be protected by being enclosed in fire resisting construction. These protected stairs should discharge direct to external or discharge to external via a corridor afforded the same level of protection as the stair. See Section 4.2 for more detail on the level of fire protection required.

2.8 Vertical Capacity

Since the escape stairs in the building are lobby protected no stair (excluding stair 4 and 5 as described previously) is discounted in the occupant capacity calculations as permitted within code guidance.

Table 2—6 summarises the capacity of each of the stairs both above and below the final exit level.

Table 2—6 Stair Capacities

Stair	Stair Widths [mm]	No. of Floors Served [-]	Stair Width per Person [mm/person]	Stair Capacity [persons]	Stair Capacity per Floor [persons] [1]	Total Capacity [persons]
Above Final Exit Level						
1	1010	3	2.76	365	121	1,125
2	1100	3	2.76	398	132	
3	1000	3	2.76	362	120	
Below Final Exit Level						
1	1100	1	3.83	287	287	550
3	1010	1	3.83	263	263	

Note 1: The stair capacity per floor has been calculated by assuming an even distribution of people across the storeys served.

2.9 Merging Flows at Final Exits

Stairs 1 and 3 serve the upper levels in the building and basement level and discharge at ground level. In addition to this Stair 3 also serve as storey exits at ground floor level. Consequently, at the final exit level there will be a merging of flows of people escaping from the building. The primary flow of people escaping the building is that from the upper levels. Therefore, the number of additional people that can use these escape routes at ground level is determined by a merging flow calculation which is based upon the width of the final exit to external.

BS9999 gives equations to determine the required width of a final exit based upon the number of occupants using the storey exit at ground level and/or level below and the stair width. However, since the final exit widths are already fixed the equation can be rearranged to give the number of occupants served from the ground floor storey exit.

For stair serving basement and upper floors the combined number of occupants from basement and ground floor that can merge at the ground floor is (for the stair that doesn't serve the ground floor N will be taken as zero):

$$W_{FE} = BX + NX + 0.75S_{up}$$

$$B + N = (W_{FE} - 0.75S_{up})/X$$

Where:

- W_{FE} is the width of the final exit in metres;
- S_{UP} is the stair width in metres;
- N is the number of occupants served from the ground floor storey exit;
- B is the number of occupants served from the basement
- X is the minimum door width per person

Table 2—7 shows the number of occupants that can merge with those using the above ground portion of the stair to escape.

Table 2—7 Merging Flow Calculations Stair 1 and 3

Stair	W_{FE} [mm]	S_{UP} [mm]	N [persons]	B [persons]
1	1000	1000	0	81
3	1600	1000	277	

[2] BS 5395-1:2010 Stairs – Part 1: Code of practice for the design of stairs with straight stairs and winders.

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The value of N + B equals the total number of occupants that can use the final exits from the basement and the ground floor i.e. the final exit of Stair 3 has capacity for an additional 277 people, who can be distributed across the Basement level and the Ground Floor level.

2.10 Building Occupant Capacity

The overall capacity of the building has been assessed both horizontally (based on door widths as shown in Table 2—4), and vertically (based on the capacity of the stairs as shown in Table 2—6). The confining factor, or the element which permits the least number of people (i.e. the horizontal or the vertical capacity), determines the occupant capacity. Table 2—8 summarises the building's occupant capacity.

Table 2—8 Building Occupant Capacity

Area	Building Capacity [1] [persons]
Third Floor	326
Second Floor	326
First Floor	326
Ground Floor (excluding West Wing)	196
Ground Floor (West Wing)	163
Basement	81
Total	**1,418**

Note 1: The rationale behind these numbers is as follows:

- Third, Second, and First Floors – each limited to 326 people by the door capacity as per Table 2—4. With lobby to Stair 1 dividing the floorplate in two separate areas the capacity of each area (to the left of the lobby and to the right of the lobby) should not exceed 163 persons.
- Ground Floor – limited by a combination of horizontal and merging flow capacities as per Table 2—4;
- Basement – limited by the merging flow capacities of Stair 1 and 3 (81 people each as per Table 2—4). Discounting one of the exit gives a total occupant capacity of 81 people.

2.11 Doors

Doors on escape routes should either:

- Not be fitted with lock, latch or bolt fastenings; or,
- Be fitted with only with simple fastenings that can be readily operated from the side approached by people making an escape. The operation of these fastenings should be readily apparent, without the use of a key, and without having to manipulate more than one mechanism.

Where serving more than 60 occupants, doors on escape routes should:

- Open in the direction of escape; and,
- Be fitted with panic hardware in accordance with BS EN 1125[1].

Electronically locked doors and security gates on escape routes should failsafe open on activation of the fire alarm and in the event of a loss of power. Any electronically locked doors on escape routes should be openable through use of Green Break Glass Units located adjacent to the door on the secure side. In no case should the security measures prevent occupants from reaching a place of relative or ultimate safety.

2.12 Final Exits

Final exit routes from the protected escape stairs should be at least as wide as the stair they serve. The final exit route should lead direct to external, or via a protected corridor to external. The corridor leading from the stair to external should have the same fire resistance as the stair that it is serving. Figure 2—7 shows the final exits from TP1.

Occupants escaping via Stair 1 discharge into the courtyard to the rear of the TP1 building. To continue their escape away from the building these occupants can either use the underpass to travel to Tavistock Place Road, or, they can move away from the TP1 building immediately and escape past the TP2 building via an exit into the adjacent Genesis car park on the West of the site.

