



Report

Project	The Fitzrovia
Report Title	Fire Strategy Report
Our Ref	BL5251/R1 Issue 9

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1.0 INTRODUCTION

1.1 Description

As existing, the proposed site contains the following existing buildings: -

- 247 Tottenham Court Road
- 3 Bayley Street
- 1 Morwell Street
- 2-3 Morwell Street
- 4 Morwell Street

Between them, the buildings contain a mixture of office, residential and retail uses. It is proposed to demolish the existing buildings and create a new 9-storey building known as The Fitzrovia. The new building will comprise the following: -

- Sub-basement: Plant space
- Basement: Plant space, retail areas, cycle storage and changing rooms
- Ground: Office reception, café, retail areas, residential entrance
- 1st – 5th Floor: Office and residential areas
- 6th Floor/Roof: Roof terrace and plant area

The building will be on a sloping site. The roof terrace of the office will be approximately 22m above the office access level with the top office level being 18m above the access level. The residential top floor is 18.4m above the access level. There will be a full separation line between the commercial and residential areas, effectively creating 2 separate buildings on one site.

1.2 Building Regulations and Guidance

The fire strategy has been developed in accordance with the guidance of BS9999: *Fire safety in the design, management and use of buildings – Code of practice*, 2017 for the office and retail areas, and BS9991: *Fire safety in the design, management and use of residential buildings – Code of practice*, 2015 for the residential areas.

1.3 Aim of Report

The aim of this report is to set out the fire strategy principles for The Fitzrovia. This report is intended for submission to the approving authorities.

2.0 EVACUATION STRATEGY

2.1 Residential Areas

The residential accommodation areas of the building will operate a 'defend in place' strategy. A fire in the commercial areas will not trigger a full evacuation of the residential areas and vice versa.

The residential ancillary areas at ground floor will operate a simultaneous evacuation strategy. Level access is provided at ground floor.

Occupants who do not require assistance are able to exit their apartment and reach the stair within a compliant travel distance. The stairs exit to an entrance lobby from which ultimate escape is available via the front of the building.

Occupants requiring assistance are able to reach the stair within a compliant single direction travel distance. The stair will provide a safe place of refuge.

There are no basement areas within the residential development.

A detailed management plan for evacuation will be developed by the building management team prior to completion and operation of the building.

2.2 Commercial Areas

The commercial areas of the building will operate a simultaneous evacuation. All commercial areas of the building will evacuate upon detection in the commercial areas.

Occupants who do not require assistance can reach either of the stair cores within compliant travel distances. Both stairs exit to outside via protected corridors.

Occupants who require assistance can reach either of the stair cores within compliant travel distances. Both stairs are provided with areas of refuge and emergency voice communication points on all levels above and below ground.

Future tenants of the retail units at ground/basement will be responsible for developing a fire strategy and management procedures that are in line with the fire strategy principles of the building.

There are level exits to outside from each commercial space at ground floor level.

The plant and office ancillary areas at 1st basement level will have access to both stairs cores which are provided with refuge areas and emergency voice communication points.

The plant areas at 2nd basement level have access to only 1 stair. Travel distances to the stair are compliant and a refuge with emergency voice communication point is provided.

A detailed management plan for evacuation will be developed by the building management team prior to completion and operation of the building. Mobility impaired occupants will await rescue once they have reached a designated refuge point.

3.0 ACTIVE FIRE SAFETY SYSTEMS

3.1 Sprinklers

3.1.1 Residential

The top floor of the building is more than 11m above ground. Therefore, sprinklers will be provided in the residential areas in line with BS 9251.

3.1.2 Commercial

Sprinklers will also be provided throughout the commercial parts of the building. These will be designed and installed in accordance with BS EN 12845.

3.2 Automatic Fire Detection

Apartments will be open plan. As such, the residential areas will be provided with at least an LD1 standard of automatic fire alarm and detection in accordance with BS5839.

Non-residential areas will be provided with a minimum of an L2 standard of automatic fire alarm and detection (AFD) in accordance with BS5839.

3.3 Emergency Lighting

Emergency lighting will be provided throughout the buildings in accordance with BS5266-1.

3.4 Emergency Signage

Emergency signage will be provided throughout the buildings in accordance with BS5499-4.

3.5 Fire Curtains

Fire curtains will be provided as a means of compartmentation in the building in the following places:

- Across the cycle lift at Ground or Basement level;
- Across the goods lift opening into the firefighting corridor at Ground or on both Basement levels;

. Fire curtains will be designed and installed in accordance with both parts of BS 8524.

4.0 MEANS OF ESCAPE – COMMERCIAL

4.1 General

The commercial building will comprise plant and retail areas at basement, retail areas and an office reception at ground, and office areas on the upper floors. The building will operate a simultaneous evacuation strategy and will be provided with 2 firefighting shafts.

The commercial areas will be separated from the residential areas via 2-hour fire resistant construction with no connections and will effectively operate as a separate building.

4.2 Occupancy

Floor	Area	Occupant Density	Occupancy
Sub-basement	Plant – 1437m ²	30	48
Basement	Retail – 711m ²	2	356
	Bike storage/changing room – 349m ²	30	12
	Plant – 165m ²	30	6
Ground	Retail – 887m ² (total)	2	444
	Reception – 222m ²	Transient	-
1 st Floor	Office – 1210m ²	6	202
2 nd Floor	Office – 1120m ²	6	187
3 rd Floor	Office – 1113m ²	6	186
4 th Floor	Office – 1034m ²	6	173
5 th Floor	Office – 994m ²	6	167
6 th Floor/Roof	Plant – 221m ²	30	8
	Terrace – 244m ²	1	244 ^[1]
Total			1789
Total above ground (office)			923

Table 1: Occupancy

Note 1: The terrace is considered a transient space, i.e. it does not add to the number of occupants above ground as only occupants of the office floors will be using it.

4.3 Travel Distances

4.3.1 Retail

Retail areas are classified as a B3 risk profile. However, this can be reduced to B2 due to the provision of sprinklers. Travel distances can be further increased by 15% due to the provision of AFD. The travel distance limits are 23m in a single direction, or 57.5m where more than one direction of escape is available.

Before fitout, the distances are taken at 2/3 of their value to account for extension due to fitout. The pre-fitout distances are therefore 15.4m and 38.5m, respectively. These are achieved throughout the building. Single direction travel distances in the retail units reach up to 15m which is within the limits above. The longest overall travel distance is approximately 17.5m at ground level in the B1/D1 space which is well within the 26m limit before fitout. Fitout will ensure that these limits are not exceeded.

4.3.2 Office

4.3.2.1 Upper Floors

Office areas are classified as an A2 risk profile. However, this can be reduced to A1 due to the provision of sprinklers. Travel distances can be further increased by 15% due to the provision of AFD. As such, the travel distances limits are 29.9m in a single direction, or 74.75m where more than one direction of escape is available.

Before fitout, the distances are taken at 2/3 of their value to account for extension due to fitout. The pre-fitout distances are therefore 20m and 50m, respectively. These are achieved throughout the building. The longest single direction travel distance is approximately 18.3m at 1st floor level. The longest overall travel distance is approximately 32m at 1st floor level.

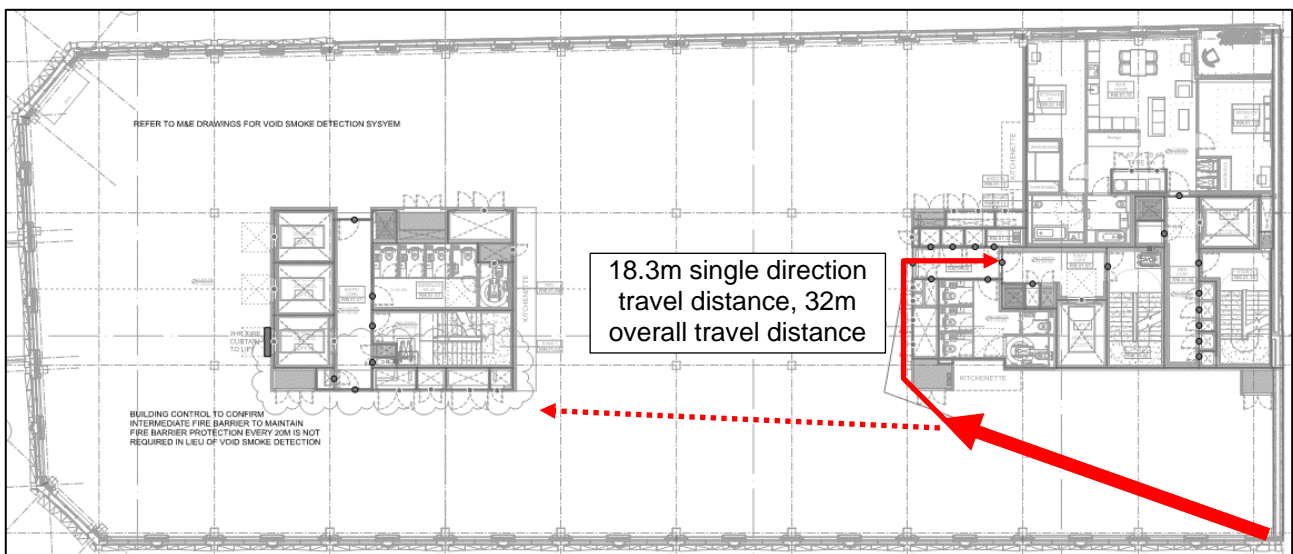


Figure 1: Typical Floor (1st Floor)

4.3.2.2 Basement Cycle Store

The cycle storage area has access to the north stair only. This will create a single direction travel distance of approximately 26m to the stair accounting for fitout. However, single direction travel distance limit in this area is 29.9m. As such, the travel distance is within the limit.