Occupants escaping via Stair 2 also discharge into the courtyard to the rear of the TP1 building. They can continue their escape away from the building via the same routes as those use by occupants from Stair 1.

Stair 3 discharges to external via the main reception area of the TP1 building. Since the building is served by other escape stairs a reception desk / enquiry office area within the stair enclosure is permitted provided the floor area of these spaces does not exceed 10 m².

Stairs 4 and 5 discharge direct to external along Tavistock Place Road from which occupants can continue to move away from the building.

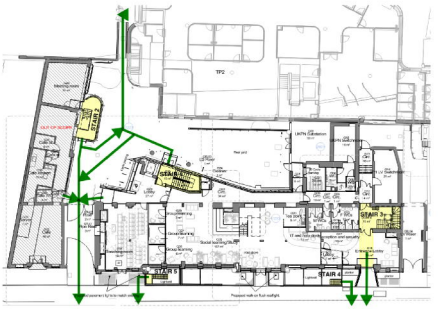

Figure 2—7 Final Exit Routes

[1] BS EN 1125:2008 Building hardware – Panic exit devices operated by a horizontal bar, for use on escape routes – Requirements and test methods.

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2.13 Evacuation of Mobility Impaired Persons

2.13.1 General

A suitable management plan should be in place to aid evacuation for Mobility Impaired Persons (MIP). Refuges will be located within each protected stair on all levels above and below ground. A suitable two-way emergency voice communication system should be provided to each refuge. Management will need to be aware of mobility impaired occupants within the building and be adequately trained to direct and assist occupants to an appropriate final exit, including carry down procedures.

2.13.2 Personal Emergency Evacuation Plan

An appropriate Personal Emergency Evacuation Plan (PEEP) should be put in place to enable staff to be aware of occupants/staff members within the building who may require assistance escaping and be trained in how to assist in evacuating them safely. This is the responsibility of LSHTM and their management team. The PEEP should include:

- Individual PEEPs for disabled people who are regularly in the premises, for example staff and regular visitors. Following discussion with an individual, a plan can be developed for their specific needs which should contain details of how they will evacuate the premises. By taking into account the individual needs of a person when preparing a PEEP, management are able to make any reasonable adjustments to the premises or procedures that are necessary.
- PEEPs for visitors to the premises who will make themselves known to staff. Visitors who are likely to require assistance in the event of an evacuation should be encouraged to make themselves known to staff on arrival. Management should be encouraged to have, especially at reception, staff who are trained in disability awareness. This make the process more comfortable for disabled people and more effective for management. The generic PEEPs should provide a wide range of guidance for differing disabilities and be adapted for the individual premises. They should include what the visitor needs to do in an evacuation, and what the management response will be. They should also reflect what specific fire safety provisions are provided for disabled people on the premises, e.g. specific evacuation chairs/uses of lifts etc. The generic PEEP should be discussed with each visitor and their particular needs taken into account where possible.
- PEEPs for visitors not previously identified to staff. The standard evacuation plan should include measures to make evacuations suitable for all persons on the premises. Information for disabled people should be noted in fire action notices and in the fire management plan. Staff should be trained so that they are aware of the facilities and their responsibilities to evacuate disabled people and know how to use features such as evacuation lifts or refuges. A sufficient number of staff should be available at all times to make sure that evacuation plans are viable.

2.13.3 Lifts

Based on the London Plan Policy D5, Inclusive design, requires for all building users to be able to evacuate from a building with dignity and by as independent means as possible. Emergency carry down or carry up mechanical devices or similar interventions that rely on manual handling are not considered to be appropriate, for reasons of user dignity and independence. The installation of lifts which can be used for evacuation purposes (accompanied by a management plan) provide a dignified and more independent solution.

It is proposed to provide an evacuation lift as part of these works.

2.13.4 Refuges

A refuge should be provided in the protected enclosure (or in a protected lobby) of all escape stairs on all levels served that are above or below ground level to accommodate disabled occupants awaiting assistance in evacuation.

To comply with code guidance each refuge should be:

- Provided with clear space of at least 900 mm x 1400 mm, which should not impede evacuation of other occupants by, for example, reducing the clear exit width; and,
- Provided with a two-way communication system that connects to a designated protected point (reception) to alert staff who can reassure occupants and then assist in carry down procedures from refuges if necessary, see Section 5.8 for more information on the type of communication system that should be provided.

It is recommended that mobility impaired occupants are made aware of where horizontal exits and refuges are located on each level this could be achieved through Personal Emergency Evacuation Plans (PEEPs) for any occupants that may have difficulty using the stair.

2.14 Assembly Points

During an evacuation scenario, a combination of two categories of people might occur: those that are familiar with the particular building i.e. staff and students; and those that are unfamiliar with their surroundings i.e. members of the public. While some members of the public can gather at assembly points, if necessary, to await information and/or meet with their friends/families etc., in general members of the public evacuating from a building will disperse away from building and can therefore be directed away from the building. On the other hand, people working/living within the building will tend to gather at assembly points for roll calls before re-entering the building following the fire service recommendations.

Assembly points will be located sufficiently far from the premises to minimize interference with the fire and rescue service or danger from falling debris, however, they will be accessible and not so far away as to discourage people from assembling.

2.14.1 Assembly Point Requirements

There are currently no specific recommendations within the prescriptive guidance document adopted pertaining to the provision and design of assembly points. Therefore, in the absence of prescriptive guidance, Buro Happold recommends that assembly points are provided on site and have the following features:

- The routes from final exits to the assembly point(s) should ensure a safe and rapid dispersal of occupants from the vicinity of the building. The routes from the buildings to the assembly points should be well defined;
- External escape routes and assembly points should have sufficient artificial lighting that will continue to illuminate the route should main power supply fail;
- Should not hinder fire tender access;
- The area provided should be adequate to accommodate the likely number of occupants evacuated in a fire scenario; and
- Ideally, assembly points should be in open air and be remote from the building in which the fire is located.

2.14.2 Assembly Point Locations and Capacity

The location of potential assembly points throughout the site are driven by the space available and anticipated number of occupants expected to evacuate at any one time.

It is recommended for the Assembly Points to be located in Cartwright Gardens, as shown in the figure below. The location of assembly point should provide sufficient separation between the building on fire and occupants gathered in the assembly point.

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Figure 2—8 Possible Assembly Point Location

Based on BS 9999 code guidance recommendations for Progressive Horizontal Evacuation, 0.3m²/person is considered reasonable occupancy load to be used where people gather around a place of safety

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3 Internal Fire Spread (Linings)

Internal surfaces and finishes should meet the minimum recommendations of BS 9999. For the purposes of Building Regulations this is all wall and ceiling linings only.

The choice of materials for wall and ceiling linings needs careful consideration as they can significantly affect the spread of fire within a building and its growth rate. To ensure that rapid growth and spread do not occur, surface spread of flame values for coverings of surfaces forming the wall and ceiling linings will satisfy the following criteria.

All references to surface spread of flame are based on the performance tests results when the material and products are tested in accordance with BS476 Parts 6[4] and 7[5] and BS EN 13501-1[6] for European class. (Note: Class 0 has a better fire performance than Class 1. It is not identified in any BS test standard). A Class 0 product is either:

- Composed throughout of materials of limited combustibility; or,
- A material having a Class 1 surface spread of flame and which has a fire propagation index (I) of not more than 12 and a sub-index (i1) of not more than 6.

The required fire performance characteristics of internal surfaces are depicted in Table 3—1 below.

Table 3—1 Surface Spread of Flame Requirements

Location	National Class	European class
Circulation/escape routes including staircase	Class 0	B-s3, d2
Rooms (excluding rooms less than 30 m^2)	Class 1	C-s2, d2
Rooms less than 30 m^2	Class 3	D-s3, d2

Note:

- The National classifications do not automatically equate with the equivalent classifications in the European column, therefore, products cannot typically assume European class, unless they have been tested accordingly; and,
- When a classification includes "s3, d2", this means that there is no limit set for smoke production and/or flaming droplets/particles.

Parts of walls in a room may be of poorer performance than specified in Table 3—1 above, but not less than Class 3 or D-s3, d2. This variation is limited to a total area not exceeding one half of the room's level area, subject to a maximum of 60 m^2.

The following are excluded from the performance requirements of surface spread of flame:

- Doors and door frames
- Window frames into which glazing is fitted
- Architraves, cover moulds, picture rails and similar narrow small members
- Fitted furniture, i.e. demountable sanitary "back panels"

The provisions do not apply to the upper surfaces of staircases (i.e. treads and risers) because they are not significantly involved in a fire until it is well developed.

Where a room is an access room, although it provides circulation to other rooms it is in accordance with the recommendations for inner rooms and therefore the surface spread of flame used will be that applicable to the size of room.

All existing provisions are assumed to have met the guidance applicable at the time of previous works that have been carried out. However, this cannot be confirmed by a visual inspection. Any work going forward should follow the guidance given above or any subsequent version of BS 9999 that supersedes it.

[4] BS 476-6:1989+A1:2009 Fire tests on building materials and structures – Part 6: Method of test for fir propagation for products.
[5] BS 476-7:1997 Fire tests on building materials and structures – Part 7: Method of test to determine the classification of the surface spread of flame of products.

[6] BS EN 13501:2018 Fire classification of construction products and building elements – Part 1: Classification using date from reaction to fire tests.

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4 Internal Fire Spread (Structure)

4.1 Structural Fire Resistance

The structural fire protection within the building is unknown and cannot be verified through a visual inspection, the only way to determine the structural fire resistance in an existing building is through an intrusive survey carried out by a competent surveyor. However, it is assumed that the building was compliant with the regulations at the time of construction.

The minimum period of fire resistance of the structural elements depends on the purpose group and the height of the top occupied floor above access level or depth below the access level for the basement. TP1 is less than 18 m in height and less than 10 m deep. Therefore, for a risk profile A2, elements of structure should have a fire resistance period of **60 minutes (loadbearing)**.

Where any changes are carried out within the building influencing the structural elements, they should be designed to achieve current fire safety guidance i.e. achieve 60 minutes fire resistance (loadbearing) as a minimum.

For new elements of structure, fire resistance periods are to be tested in accordance with the BS 476 suite of standards.

Elements of structure provided with this standard of protection include the following, but are not limited to:

- Member forming part of the structural frame of a building or any other beam/ column/ brace;
- Load bearing wall or load bearing part of a wall;
- Any floor;
- A compartment wall, including any structural frame members providing support or restraint to that wall; and,
- External wall provided to limit external fire spread.

4.2 Compartmentation and Fire Resisting Enclosures

In accordance with BS9999, there is no limit on the floor area of any one storey in a building with a A2 risk profile. Therefore, there is no need to split the building up into different compartments. In addition to this, since the building is below 30 m in height the upper floors do not need to be constructed as compartment floors. The floor between the basement and the upper levels, however, should be a compartment floor, and be provided with **60minutes fire resistance** (loadbearing -R, integrity-E and insulation-I).