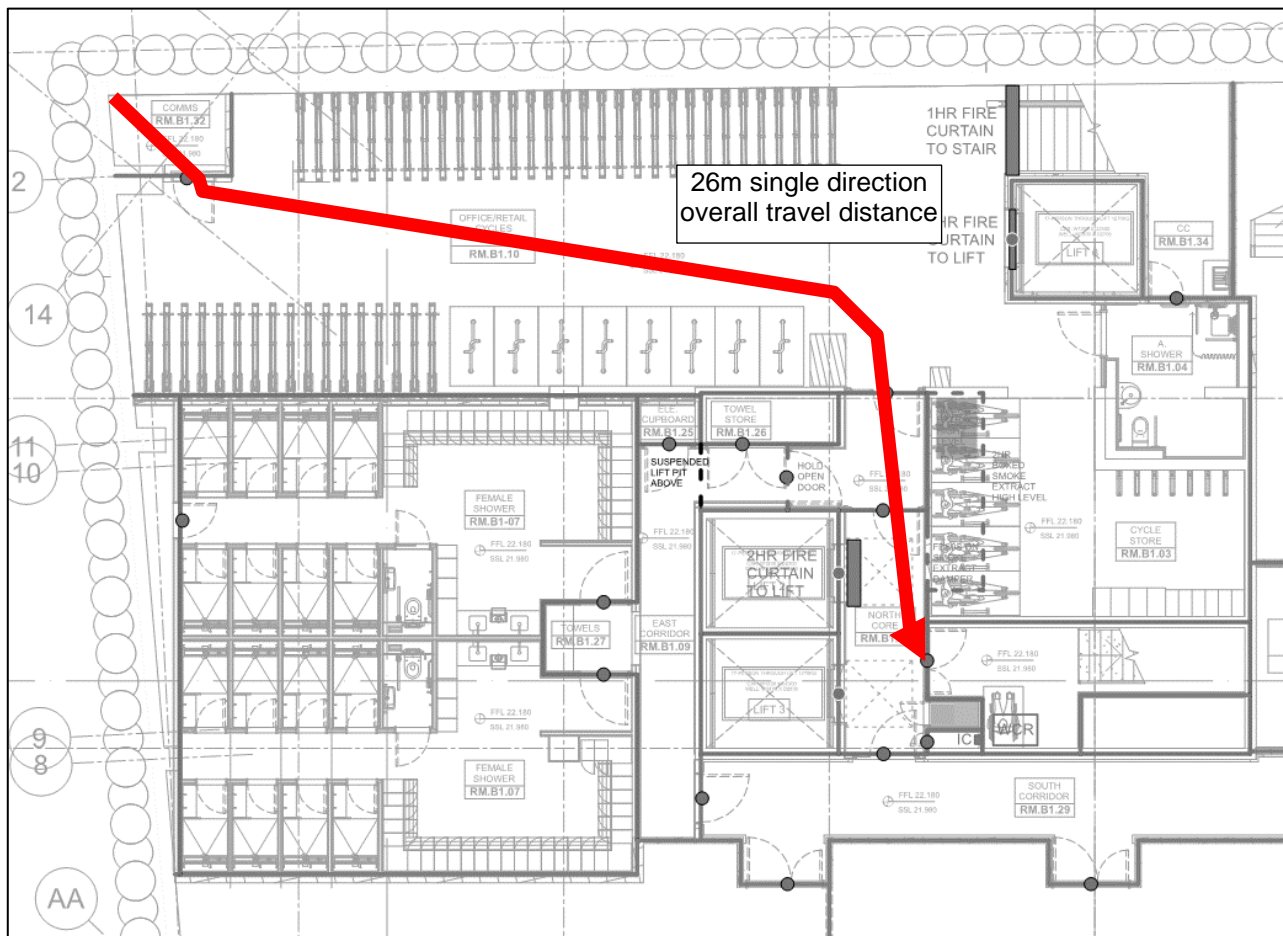


Figure 2: Cycle Store Travel Distance

4.3.3 Plant

Plant areas are classified as an A3 risk profile. However, this can be reduced to A2 due to the provision of sprinklers. Travel distances can be further increased by 15% due to the provision of AFD. As such, the travel distances limits are 25.3m in a single direction, or 63.25m where more than one direction of escape is available.

Before fitout, the distances are taken at 2/3 of their value to account for extension due to fitout. The pre-fitout distances are therefore 16.9m and 42.3m, respectively. These are achieved throughout the building. The plant room layouts have not been confirmed at sub-basement level which is where the majority of them are located. The specific distances will be confirmed at a later stage, but plant rooms will be designed in accordance with the limits above.

4.4 Storey Exits

4.4.1 Upper Floors

Each upper office floor will be provided with 2 x 1050mm storey exits. The exit width factor for an A1 risk profile with AFD is 2.805mm/person. As such, each exit provides capacity for 374 occupants. After discounting one exit due to a fire, each office floor is provided with capacity for 374 occupants. This is sufficient for the calculated occupancies.

4.4.2 Ground

4.4.2.1 Retail

The western retail areas at ground are subdivided with each unit being provided with one front entrance that is at least 1800mm clear width.

The largest retail unit in the western section is approximately 140m² which would give an occupancy of 70 using a floor space factor of 2m²/person with no back of house. However, as only one exit is provided from each unit, the occupancy should therefore be limited to 60 occupants in each unit. Therefore, the fit out of the space should be limited to no more than 110m² front of house. Each unit has an associated space at Basement level that will be connected to the ground floor area. The storey exits for the basement areas are discussed in the following section.

The eastern B1/D1 unit is provided with a 1800mm front entrance and a 1050mm route to the firefighting corridor. The exit width factor for a B2 risk profile with AFD is 3.485mm/person. The 1800mm front entrance opens against the direction of escape so is limited to 60 occupants. The largest exit is then the 1050mm route which after being discounted leaves a capacity of 60 occupants at Ground Floor. This leaves a shortfall of 71 occupants.

It is proposed to not restrict the occupancy on the basis that for a fire blocking the 1050mm route, occupants will be able to use the open stair to escape via Basement where there is a surplus in capacity as discussed in the following section.

For a fire at basement, both exits at Ground would be available and there would not be a shortfall so occupants would not need to escape down to basement towards the fire.

4.4.3 Lower Floors

4.4.3.1 Basement Retail

Each basement retail area has access to the shared escape corridor. From this corridor, escape routes are available into both stair cores. Both storey exits will be at least 1050mm wide. Using an exit width factor of 3.485mm/person, the exits provide capacity for 602 occupants. This is sufficient for the calculated occupancy. However, each western retail unit is provided with a single exit at least 850mm wide. Given the units will have a single exit the individual occupancies will be limited to 60. The largest unit in this area is approximately 100m² which would give an occupancy of 50. As such, the single exit will be sufficient. Larger units would be acceptable provided that the overall occupancy limits described are not exceeded.

The eastern B1/D1 unit has 2 x 1450mm exits into the corridor. After discounting one due to a fire, there will be capacity for 416 occupants using an exit width factor of 3.485mm/person. The area of the unit at this level is approximately 258m² which would give an occupancy of 129. As such, the exits are sufficient for both the occupancy at Basement and the potential 71 additional occupants from Ground.

4.4.3.2 Basement Cycle Store

The cycle store will be provided with 1 x 1050mm exit into the north stair and a 1 x 1050mm door into the stair lobby. The provision of a single exit will restrict the capacity to 60. However, this is sufficient for the anticipated occupancy.

4.4.3.3 Basement Plant Areas

The south stair will provide sufficient escape capacity for the calculated occupancy.

4.4.3.4 Sub-basement

The Sub-basement floor has access to 1 x 850mm exit. This will limit the occupancy to 60 which is sufficient for the calculated occupancy.

4.5 Stairs

4.5.1 General

The commercial areas will be provided with 2 x 1200mm firefighting stairs. The stairs have been assessed in 2 sections as the section serving the lower floors will serve a different occupancy characteristic to that of the upper floors.

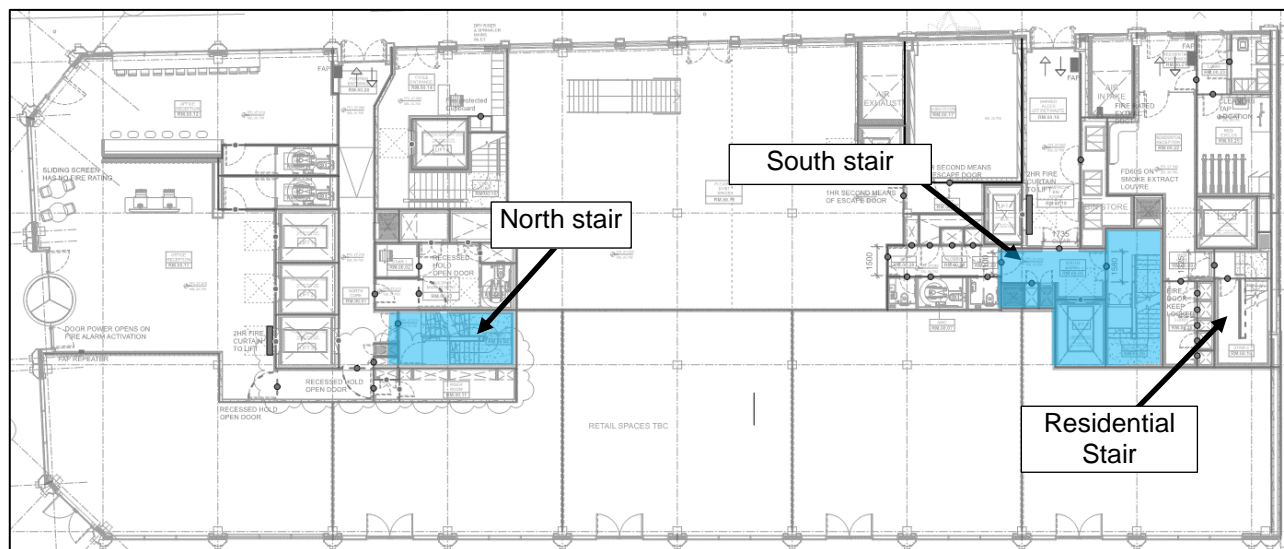


Figure 3: Stair Cores

4.5.2 Upper Floors

The stairs serve 6 floors of office use only above ground (including the roof terrace). Over 6 floors, the stair width factor is 1.7mm/person for an A1 risk profile with AFD. Therefore, the stairs provide capacity for 1410 occupants on the upper floors. This is a surplus of 487 over the calculated occupancy.

4.5.3 Lower Floors

Both stairs serve the Basement level. The south stair also serves the sub-basement. The stair capacity from the basement has therefore been calculated over two floors for the south stair and one floor for the north stair. A B2 risk profile has been used in both cases to reflect the higher risk profile of the retail, which has access to both stairs. The resulting capacity of each stair is given in the table below. The 15% enhancement from AFD has been used as the minimum fire detection required in a B2 risk area is manual call points.