Table 4—1 summarises the recommended compartmentation and fire resisting enclosures for the building.

The provision and performance of the existing fire resisting enclosures cannot be determined without an intrusive inspection survey or as built information of the building. Where any further works/ refurbishment is carried out within the building, this should be designed to achieve current fire safety guidance, therefore the fire resistance periods in Table 4—1 should be provided as a minimum.

Stairs 1 and 3 and the adjacent lift shaft penetrates the compartment floor between the basement and the upper levels, therefore, it should be enclosed in 60 minutes fire resisting construction (REI). Basement stairs that also serve the upper levels should also be provided with a protected lobby between the stair and the accommodation (Stairs 4 and 5 do not need to be lobby protected).

Based on existing construction of Stair 3 it is considering reasonable for the compartmentation between basement and upper floors to be maintained by the 60 minutes fire resisting enclosure of the stair at the basement. A 30 minute enclosure is provided to the stair at the upper floors, this corresponds to recommendations given for protected cores.

Table 4—1 Summary of Compartmentation and Fire Resistance

Part of the building	Minimum Period of Fire Resistance [minutes][1]	Fire Door Performance [minutes][2]
Compartment floor between the Basement and the Ground Floor	60 REI	n/a
Life safety plant rooms	120	FD60S
Protected shafts (i.e. any shaft penetrating a compartment floor including the lift shaft)	60	FD30S
Protected escape stair	30	FD30S
Protected lobby	30	FD30S
Dead-end corridor [3]	30	FD30S
Boiler rooms	60	FD60S
Refuse rooms	60	FD60S
Transformer and switchgear rooms for equipment above low voltage	60	FD60S
Transformer, switchgear, and battery rooms for low-voltage or extra low voltage equipment	30	FD30S
Storerooms less than 450 m^2	30	FD30S
Fire and smoke curtain	30EW	n/a

Note 1: All fire resistance is for Integrity (E) and Insulation (I) unless stated otherwise (R stands for loadbearing capacity).

Note 2: Minimum fire resistance of a door in terms of Integrity (E).

Note 3: The are a number of existing dead-end corridors that are not afforded passive fire protection, please refer to Section 2.6.5.1 for more details.

4.3 Stair Separation

Following code guidance recommendations basement and upper storeys are separated within the staircase at the ground floor level with a 30 minute fire resisting construction including a FD 30S self-closing fire door.

This is not provided for either of the stairs serving the basement, however this is considered reasonable as this is an existing condition that is being improved by provision of protected lobbies to the stairs at all levels (excluding the top level). In addition, the building is relatively simple in design with intuitive stair locations. To aid way finding signage at the ground floor should be provided to indicate ground floor level.

4.4 Fire and Smoke Curtain

A fire curtain achieving a minimum of E30 EW30 fire curtain with smoke seals is required for the protected stair enclosure at ground floor level. Fire and smoke curtain should be tested and installed in line with BS 8524-1 & BS 8524-2.

4.5 External Escape Stairs

External escape stairs should be afforded the following:

- Doors to the stair should be fire resisting (minimum E 30) and be fitted with a self-closing device, except for a single exit door from the building to the top landing;
- Fire resisting construction (minimum RE 30) should be provided in accordance with Figure 16 of BS 9999 (see Figure 4—1 herein);

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- Fire resisting construction (minimum RE 30) should be provided for any part of the building within 1800 mm of the escape routes from the foot of the stair to a place of relative safety;
- Weather protection (but not a full enclosure) when the stair is more than 6 m in height should be provided.

Stair 2 is located on the East elevation of the West Wing. The external wall adjacent to this building should achieve the fire protection outlined above. It is understood this has been provided as part of previous works for the West Wing. Protection should be provided to the new infill that is within 1800mm from the external stair.

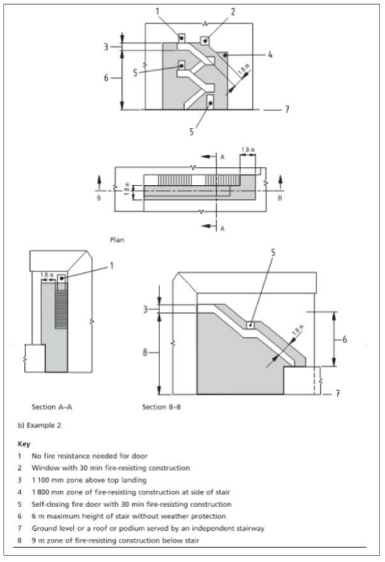

Figure 4—1 Fire Resistance of the Façade Near External Escape Stairs (Figure 16 from BS9999)

4.6 Internal Angles

When two walls join to form an angle of 90 degrees or less on the external side then the angle is considered to be internal. Internal angles should be protected by fire resisting construction for a horizontal distance of 1.8 m to ensure that a fire cannot spread from one compartment to another. The period of fire resistance for this construction should be the same as that of the separation between the two different compartments. This 1.8 m of protection can be applied to the wall forming the internal angle provided this fire resistance is achieved when exposed from either side.

This will be provided where the angle is created between protected Stair 3 and adjacent floor plate, as shown in Figure 4—2.

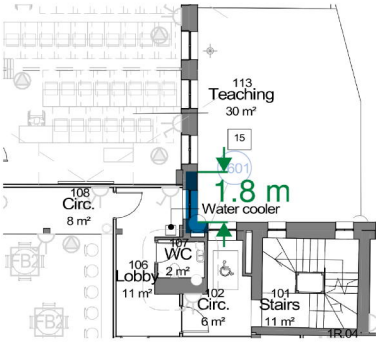

Figure 4—2 Internal Angle

4.7 Fire Doors

All doors in fire resisting walls should meet the standards of fire resistance as set out in Table 4—1.