Stair	Width (mm)	Minimum width per person	Stair capacity
South	1200	3.4mm (2 floors)	352
North	1200	4.08mm (1 floor)	294
		Total	646

Table 2: Lower Floor Stair Capacity

The total occupancy of the two basement levels is 422. As such, the stairs are sufficient with a surplus of 224 occupants.

4.5.4 Merging Flow

The basement floors share a final exit in both cores with the stairs serving the upper floors which will result in a merging flow. The south stair is provided with an 1800mm final exit and a corridor that is at least 500mm wider than the stair. The north stair is provided with an 1800mm exit via a corridor that is at least 500mm wider than the stair.

However, the stairs provide a surplus of 487 occupants. Theoretically, the stairs could be reduced to 1100mm and still provide sufficient capacity. As such, for the purposes of the merging flow calculation, the stair width is taken as 1100mm throughout the calculations.

The number of expected occupants at basement is 422. However, in the retail units it is likely that occupants in unaffected units will escape via the route they are familiar with i.e., the front entrance at ground as this is where they entered the unit. The increase in escape time through the front exit would not be an issue as occupants would be separated from the fire by 1-hour compartment walls.

As such, the largest occupancy to escape from basement would be the B1/D1 demise which has an occupancy of approximately 130.

For the south stair, there is a merging flow from the B1/D1 demise at Ground and from the B1/D1 demise at basement. Assuming all of the occupants in the B1/D1 demise at Ground would merge with the firefighting corridor, a final exit width of 1735mm would be required. The 1750mm exit that will be provided will therefore be sufficient. All doors along the route to the final exit after exiting the stair will also be at least 1750mm

The south stair basement and upper levels will first merge through the door to the stair. This door will be at least 1300mm wide to accommodate the merging flow.

For the north stair, there is a merging flow from the B1/D1 demise at basement only. A final exit width of 1278mm would be required. As such, the 1750mm final exit and 1500mm corridor width will be sufficient.

Full calculations are shown in Appendix B.

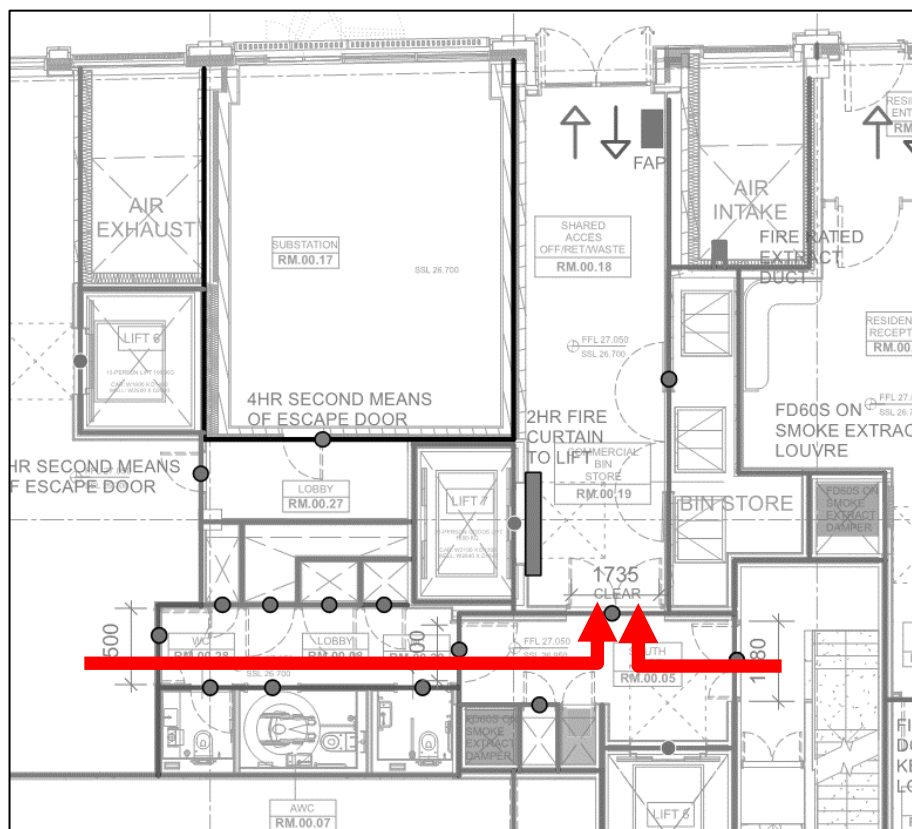


Figure 4: South stair Merging Flow

4.5.5 Final Exits

The stairs are located in the centre of the building plan and as such they will exit to outside via a protected corridor with a final exit that are both at least as wide as the stair. Both stairs will be firefighting stairs and as such the corridor will be at least 500mm wider than the stair.

The final exit route from the south stair will be the firefighting entrance corridor. It is proposed to allow for a vented refuse store and a goods lift that is lobbied at basement levels to open into this corridor. These proposals are discussed in more detail in Section 6.3.

4.6 Mobility Impaired Occupants

Each stair core will be provided with an emergency refuge on all levels above or below ground. Each refuge will be at least 900mm x 1400mm and provided with an emergency voice communication system in accordance with BS5839-9.

The south stair refuge will be provided externally with an emergency voice communication point nearby at roof level.

4.7 Inner Rooms

Inner rooms such as the Tele Intake room at basement, the changing rooms at basement, and any future rooms created within the retail units will be provided with a sounder linked to detectors in the access room or will be provided with doors containing a vision panel of at least 0.1m². Travel distances from remote parts of an access room to a storey exit will be within the relevant single direction travel distance limits. The occupancy of inner rooms will be restricted to 60.

4.8 Terraces

4.8.1 4th and 5th Floor

The offices will be provided with terraces on the 4th and 5th floors. Doors to the terraces will be at least 850mm wide but will open against the direction of escape. The terraces will be provided with multiple exits to ensure that they do not create excessive single direction travel distances. The terraces will effectively form inner rooms to the main office space and so will meet the requirements of an inner room listed above.

Terraces will be provided with beacons/ alarms as part of the alarm system in accordance with BS 5839.

4.8.2 Roof Terrace

There will also be a roof terrace which will be provided as its own level with access to both stair cores. As such, it will not be subject to the inner room requirements. The exits at each end give a choice of escape routes and travel distances are within the limits discussed for office occupants.

Both stairs are accessed through doors at least 850mm wide. After discounting one of these, the terrace will have capacity for 163 occupants using an A2 risk profile as this is the most onerous risk profile present at this level due to the plant areas. This is less than the anticipated occupancy, so the occupancy will be restricted to 163. This will also be a transient space so will not increase to the overall occupancy of the building.

4.8.3 Roof plant

There are open and enclosed plant areas on the roof; the enclosed plant room will be provided with two exits and travel distances will be within the limits described for plant rooms previously.

The open areas of roof top plant will have a choice of escape routes and travel distances will be up to 60m as shown below. This is within recommend limits for open roof plant.

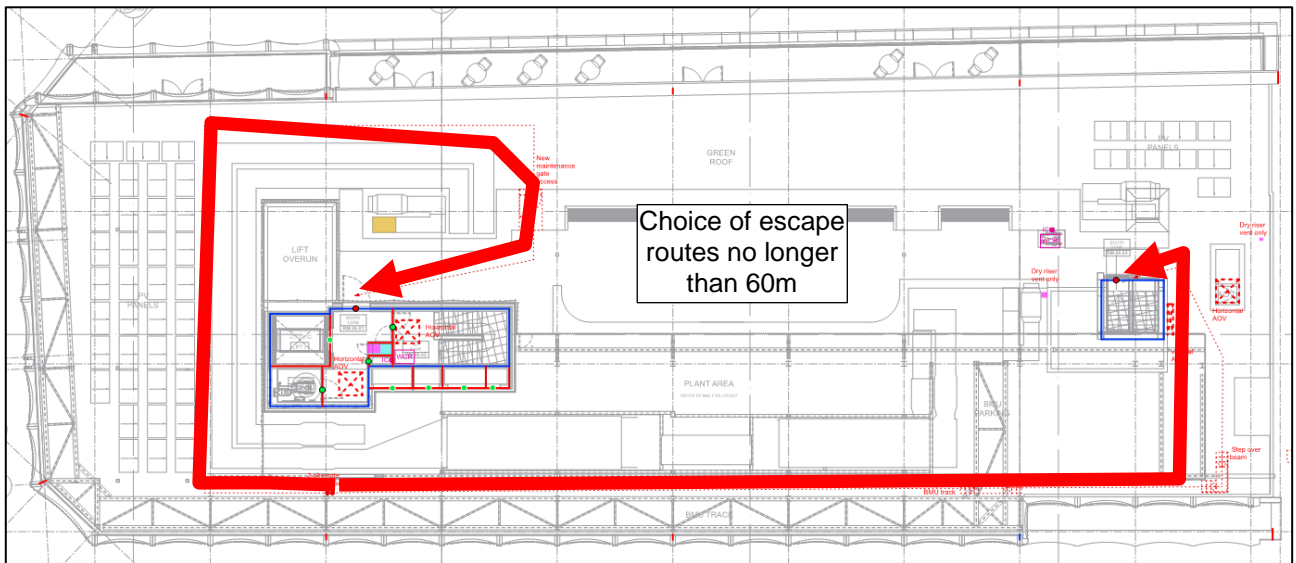


Figure 5: Escape from roof

5.0 MEANS OF ESCAPE – RESIDENTIAL

5.1 General

The residential building will be fully separated from the commercial building and as such will function as an independent building. The building will operate a stay-put evacuation strategy and will be provided with a firefighting core and lift.

5.2 Apartment Design

5.2.1 Design approach

The apartments will be designed as open-plan apartments. This is supported by the provision of an LD1 alarm system and sprinkler protection. Each apartment has only 1 exit, so travel distances will be limited to 20m in a single direction. This is achieved throughout all apartments.

A duplex apartment will be provided on the 4th floor, extending up to 5th floor. The internal stair will be enclosed with 30-minute fire resistant walls and FD30S doors at 5th floor level.

Apartments are also provided with small balconies. It is not proposed to provide sounders on each balcony as they are small in size and provided with windows so that occupants can see into the apartment.

5.2.2 Open kitchens

The apartments are larger than 8m x 4m but will have open kitchen areas. Kitchen fires typically present the largest fire risk within an apartment so ensuring occupants are able to safely escape away from them is paramount. However, a fire engineering solution to allow for open kitchen areas is proposed on the basis that escape can be made without passing within 1.8m of a cooking appliance. This is based on the results of previous detailed fire engineering analyses.

It is proposed to provide open kitchens on the basis that hobs and cooking appliances will be positioned such that an escape route is available that does not pass within 2m of cooking appliances. Occupants will be far enough away from the appliances that they are not severely affected by the heat radiation (see Appendix A), and they would be at no greater danger from smoke than when compared to a fire anywhere else in the apartment. Appendix A also contains an email from Building Control confirming acceptance of this assessment.

5.3 Common Corridors

Travel distances from the flat entrances to the stair door will be within 15m due to the provision of a sprinkler system.

The common corridor on each level will be provided with a mechanical smoke extract system. The smoke shaft will be approximately 0.6m² – 0.8m² in area and will achieve an extract rate of 3m³/s – 5m³/s. The exact performance criteria will be determined by the specialist system supplier.

5.4 Mobility Impaired Occupants

Building Regulations guidance does not require any specific measures to be provided for escape for mobility impaired occupants. The firefighting lift will be available to support the evacuation of the occupant once the fire service arrive if necessary.

This is proposed as the specialist supplier has stated it is not possible to provide a firefighting lift that continues to operate before the fire service arrive. This is proposed as:

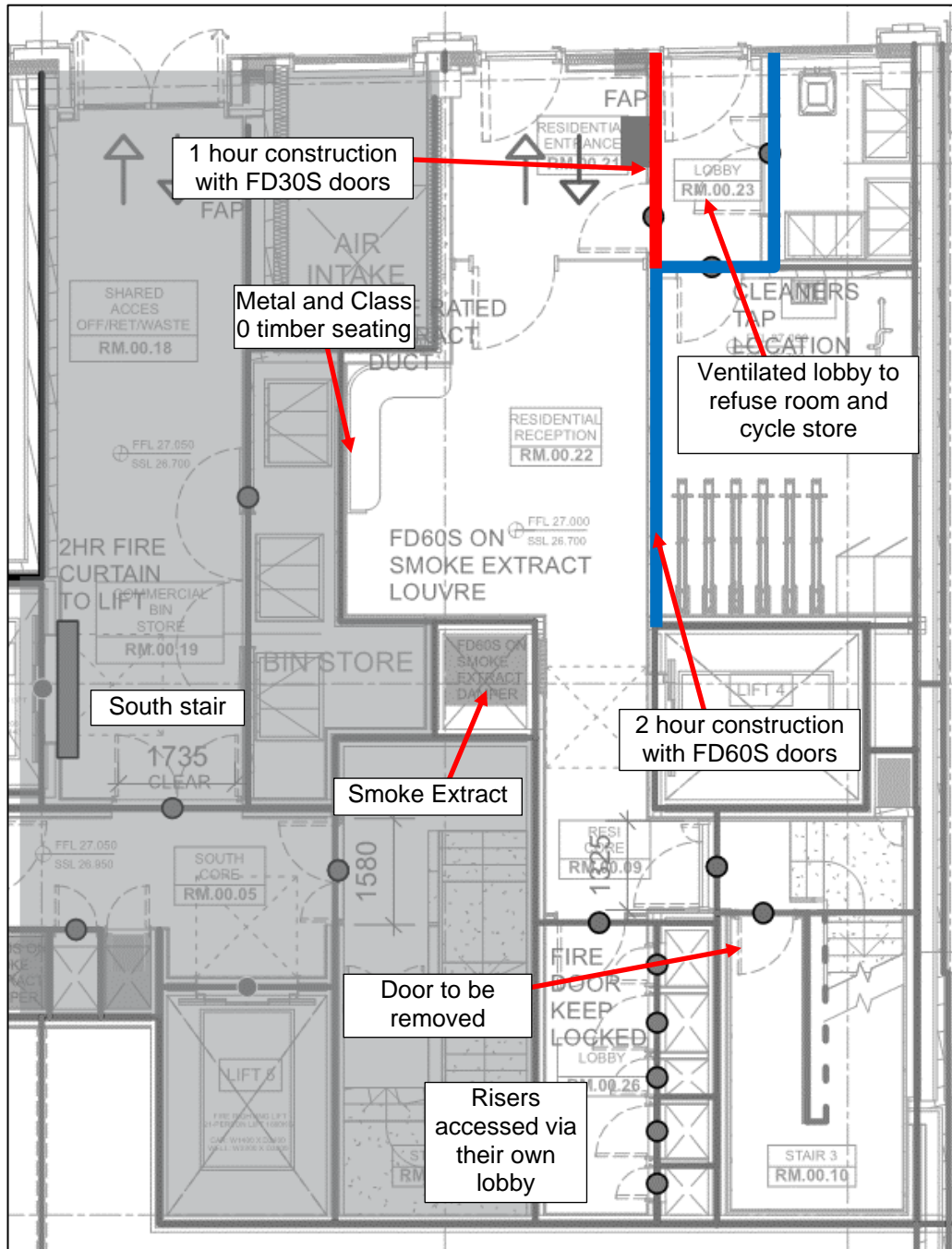
- Occupants requiring assistance are able to reach the stair within a compliant single direction travel distance. The stair will provide a safe place of refuge.

- There is only a total of 8 apartments in the building. Therefore, the number of occupants escaping would be limited and should not disrupt firefighting operations.

5.5 Final Escape Route

The stair will discharge to outside at ground via the entrance lobby. The lobby itself will not contain any fire risk other than fire-rated post boxes and very low fire risk seating and will not give access to any service risers. Service risers will be separated from the escape route via 2-hour fire resistant construction such that they are contained within and accessed only via their own lobby. The risers themselves will all be enclosed with 2-hour fire-resistant construction with FD120S access doors. The door to this lobby as well as the riser access doors will be designated as Keep Locked Shut. Seating will be constructed with a metal frame and timber treated to achieve a Class 0 rating.

A refuse store and bike store will be accessible from the escape route via a ventilated lobby which is separated from the entrance by construction achieving 1 hour fire resistance with the 2 hour firefighting shaft enclosure running in front of the refuse and bike stores. This is shown in the figure below. The refuse store will also be provided with at least 0.4m² permanent ventilation directly to outside. Additionally, the refuse store will be provided with sprinklers which will help to fight or even extinguish a fire during the early stages.



6.0 STRUCTURE AND COMPARTMENTATION

6.1 Structure

All elements of structure will be designed to achieve 1-hour fire resistance. This is in line with BS 9999 Table 23 for an A1 risk profile with sprinklers in the commercial areas and BS9991 Table 4 for a sprinklered building in the residential areas.

6.2 Compartmentation

6.2.1 General

The commercial areas of the building will be fully separated from the residential areas of the building via a full-height 2-hour compartment walls.

6.2.2 Walls and Floors

Compartmentation will be provided throughout the building in accordance with the following table.

Location	Fire Resistance	Fire Doors
Firefighting shaft enclosure	2-hour	FD60S
Firefighting access route enclosure (including lobbies)	2-hour	FD60S
Walls within a firefighting shaft (between lobby and stair etc)	1-hour	FD30S
Walls separating residential and commercial areas	2-hour	N/A
Floors between residential and commercial areas	2-hour	N/A
Protected shaft/riser enclosure (Office)	1-hour	FD30 – S rating if forming part of a protected lobby/corridor
Protected shaft/riser enclosure (Residential)	2-hour	FD120S
Protected lobbies/corridors	30-minute	FD30S
Compartment floors between different commercial uses	1-hour	N/A
Compartment walls between retail units	1-hour	N/A
Plant room enclosures	30-minute – 2-hour (depending on contents)	FD30S – FD120S
Ancillary areas (storage cupboards, management room)	30-minute	FD30S
UKPN Substation	4-hour	FD120S
Walls between apartments and common corridor	1-hour	FD30S
Floors enclosing residential levels	1-hour	N/A
Residential refuse store area	1-hour	FD30S

Table 3: Compartmentation

6.3 Cavity Barriers

Cavity barriers will be provided in accordance with Figure 35 of BS9999 and Figure 24 of BS9991. Cavity barriers will achieve 30-minute fire resistance for integrity and 15-minute fire resistance for insulation.

6.4 Fire Stopping and Damping

Services penetrating compartment walls or floors will be provided with fire stopping around the penetration with fire resistance equal to the wall or floor penetrated.

Service ducts penetrating compartment walls or floors will be provided with fire-resistant construction equal to that of the wall or floor penetrated or will be provided with fire dampers along the compartment line.

6.5 Roof Coverings

Roof coverings to the commercial and residential areas will be in accordance with the following table from the Approved Document B. The guidance for roof coverings in BS 9999 and BS 9991 has not been used as they referred to old classification systems and the ADB provides the latest ratings.

Table 14.1 Limitations on roof coverings				
Designation ⁽¹⁾ of covering of roof or part of roof	Distance from any point on relevant boundary			
	Less than 6m	At least 6m	At least 12m	At least 20m
B _{ROOF} (t4)	●	●	●	●
C _{ROOF} (t4)	○	●	●	●
D _{ROOF} (t4)	○	● ⁽²⁾⁽³⁾	● ⁽²⁾	●
E _{ROOF} (t4)	○	● ⁽²⁾⁽³⁾	● ⁽²⁾	● ⁽²⁾
F _{ROOF} (t4)	○	○	○	● ⁽²⁾⁽³⁾

● Acceptable. ○ Not acceptable.

NOTES:

Separation distances do not apply to enclosed/covered walkways. However, see Diagram 8.2 if the roof passes over the top of a compartment wall.

Polycarbonate and uPVC rooflights that achieve a class C-s3, d2 rating by test may be regarded as having a B_{ROOF}(t4) classification.

- The designation of external roof surfaces is explained in Appendix B
- Not acceptable on any of the following buildings.
 - Industrial, storage or other non-residential purpose group (purpose groups 6 and 7) buildings of any size.
 - Any other buildings with a cubic capacity of more than 1500m³.
- Acceptable on buildings not listed in (1) if both of the following apply.
 - Part of the roof has a maximum area of 3m² and is a minimum of 1500mm from any similar part.
 - The roof between the parts is covered with a material rated class A2-s3, d2 or better.

Figure 7: Roof Covering Criteria

Alternatively, the roof covering build-up will use materials in accordance defined in Commission Decision 2000/553/EC implementing Council Directive 89/106/EEC.

The area at the junction between the commercial and have a 1.5m zone either side of the compartment wall junction that achieves at least a B_{ROOF}(t4) rating.