Where any new fire doors are provided, they should be either a proprietary certified fire resisting doorset, door assembly (i.e. complete door and frame), or, where the frame is considered to be appropriate, a fire door with applicable evidence. In all cases the ironmongery, vision panels, etc should be those relevant to the fire door to be installed.

Doors in fire resisting elements should have overhead self-closing devices unless they are to service cupboard or small store room which is kept locked shut. Existing or new fire doors will have been tested in accordance with BS 476-227 or BS EN 1634-18. Where specified as 'smoke sealing' will comply with the recommendations of BS 476-319 or BS EN 1634-310. Fire doors requiring flexible edge smoke seals are denoted with the suffix 'S' and 'Sa'.

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4.8 Fire Stopping

To avoid fire and smoke breaching the compartmentation/fire resisting enclosures through any imperfections and gaps fire stopping is required. Fire stopping should be provided on the line of compartment walls and floors where gaps exist, which could allow smoke and flames to breach the compartment wall or floor. Joints between elements that serve as a barrier to the passage of fire should be fire stopped. All openings for pipes, ducts, conduits or cables that have to pass through any part of the element that serves as a barrier to the passage of fire should be:

- Kept as few as possible;
- Kept as small as practicable; and
- Fire stopped (which in the case of a flue of duct should allow for thermal movement).

The full extent of the fire stopping cannot be ascertained by a visual inspection. This can only be determined through a full compartmentation survey. For any new works the above recommendations should be followed. Where there are any obvious gaps or imperfections of fit on existing elements these should be made good as part of these works.

4.9 Extensive Cavities

The maximum dimensions of cavities should be limited to 20 m in any direction where the surface spread of flame classification of the exposed products is Class 1 (national class) or Class C-s3, d2 (European Class), or better. This could increase to 40 m in ceiling/floor cavity of a single room.

If none of the above classifications can be confirmed the maximum dimension should not exceed 10 m in any direction.

4.10 Fire and Smoke Dampers

Automatically actuated fire and smoke dampers triggered by smoke detectors should be provided to ductwork passing or serving:

- Protected refuge spaces;
- Protected lobbies to escape stairs; and,
- Protected escape routes to outside from escape stairs.

All other ductwork passing through fire resisting construction should be provided with fusible link fire dampers.

The existing provision of fire dampers cannot be ascertained from a visual inspection. This can only be determined through a full compartmentation survey. For any new works the above recommendations should be followed.

4.11 Services in Escape Routes

Gas installation and service pipes should not be run in a protected stairway or lobby where practicable.

Electrical risers within a protected stairway or lobby should be separated therefrom by 30 minutes (EI) fire resisting construction and access doors, which should be kept locked shut.

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5 Active Fire Safety Systems

5.1 Fire Detection and Alarm System

An L2(M) automatic fire detection and alarm system is installed throughout the building. Any changes to the existing system and any new systems should be in accordance with BS 5839-1:2017[7].

The main fire alarm panel will be located behind the reception desk at ground floor.

It is recommended that all voids greater than 800 mm in depth be provided with automatic fire detection and alarm in accordance with BS 5839-1.

Manual call points should be located by the escape stairs, final exits and the entrance to protected escape routes in accordance with BS 5839-1.

5.2 Automatic Suppression

A data centre is located in the basement of TP1. This room is fitted with an automatic water mist suppression system in accordance with NFPA 750[8] for property protection purposes.

5.3 Basement Smoke & Heat Clearance System

The previous strategy for the smoke ventilation was natural system via the lightwells adjacent to Tavistock Place road. Areas within the basement that do not have direct access to these lightwells were assumed to be vented indirectly by opening connecting doors. This was an existing condition.

It is understood that mechanical smoke ventilation is proposed as part of works. Mechanical smoke clearance system should:

- Provide 10 air changes per hour;
- Be capable of handling gas temperatures of 300 °C for minimum 60 minutes; and,
- Turn on automatically as a reaction to activation of the sprinkler system or by an automatic fire detection system.

5.4 Fire and Escape Doors

Electrically powered locks should return to the unlocked position in the following situations:

- Activation of the fire detection and alarm system;
- Loss of power or system error; and,
- If the security mechanism override is activated.

Security mechanism overrides for electronically powered locks should be a Type A call point as described in BS 7273-4[9]. The call point should be positioned on the side approached by people escaping.

To ensure that doors are released and close effectively they must be provided with an automatic release mechanism that is part of the door or door closing devices that incorporates a hold open mechanism. To ensure that the device releases in the event of a fire, the system should be designed to conform to the requirements of BS 5839-3[10] and BS EN 1155[11].

Systems/activation methods to ensure that hold open devices release the door to close are:

- Detection of smoke by the fire alarm system;
- Mechanical damage to cable;
- Failure of power supplies;
- Activation of local manual over-rides (green break glass units); and,
- Activation of a manual call point.

5.5 Secondary Power Supplies

A secondary power supply serving the life safety systems of the building should be provided. This power supply should be provided via diverse routes and the routes of supply fire separated from each other. Secondary and life-safety power supplies should have been designed and installed in accordance with the relevant parts of the design codes applicable to emergency power for the services they serve. Secondary power supplies are required for all life safety systems for example: fire detection and alarm systems, communication systems and emergency escape lighting.