7.0 FIREFIGHTING – COMMERCIAL

7.1 General

The top floor height of the occupied office is 18.2m above firefighting access level and there are floors with an area over 900m². Therefore, two firefighting shafts will be provided.

The firefighting cores will be provided with the following:

- 2-hour fire resistant enclosure;
- Smoke-vented lobby at all levels;
- Dry rising fire main outlet on all levels;
- Firefighting lift with back-up power;
- 1200mm firefighting stair;
- 1m² free area AOV at the head of the stair.

7.2 North Core

The north firefighting core will be provided with a 2-hour fire-resistant enclosure, smoke-vented firefighting lobby and firefighting lift that serves all levels (excluding sub-basement) including the terrace, but with the following deviations: -

- The firefighting lobby will be approximately 9m long which is in excess of the 8m maximum recommendation. This is supported on the basis that the space will be a part of the office access route and well-managed via the provision of CCTV cameras within the core. The CCTV feed will be viewable by the reception staff and as such if any items or goods are left in the lobby, they will be removed by the building management team.
- The firefighting lift will be dual entry but no protected lobby to the accommodation side is proposed. Instead, a 2-hour smoke-sealed fire curtain will be provided to the accommodation side on all relevant levels to form the separation in the event of a fire. The space will be well managed to ensure no obstructions are present and beam detection will be provided to alert staff if any obstructions do arise. The curtains will be designed, installed and maintained in accordance with both parts of BS 5824. The fire curtains will descend on local detection on the affected floor only.

A fire curtain will be provided across the passenger lift at Basement level in the North core to protect the firefighting lobby at basement from a fire in the reception at Ground.

- The north core muster/set-up point will be within the office reception area rather than an enclosed firefighting lobby at Ground floor. This is proposed on the basis that occupants will still be escaping via a 2-hour protected corridor to outside so as to not impede mustering operations. A repeater panel for the life safety systems such as the fire alarm system and smoke extract systems will be provided within the reception to facilitate mustering operations.

Additionally, a fire in the reception area would not require access to the core as it will be fought directly from outside. In the unlikely event that the reception becomes compromised during operations on the upper floors, the 2-hour protected route to outside will still be available for firefighter retreat.

- The dry riser main will be contained in a riser but the access door will not be fire rated. However, the riser will be provided with fire stopping at floor level.

Other than the points discussed above, the final exit route from the north stair will discharge directly to outside via a corridor designed in accordance with Figure 20b) of BS 9999.

7.3 South Core

It is not proposed to continue the south firefighting lift to the roof terrace. This is proposed on the basis that the space is external so heat and smoke from the fire will vent directly to atmosphere and it is standard firefighting procedure to set up below the fire floor. The firefighting stair will continue to roof level and will be enclosed with 2-hour fire resistant construction with an FD60S door to the terrace.

The south stair will exit to outside at ground via a protected corridor which will be lobbied from adjacent accommodation and will be 500mm wider than the stair. The firefighting lift will be accessed via a protected lobby in front of the stair rather than a dedicated route. This is proposed based on the following: -

- The offices will operate a simultaneous evacuation strategy. This means that occupants will be out of the building much quicker than for a comparable building with phased evacuation and are therefore less likely to impede firefighters setting up in the final escape corridor
- There is a surplus in stair capacity which will result in either a quicker overall evacuation, or the stair not being used to its full capacity.

It is also proposed to provide access to a refuse store from within the south firefighting corridor without a lobby between the refuse store and the corridor. This is proposed based on the following: -

- The refuse store will be provided with a vent to provide permanent ventilation and will be sized to provide some natural ventilation to remove smoke in the event of a fire. This should prevent smoke pressures building up to such an extent that it forces through the smoke sealed fire door.
- The room will be accessed via an FD60S fire door that will be kept locked shut;
- The fire service will not need to access the core to fight a fire in this area, they will be able to muster and attack the fire from outside via the corridor exit. The access point to this corridor is via a road so the fire vehicle can park directly outside. The door to the refuse store is then only 6m from the corridor entrance.
- Occupants will have an alternative means of escape via the other firefighting stair. The stair itself does not provide the full capacity for the upper floors with a shortfall of 159 occupants, but the extra evacuation time in the stair is considered reasonable as occupants will be separated from the fire by multiple compartment lines and the building will be provided with sprinklers to prevent the fire from growing to a size that would compromise the other firefighting route.

A goods lift will also open into the corridor. This is proposed based on the following: -

- The lift will be separated from the firefighting corridor via 2-hour fire resistant construction to maintain the corridor's 2-hour fire resistance;
- A 2-hour smoke-sealed fire curtain will be provided across the lift at Ground level or at both basement levels;
- The lift discharges into a protected lobby at both basement levels which will be fire sterile areas so it is unlikely that large amounts of smoke will reach the lift;
- The basement levels are not deep enough to require the firefighting stair or lift to be extended down to serve them; the provision of them in this case is for best practice. As such, firefighting access to the basement via the north stair is equally compliant;
- Strict management procedures will be developed for the building to ensure that the goods lift is cleared of goods or stock on a regular basis.

7.4 Fire Vehicle Access

Fire vehicle access will be provided via the surrounding roads. Dry riser inlets will be within 18m of the fire vehicle parking position and visible from the road. A figure showing the parking positions and access points is shown in the figure below.

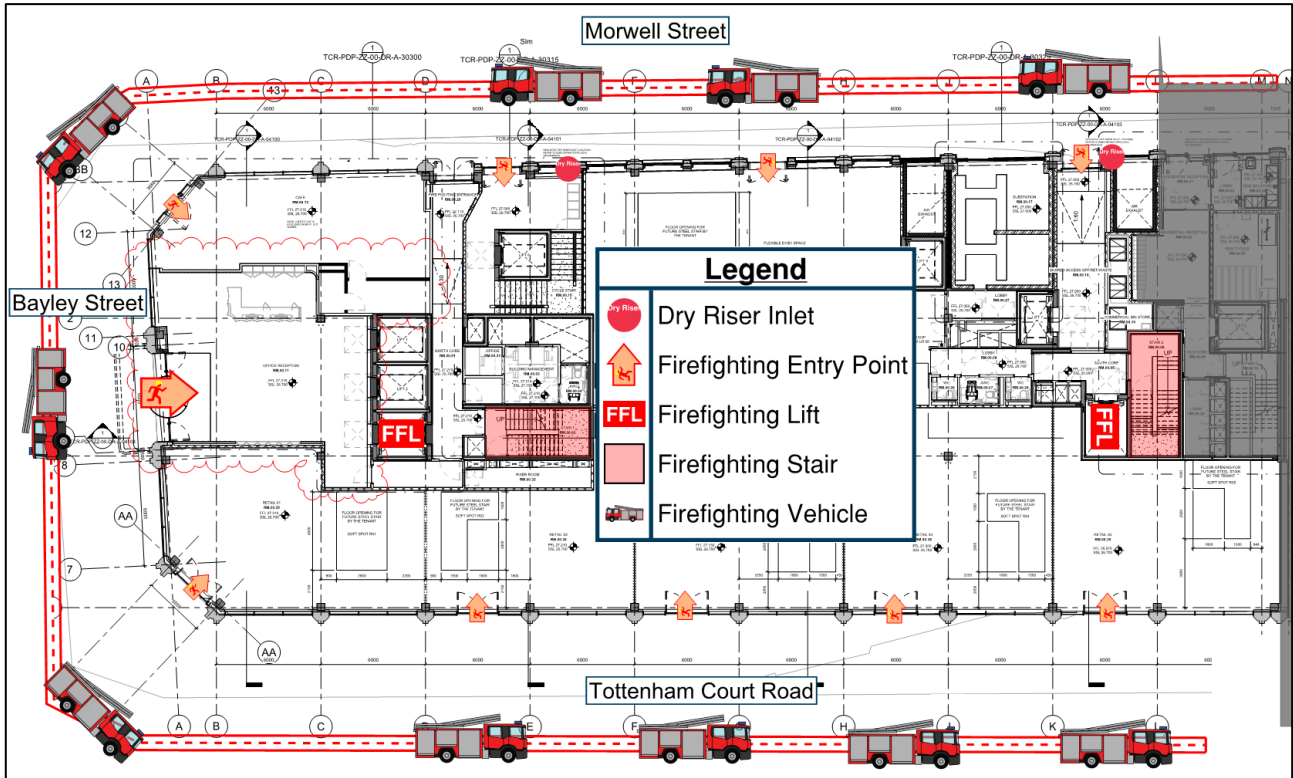


Figure 8: Fire Service Access Provisions (Internal layout is indicative and subject to change)

7.5 Hose Coverage

All areas are provided with sprinklers. As such, the limit for hose coverage distances from a fire mains outlet is 60m. This corresponds to 40m before fitout. All areas will be within 40m of a dry riser outlet within a firefighting core.

For a fire in the retail areas at ground floor, the fire service will be able to fight the fire from the street. For the retail areas at basement level, all areas are within 40m of a dry riser outlet.