5.6 Emergency Escape Lighting

Emergency lighting should have been designed and installed in accordance with BS 5266-1[12].

5.7 Emergency Signs and Escape Signage

To ensure safe and quick evacuation fire safety signage should be provided. Escape routes should be marked with appropriate exit signage designed in accordance with appropriate standards at the time of design/construction and if updated it should comply with Health and Safety (Safety signs and signals) Regulations 1996 and EC Directive 92/58/ECC.

Every doorway or other exit leading to the escape routes should be marked with an exit sign. Exit & safety signs will comply with the appropriate standards at the time of design/construction or if updated they should comply with BS EN ISO 7010:2012[13] and BS ISO 3864-1:2011[14] . Where stair continues to the basement appropriate signage should be provided to ensure occupants discharge at the ground level and not continue to the basement level. This should be reviewed as part of the RRO Fire Risk Assessments throughout the lifetime of the building.

5.8 Communication Systems

To meet current code guidance all refuges should be provided with a two-way emergency communication system with Type B outstations (i.e. an outstation using an intercom-style fixed microphone and adjacent loudspeaker, normally mounted on a wall or other vertical surface) designed and installed in accordance with BS 5839-9[15]. These outstations should be connected to the master station located at reception to alert staff who can reassure occupants and then assist in carry down procedures from refuges, if necessary.

[7] BS 5839-1:2017 Fire detection and fire alarm systems for buildings – Part 1: Code of practice for design, installation, commissioning and maintenance of systems in non-domestic premises (incorporating Corrigendum No. 1).
[8] NFPA 750, Standard on Water Mist Fire Protection Systems, 2010 Edition.
[9] BS 7273-4:2015 Code of practice for the operation of fire protection measures – Part 4: Actuation of release mechanisms for doors.
[10] BS 5839-3:199B Fire detection and alarm systems for buildings – Part 3: Specification for automatic release mechanism for certain fire protection measures.
[11] BS EN 1155:1997 Building Hardware – Electrically powered hold-open devices for swing doors – Requirements and test methods
[12] BS 5266-1:2016 Emergency lighting – Part 1: Code of practice for the emergency lighting of premises
[13] BS EN ISO 7010:2012 +A7:2017 Graphical symbols – Safety colours and safety signs – registered safety signs
[14] BS ISO 3864-1:2011 Graphical symbols – Safety colours and safety signs. Part 1: Design principles for safety signs and safety markings.
[15] BS 5839-9:2011 Fire detection and alarm systems for buildings – Part 9: Code of practice for the design, installation, commissioning and maintenance of emergency voice communications systems

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6 External Fire Spread

6.1 Building Separation

Fire spread from building to building by radiation is dependent on:

- The distance between, and orientation of, the building of origin and the neighbouring structure;
- The extent of the building surface capable of transmitting heat i.e. the area of non-fire resisting façade; and,
- The intensity of the source of radiation i.e. the building usage.

The boundary at which the radiation intensity is assessed is known as the relevant boundary. The relevant boundary should usually be taken as the site boundary. Where a wall faces onto a space that is unlikely to be developed, such as a road or river, the relevant boundary may be assumed to be an imaginary line halfway across this feature. When two buildings are on the same site a notional boundary may be assumed to exist between the two buildings. This notional boundary is then considered to be the relevant boundary.

The East and West elevations are effectively on the site boundary and should achieve **60 minutes** fire resistance (from inside out and outside in for both integrity and insulation). The relevant boundary to the South is the midpoint of Tavistock Place Road. To the rear of TP1 where TP2 was built in 2022 the provisions for fire spread between the two building are provided on TP2 rather than TP1.

As part of the works the Stair 3 is planned to be extended to serve the roof and an infill providing additional space is provided at the first and second floor adjacent to Stair 1.

The protected fire sterile stair will not have an impact on the external fire spread assessment.

The potential for fire spread between adjacent buildings has been evaluated for the infill using the BR 187 Enclosing Rectangle Method. The height of the enclosing rectangle in the calculation is taken as the height of the infill – two floors approximately 8m and the width is taken as 6m. The distance between TP2 and the infill is 10m the boundary distance was taken as half of this distance – 5m. Building purpose category 2 was used. Based on this the infill façade can remain 100% unprotected. Please note the area within 1.8m from the external stair should be provided with 30min fire resisting construction as per Section 4.5.

Where any material alterations are made to the building, then it should be ensured that the building is not made more unsatisfactory.

6.2 External Faces of Buildings

6.2.1 Code Guidance

External walls should be constructed using material that does not support fire spread. Flame spread over or within an external wall construction should be controlled to avoid creating a route for rapid fire spread bypassing compartment floors or walls.

It is recommended that combustible materials should be avoided in façade build ups, cladding systems and extensive cavities.

Currently, the front external face of the TP1 is clad in brick and stone. This elevation is to be retained. The rear/north elevation will be removed and replaced with new fibre cement cladding. These alterations to the external faces of the building should be designed to meet the provisions of Figure 47 of BS9999, which for a building that is not a relevant building and less than 18 m in height, are as follows:

- Less than 1 m from the relevant boundary: Class B-s3, d2 or better;
- 1 m or more from the relevant boundary: No provisions.

6.2.2 Cavity Barriers

Cavity barriers should be provided to close the edges of cavities, including around openings, see Figure 6—1. They should also be provided:

- At the junction between an external cavity wall (except where the cavity is as shown in Figure 6—2) and every compartment floor and compartment wall;
- At the junction between an internal cavity wall (except where the cavity wall is as shown in Figure 6—2) and every compartment floor, compartment wall, or other wall or door assembly which forms a fire fire-resisting barrier; and,
- Extensive cavities should be provided as recommended in Clause 33.2 of BS 9999.