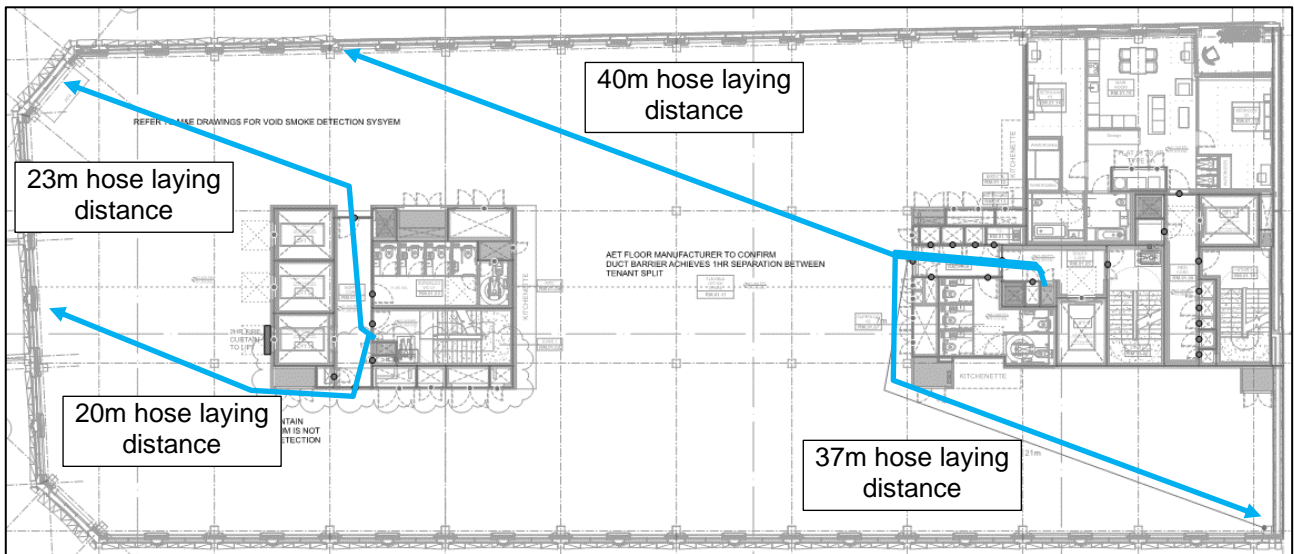


Figure 9: Hose Coverage Distances

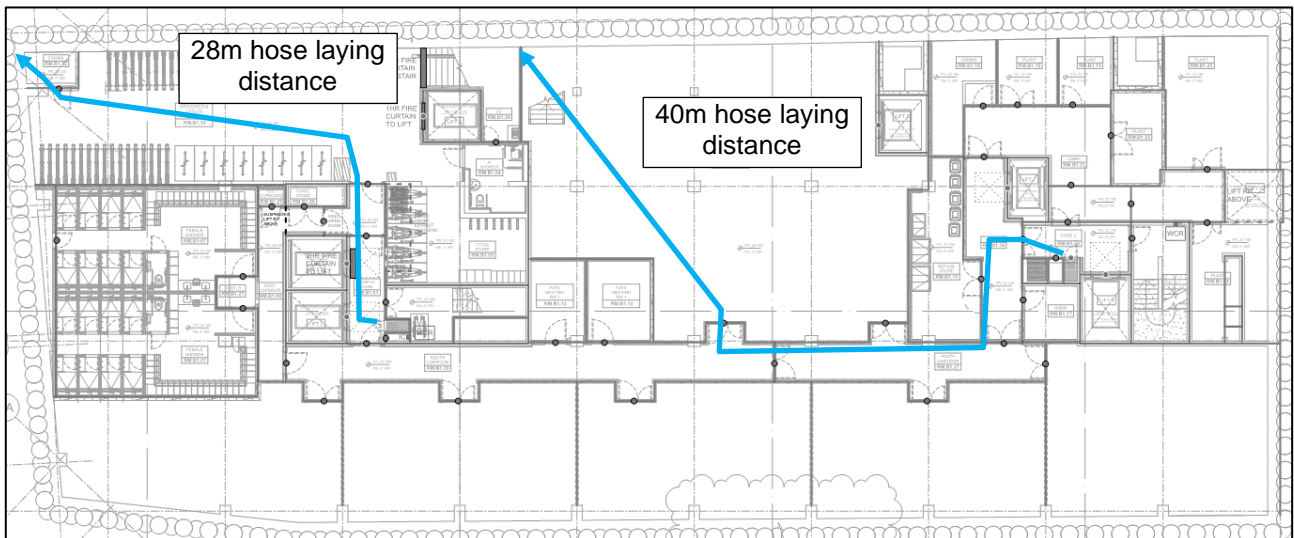


Figure 10: Basement Hose Coverage

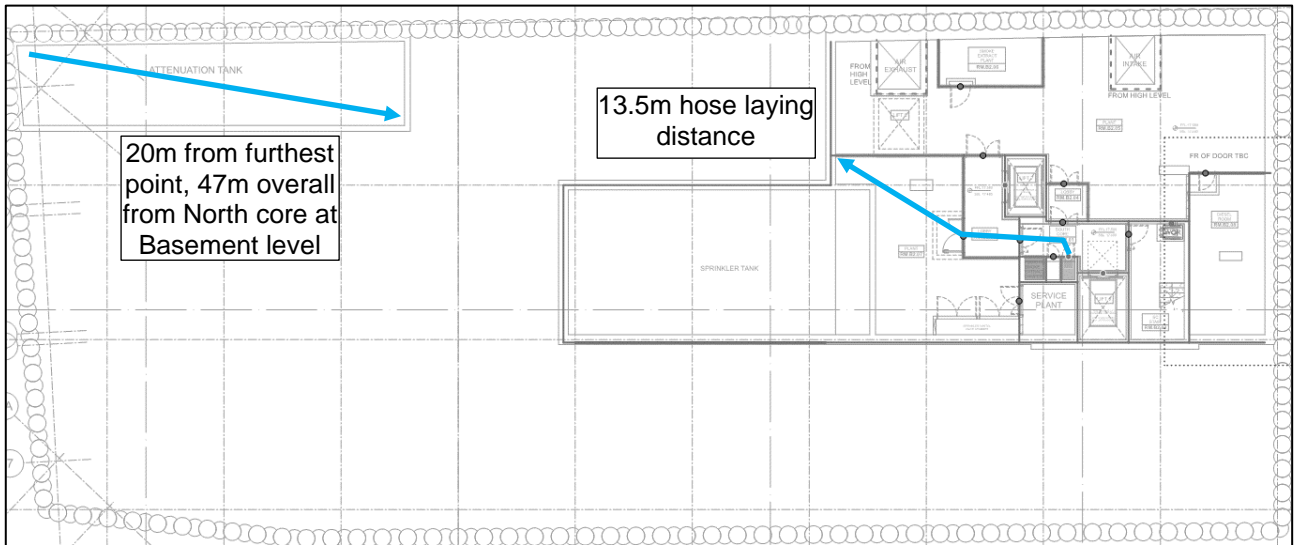


Figure 11: Sub-basement Hose Coverage Distance

7.1 Basement Smoke Venting

The basement levels will be provided with a smoke venting system which extracts smoke from each basement room individually. This will be provided via a mechanical smoke venting system.

A mechanical system will achieve: -

- 10 air changes per hour;
- Be able to withstand gas temperatures of up to 300°C for at least 1 hour;
- Activate automatically upon activation of the sprinkler or fire detection system.

8.0 FIREFIGHTING – RESIDENTIAL

The top residential floor will be 18.4m above ground level and as such the building will be provided with a firefighting shaft and firefighting lift with the following design criteria: -

- 1200mm firefighting stair;
- Firefighting lift with back-up power within 7.5m of the stair door;
- Dry rising fire main outlet on all levels;
- Smoke-vented common corridor on all levels;
- 1m² free area AOV at the head of the stair;
- 2-hour fire resistant enclosure to the stair and lift;

The firefighting lift discharges directly into the escape route from the stair at ground. This is proposed on the following bases: -

- The firefighting lift represents a low fire risk;
- The lift is immediately next to the entrance lobby, which provides sufficient space to act as a mustering point which is out of the way of the escape route.
- The top floor consists of the top floor of a single apartment which is accessed from the level below and the top floor of a duplex apartment - the last firefighting level where access is gained to an apartment is less than 18m above the firefighting access level. As such, a firefighting lift would not otherwise be required. There is only a total of 8 apartments in the building. Therefore, the number of occupants would be limited and should not disrupt firefighting operations given the defend-in-place strategy whereby only the affected apartment will evacuate.

8.1 Fire Vehicle Access

Fire vehicle access will be provided via the surrounding roads. Dry riser inlets will be within 18m of the fire vehicle parking position and visible from the road. A figure showing the parking positions and access points is shown in the figure below.

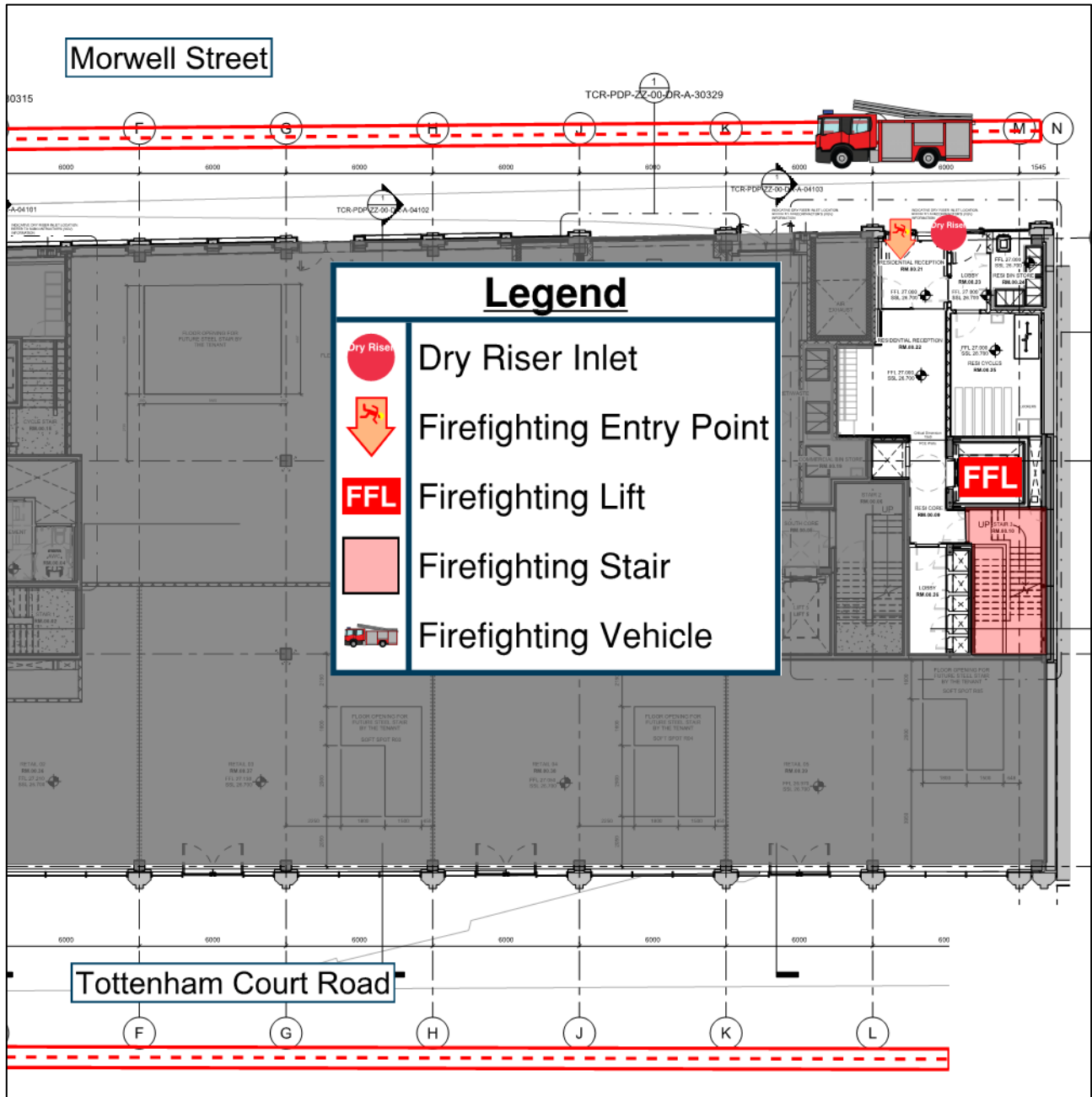


Figure 12: Fire Service Access Provisions

8.2 Hose Coverage

The residential areas are provided with sprinklers throughout. Therefore, all areas should be within 60m of a dry riser outlet on all levels. This is achieved throughout the residential areas.