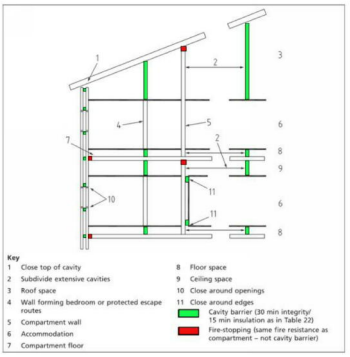

Figure 6—1 Figure 35 of BS 9999:2017 – Provisions for Cavity Barriers

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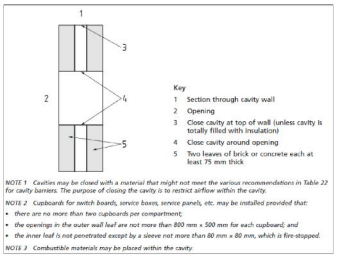

NOTE 1 Cavities may be closed with a material that might not meet the various recommendations in Table 22 for cavity barriers. The purpose of closing the cavity is to restrict airflow within the cavity.

NOTE 2 Cupboards for switch boards, service boxes, service panels, etc. may be installed provided that:

- *there are no more than two cupboards per compartment;*
- *the openings in the outer wall leaf are not more than 800 mm x 500 mm for each cupboard; and*
- *the inner leaf is not penetrated except by a sleeve not more than 80 mm x 80 mm, which is fire-stopped.*

NOTE 3 Combustible materials may be placed within the cavity.

Figure 6—2 Figure 36 of BS 9999:2017: Cavity Wall Excluded from Provisions for Cavity Barriers

6.3 Roof Coverings

Where any alterations are made to the roof coverings of TP1, it is recommended that the roof covering have a $B_{ROOF}(t4)$ classification in accordance with BS EN 13501-5[16].

[16] BS EN 13501-5:2016 Fire classification of construction products and building elements – Part 5: Classification using data from external fire exposure to roof tests.

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7 Fire-Fighting Access and Facilities

7.1 Fire-fighting Vehicle Access

The fire service can access the TP1 building from Tavistock Place road, as shown in Figure 7—1. The dimensions of the vehicle access route conform to the dimensions shown in Table 7—1. The total floor area of the building is between 2000 m^2 and 8000 m^2 and the top occupied storey is less than 11 m above ground level therefore 15% of the building's perimeter should be accessible by a fire pump appliance. Since the entire South elevation of the building can be reached from Tavistock Place road, this criterion is achieved.

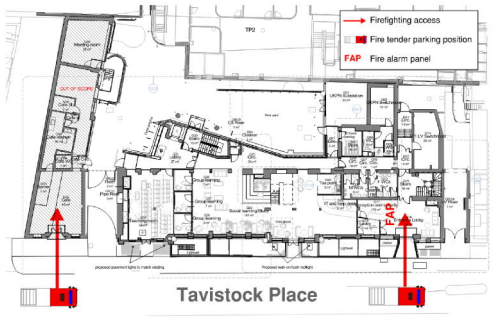

Figure 7—1 Firefighting Access Route

Table 7—1 Typical Vehicle Access Route Dimensions

Appliance Type	Min. Width Of Road Between Kerbs [m]	Min. Width Of Gateways [m]	Min. Turning Circle Between Kerbs [m]	Min. Turning Circle Between Walls [m]	Min. Clearance Height [m]	Min. Carrying Capacity [t]
Pump	3.7	3.1	16.8	19.2	3.7	14.0
High-reach	3.7	3.1	26.0	29.0	4.0	23.0

7.2 Access for Fire-fighters

Every elevation with vehicle access should be provided with a door that gives access to the building. The maximum distance between doors, or between a door and the end of the elevation, is 60 m. Since there is access to TP1 via the reception (which is also the final exit of Stair 3) on the East side of the South elevation, and there is access to the West Wing of the building on the other side of the underpass that splits the building into two at ground level, fire-fighting access is achieved.

7.3 Fire-fighting Facilities

The main fire alarm panel for the building is located in reception, which can be accessed direct from Tavistock Place road.

7.4 Fire Hydrants

A fire hydrant should be located within 90 m of the entrance to the building. All hydrants should have signage in accordance with BS 3251[17] and should not be located within 6 m of any building.

A fire hydrant is located at the intersection of Marchmont Street and Tavistock Place which is within 90 m of the entrance to the reception of TP1.

[17] BS 3251:1976 Indicator plates for fire hydrants and emergency water supplies (AMD 6736)

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8 Fire Safety Management & Evacuation

8.1 Introduction

In order to ensure that there is a high standard of fire and life safety within the building a number of active and passive design measures are adopted. These design measures are described within this document and include, but are not limited to the following:

- Automatic Fire Detection and Alarm (AFD) throughout to provide early warning in event of fire;
- Multiple protected escape stairs such that occupants are provided with multiple and diverse escape routes available via protected corridors and spaces; and
- The provision of adequate number and location of suitable hand held fire extinguisher for use by trained staff.

Fire safety systems and design alone are not enough to reduce the risk of a fire occurring and ensuring safe evacuation from the building. In order to effectively address this risk, there must be measures in place which inherently control the likelihood of an incident occurring, and if a fire does occur, ensure that there are adequate measures in place to effectively deal with the incident.