9.0 EXTERNAL WALLS

9.1 External Wall Construction

As the building exceeds 18m in top floor height, products which form part of the external wall construction will achieve European Class A2-s1, d0 or Class A1, with the exception of sealants, gaskets, doors and windows (including frames); (see regulation 7(3) for the full list of exemptions).

Membranes within the external wall will achieve a minimum Class B-s3, d0.

9.2 External Fire Spread

9.2.1 General

The building will be provided with sprinklers.

The commercial areas have been assessed in two parts: the largest retail compartment at ground and the typical office floorplate on the upper levels. The calculations have been carried out on the basis of compartment floors being provided given the provision of sprinklers in accordance with BS 9999 Clause B.8.

The external elevations have been assessed using the 'rectangle method' as described in BR187. The elevations are adjacent to roads on all sides, so a notional boundary has been taken to the centre of the road as it is unlikely there will be future development in these areas.

9.2.2 North Elevation

9.2.2.1 Retail

The largest retail compartment is the Western portion. The height of the compartment is 3.5m and the width is 10m. The distance to the centre of Bayley Street is 8m. This allows for 100% unprotected area.

9.2.2.2 Office

The largest office compartments occur at 1st – 4th floor level. The height of the compartment is 2.8m and the width is 26m. The distance to the centre of Bayley Street is 8m. This allows for 100% unprotected area.

9.2.3 East Elevation

9.2.3.1 Retail

The largest retail compartment is the D1/B1 flexible space. The height of the compartment is 3.7m and the width is 18m. The distance to the centre of Morwell Street is 5m. This allows for 100% unprotected area.

9.2.3.2 Office

The largest office compartments are the same size at all levels. The height of the compartment is 2.8m and the width is 52.5m. The distance to the centre of Morwell Street is 5m. This allows for 100% unprotected area.

9.2.4 West Elevation

9.2.4.1 Retail

The full width of the elevation is retail space. The height of the compartment is 3.7m and the width is 65m. The distance to the centre of Tottenham Court Road is 10m. This allows for 100% unprotected area.

9.2.4.2 Office

The largest office compartment is at 1st floor level. The height of the compartment is 2.8m and the width is 63.5m. The distance to the centre of Tottenham Court Road is 10m. This allows for 100% unprotected area.

9.2.5 Connection of Floors

The connection of two office floors would still allow for 100% unprotected area.

9.3 Residential balcony glazing

Some flats have glazing close to the party wall where they open onto the private balconies. The glazing faces perpendicular to the party wall and no specific provision is required.

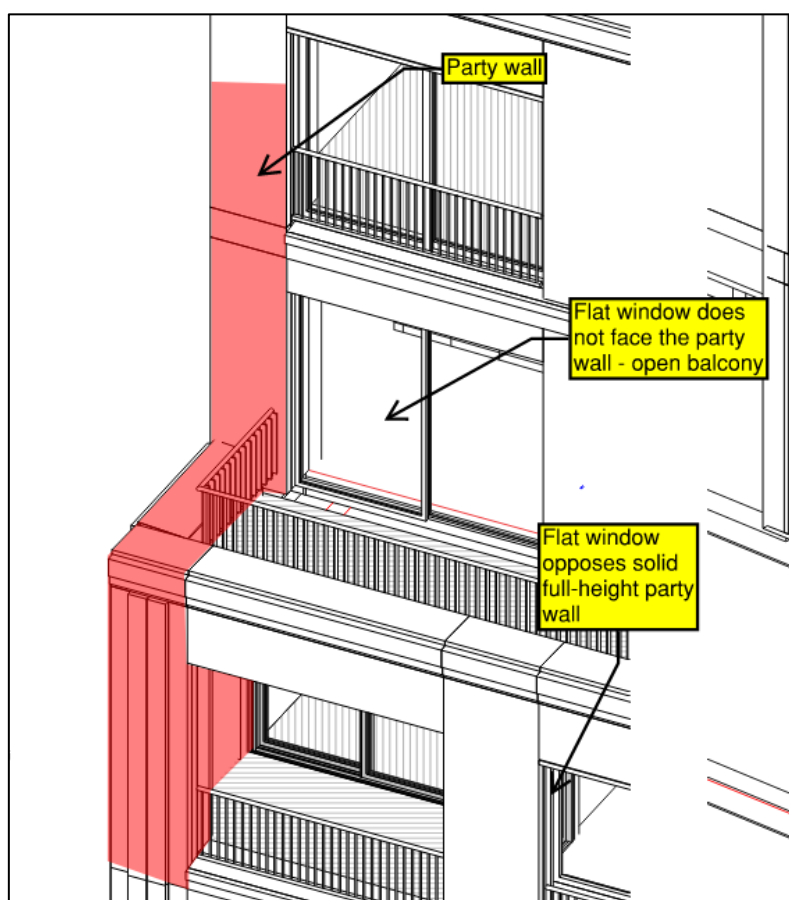


Figure 13: Balcony party wall

10.0 FIRE SAFETY MANAGEMENT

10.1 General

Once the building is occupied, it is the responsibility of the management to ensure that all fire safety systems are tested and maintained to ensure their continuous effectiveness. The management should: -

- Be aware of all the fire safety features provided and their purpose
- Ensure a competent person is present in the building during all occupied times
- Liaise with and seek the advice of the fire authority

10.2 Staff

Staff should be trained by competent persons. The training should be at regular intervals and should ensure that all staff know what to do if a fire is discovered; the correct response on hearing a fire alarm, and the correct escape procedures from every part of the building.

A management structure should be provided to ensure that in the case of fire staff are aware of their responsibilities, which should be clearly defined. A chain of command should be provided with clear lines of responsibility, authority and accountability.

10.3 Fire Safety Manual

Before a building is occupied, a fire safety manual should be completed. The purpose of the manual is to clearly define the nature of the fire safety systems provided for the building. It should include: -

- An explanation of the overall fire safety strategy
- Evacuation procedures
- Design documentation to describe the use of each fire safety system
- Staff roles in the event of a fire: their responsibility, authority and accountability
- A detailed maintenance routine

The Fire Safety Manual should be reviewed periodically and when any alterations are made to the building. Details of the suggested contents of the fire safety manual are provided in Section 19 of the Approved Document B and Annex H of BS 9999 Code of practice for fire safety in the design management and use of buildings.

10.4 Maintenance and Housekeeping

It is the role of management to ensure that maintenance is carried out in accordance with the relevant British Standards, so that all fire safety systems are operational in the event of a fire. It is also important that good housekeeping practices are followed. The building management should be aware of any hazardous substances or practices within the building, which increase the risk of fire.

10.5 The Regulatory Reform (Fire Safety) Order 2005

This Order places a duty on the 'responsible person' to ensure, 'as far as is reasonably practical' the safety of his employees and to take such general fire precautions as may be reasonably required to ensure that the premises are safe [i.e. for non-employees].

Under the Order, there is a requirement to carry out and continually update an assessment of the risk of fire to people in and around the premises/building, and to assess and maintain the measures to reduce those risks to an acceptable level. Where there are five or more employees, the risk assessment must be recorded.

A Fire Risk Assessment should be carried out:-

1. On completion of the building fit out, and strictly before first occupation of the building.
2. Regularly, particularly where any changes occur such as changes in the use of the building, the number or nature of occupants, or building works.
3. We would recommend that a fire risk assessment is carried out at least annually.

Other legal duties include: -

1. Keeping a record of the Fire Safety Arrangements. These are the preventative and protective measures for the building.
2. A person must be nominated for any special role identified in an emergency plan.
3. Employees must be consulted about nominations to perform special roles, and about any proposals for improving the fire precautions.
4. Other employers in the building must be informed about any significant risks, which might affect the safety of their employees, and there must be co-operation with them in measures to reduce the risk.
5. Those having control over the workplace have a responsibility to ensure compliance with the regulations in those parts of the building over which they have control.
6. A suitable and readily available method of calling the emergency services must be established.
7. Employees are required to co-operate in ensuring that the workplace is safe from fire.

The order also adopts 'Principles of Prevention'. These include:-

- Avoiding risks;
- Evaluating the risks which cannot be avoided;
- Combating the risks at source;
- Adapting to technical progress;
- Replacing the dangerous by the non-dangerous or less dangerous [particularly with respect to hazardous substances];
- Developing a coherent overall prevention policy which covers technology, organisation of work and the influence of factors relating to the working environment, and;
- Giving appropriate instructions to employees.

11.0 INFORMATION, LIMITATIONS AND ASSUMPTIONS

The information limitations and assumptions used in the preparation of this report are noted below: -

Drawings

This report is based on drawings issued to us. Dimensions have been taken from these drawings. The following drawings were used: -

Area	Drawing
Sub-basement	ST-PR-37-098
Basement	ST-PR-37-099
Ground	ST-PR-37-100
1 st Floor	ST-PR-37-101
2 nd Floor	ST-PR-37-102
3 rd Floor	ST-PR-37-103
4 th Floor	ST-PR-37-104
5 th Floor	ST-PR-37-105
6 th Floor/Roof	ST-PR-37-106
North Elevation	ST-PR-37-151
East Elevation	ST-PR-37-152
West Elevation	ST-PR-37-150
Fire Service Access Plan	TCR-PDP-ZZ-00-DR-A-02100

Survey (Existing Building)

This building has not been surveyed by Jeremy Gardner Associates.