A high level of effective fire safety management is very important in this building due to the nature of the population within. Given this, a robust fire safety management and evacuation procedures need to be in place to ensure that all visitors and staff can be evacuated to safely to external.

Therefore, because of the above factors, it is necessary for the management team to develop and implement a fire safety management plan and carry out a continuous iterative review of this during the lifetime of the building through ongoing fire risk assessments.

The sections below outline some of the key management considerations to assist in developing and implementing this plan.

8.2 Legal Responsibilities

Under the Regulatory Reform (Fire Safety) Order 2005 (RRO) every owner, occupier, and operator of a premises is required to adequately manage the safety of the areas under their control. Under this legislation a 'responsible person, or persons' is required to be appointed in order for the necessary level of safety is maintained, with an inherent necessity for compliance in the area of fire safety. This role will be allocated to the building's fire safety officer.

Management of fire safety must be integrated with all other management systems. If this management is lacking, then there is a danger that all the other areas, such as, security measures and alarm systems will be ineffective. To ensure there is no doubt as to where the responsibility for fire safety rests, and to enable consistency of approach, it is important that each establishment appoints a designated Fire Safety Manager. It may be possible to appoint a professional to take on this role but that will depend on the size of the premises, costs, etc. Reference should be made to the BS 9997:2019 document giving a specification on Fire Risk Management that can be adopted by any organisation wanting to implement a formal procedure to reduce the risks associated with fire in the working environment.

The RRO has five key objectives:

1. Create a single regime based risk assessment;
2. Focus resources for fire prevention on premises which pose the greatest risk;
3. Improve compliance;
4. Focus on establishing a culture of fire prevention; and
5. Ensure that fire safety facilities and equipment are properly maintained.

The local authority enforces the Order for the building. This authority has the power to inspect the premises to check that the Responsible Person(s) comply with the duties under the Order and will look for evidence that the Responsible Person(s) has carried out a suitable fire risk assessment and acted upon the significant findings of that assessment.

This Fire Strategy informs of the fire safety management plan of the building, and both documents will form the basis for the requirements to be met during the operation of the building. This process is highlighted in Figure 8—1.

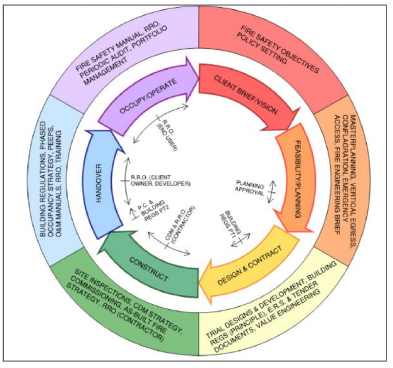

Figure 8—1 Circle of Fire Safety

8.3 Proactive Measures of Management

The management of fire safety is driven by the operational processes throughout the life of the building. Effective management will contribute to the protection of the occupants by:

- Establishing a Fire Safety Policy;
- Developing and continuously reviewing the Fire Safety Plan and Manual;
- Preventing the likelihood of fires occurring;
- Being aware of evacuation procedures, particularly for mobility impaired occupants requiring assistance;
- Providing training for staff to respond to a fire incident in the appropriate manner; and
- Ensuring that all of the fire safety measures in the building are understood and maintained.

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A high standard of management is considered to be critical in providing a high standard of fire safety for the building. The operational management team should commit to:

- Familiarising themselves with, and implementing, the fire strategy, the fire safety policy plan and manual;
- Ensuring that all staff in the building are adequately trained and fully aware of any potential hazard as appropriate; and
- Ensuring that all staff in the building know what to do in the case of fire and know the location of, and how to use, fire equipment, where necessary.

8.4 Level of Fire Safety Management

It is recommended that a Level 2 fire safety management system as defined by BS 9999[18] is in place for the building.

Level 2 demonstrates good practice with a basic level of management that satisfies the minimum requirements of legislation.

8.5 Fire Safety Plan

A fire safety plan should be developed as part of the wider fire safety policy for the building which will inform the operational team (management and staff) of the necessary actions required. The philosophy for setting the management standard should follow the guidance set out in BS 9999.

One of the aims of any fire safety plan is to provide the confidence that, in the event of a fire alarm escalating into a full evacuation, the management team will have the capability and resources to respond in an appropriate manner. Activation of the fire alarm will initiate a number of events, all of which will require specific staff actions. An understanding of potential fire scenarios, the staff structure, fire and life safety systems and communication systems, helps to define the responsibilities and required actions of management and staff in an emergency. The plan should outline the actual procedures in the event of fire including details of how staff will ensure each area evacuated, including different procedures for dealing with different ages and occupant types.

The Fire Safety Plan for the TP1 building needs to take into account all of the above considerations and in particular needs to embrace the following assumptions, which have been made in line with the fire strategy requirements:

1. The protected escape routes and stairs serving the building must remain sterile and free from significant combustible content. This needs to be enforced throughout the occupation of the building and should be reviewed as part of the Annual RRO risk assessment and managed on a daily basis;
2. The evacuation scenario will be simultaneous and should be conducted under the control and supervision of the staff;
3. Staff should be aware of the fire strategy, compartmentation and fire safety systems;
4. Assistance is provided to Mobility Impaired Persons, where required, by trained staff, additionally areas where safe egress for MIP cannot be assured should be clearly identified and known to relevant staff members responsible for PEEPs; and
5. Staff are to be trained in the fire detection and notification procedures for the TP1 building.

[18] BS 9999:2017 Fire safety in the design, management and use of buildings – Code of practice.

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