Building Regulations

This report considers building regulations, which deal with life safety. Property protection and insurance issues are not addressed in this report. Guidance on property protection and insurance requirements can be found in the document *Approved Document B: Fire Safety (Volume 2) – Buildings other than dwellinghouses Incorporating Insurers' Requirements for Property Protection*, RIBA Publishing 2015.

Other Limitations

Complying with the recommendations of this report will not guarantee that a fire will not occur.

Unless otherwise described in this report, the fire strategy assumes that the building design, the mechanical and electrical systems, construction methods and materials specifications will comply with current Building Regulations guidance, and relevant British Standards and Codes of Practice. The design of mechanical and electrical systems such as fire alarm and sprinklers is a specialist area. Fire Strategy recommendations are

given in this report, however, the design and specifications need to be developed at the appropriate stage in consultation with the specialist designers of these systems.

This report has been prepared for the sole benefit, use and information of Prudential UK Real Estate Limited Partnership and the liability of Jeremy Gardner Associates Limited, its directors and employees in respect of the information contained in the report will not extend to any third party.

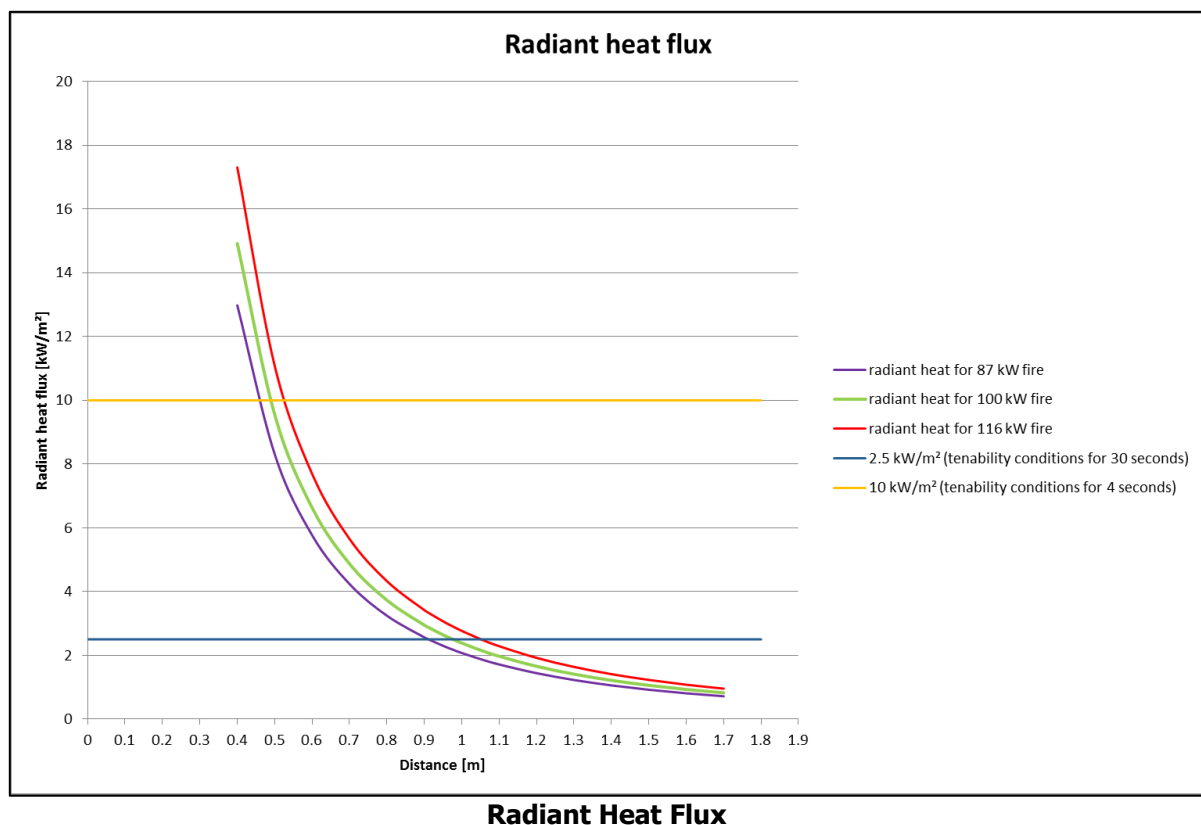
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APPENDIX A – HOB LOCATIONS

The analysis is for a sprinkler-controlled fire that limits the fire to the cooking pan, which is in line with results of BRE sprinklered test. The time for occupants to escape past the hobs is solely that for movement past the hob, in order to demonstrate that occupants would not be harmed in passing the hob.

BS 7974 “Applications of Fire Safety Engineering Principles to the Design of Buildings” states that at a point where the radiant heat flux is 10 kW/m^2 tenable conditions are maintained for 4 seconds and where the radiant heat flux is 2.5 kW/m^2 they are maintained for 30s. This is a reasonable time to escape from the living room / kitchen area. The radiant heat flux is a function of the heat release rate of a fire and the distance from the fire (see Figure 1).

A research study carried out by lit Gandhinagar and Underwriters Laboratory Inc. (“Report of research on detection of kitchen fire”, 8 July 2010) shows that the peak heat release rate of a cooktop fire is 86.9 kW . Another research study carried out by Hyeong-Jin Kim and David G. Lilley and published by the American Institute of Aeronautics and Astronautics (“Heat release rates of burning items in fires”, January 2000) gives a heat release rate for a 12-inch pan fire of 116 kW . Both of these fire sizes were not controlled by sprinklers and represent the worst-case scenario as the fire was fed by constantly burning oil.



The hob fire sizes within a range between 87 kW and 116 kW are modelled, as shown in the figure above. The calculations below show that to keep tenable conditions for 30 seconds the distance from the hob fire should not be less than 1.1 m . To keep tenable conditions for 4 seconds the distance from the hob fire should not be less than 0.53 m .

A method of calculating the separation between a fire and a combustible material is described in NFPA92b and the SFPE Handbook, which assumes a point source, and measures the separation distance from this point.

The method relates the radiant heat flux (RHF), q , at a distance r from the centre of a fire to the total of heat release rate (HRR) of the fire, Q_t .

The equation is:

$$q = \frac{0.3Q_t}{4\pi r^2}$$

Where 0.3 is the fraction of heat emitted as radiation.

The distance, r , from the centre of fire can be calculated from the following equation:

$$r = \sqrt{\frac{0.3Q_t}{4\pi q}}$$

Therefore, the distance for 2.5kW/m² RHF at 116kW HRR would be:

$$r = \sqrt{\frac{0.3 * 116}{4\pi * 2.5}}$$
$$r = 1.1m$$

The distance for 10kW/m² RHF at 116kW HRR would be:

$$r = \sqrt{\frac{0.3 * 116}{4\pi * 10}}$$
$$r = 0.53m$$

The minimum distance between the hob and the escape route is at least 2m throughout the apartments. Assuming occupants have shoulder width of 0.6m, two occupants would be able to escape side by side with surplus space. Therefore, the radiant heat flux in the proposed open-plan flats does not exceed 10 kW/m² as they pass the fire.

Once they reach the door to the common corridor, they will be separated by more than the 1.1m needed to keep exposure to within 2.5kW/m². This is tenable for 30 seconds, which is sufficient to allow occupants to open the front door and enter the common corridor, at which point they will be protected from the fire by fire resistant construction.

The analysis also takes no account of the effect of sprinklers in controlling the hob fire, the radiation absorption and cooling of the occupants' skin by the water spray. Therefore, in the event of a hob fire occupants should be able to escape safely from the flat.

Lalor, Jack

From: Wadood, Michael <michael.wadood@sweco.co.uk>
Sent: 12 January 2022 15:45
To: Jason Warren; Lalor, Jack; Reuben, Kurt; Roscoe, Luke
Cc: Sean Crummey
Subject: RE: Fitzrovia response to Fire radiated calculations

Jack,

Further to your email, I confirm that our 3rd party Fire Engineer considers the radiant heat calculation as acceptable – the commentary is around the fact that the size of the open plan flat with open kitchen falls outside of the guidance within BS 9991, which is referenced within your fire report.

We believe that your fire report should make a statement where the size of the open plan flat with open kitchen falls outside of the guidance in BS9991, then you have submitted radiation calculations as a means of justification.

We believe that the Fire Authority are now beginning to crack down on areas of non-conformity within fire strategy reports and British Standards.

I hope this clarifies.

Regards

Michael Wadood BSc(Hons), PPCABE, FCABE, FRICS, MCIQB
Mobile +44 7824 591 492
Telephone 020 7422 7800



From: Jason Warren <j.warren@stiffandtrevillion.com>
Sent: 12 January 2022 15:22
To: Lalor, Jack <jack.lalor@jensenhughes.com>; Reuben, Kurt <kurt.reuben@jensenhughes.com>; Roscoe, Luke <luke.roscoe@jensenhughes.com>; Wadood, Michael <michael.wadood@sweco.co.uk>
Cc: Sean Crummey <s.crummey@stiffandtrevillion.com>
Subject: Re: Fitzrovia response to Fire radiated calculations

Good afternoon Michael

Please could you respond to JGA comments below

Please could you reply to all so as to copy JGA in

Many thanks

Jason

Kind regards

Jason Warren
Senior Associate

APPENDIX B – MERGING FLOW

The south stair has a merging flow with the B1/D1 demise at both basement and ground floor level. BS 9999 gives the following equation for the final exit width in such a scenario: -

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

Where:

B = number of occupants escaping from basement

N = number of occupants escaping from ground

X = relevant exit width factor for the area

Sup = width of the stair serving the upper levels

There will be approximately 130 occupants in the B1/D1 demise at basement level, making it the largest retail occupancy at basement. All other units are assumed to use the familiar front entrance. As such, B = 130.

Assuming that the front entrance is blocked by a fire at ground in B1/D1, all occupants will be escaping into the south staircorridor. As such, N = 131.

Both areas are a B2 risk profile. As such, X = 3.485mm/person.

The south stair is 1200mm wide. However, it could be 1100mm without having a negative impact on escape capacity. As such, Sup has been taken as 1100mm.

Therefore: -

$$W_{FE} = (130 * 3.485) + (131 * 3.485) + (0.75 * 1100)$$

$$W_{FE} = 1735mm$$

The north stair has a merging flow with the B1/D1 demise at basement only. BS 9999 gives the following equation for such a scenario: -

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

Where B, X and Sup represent the same factors as above.

B will remain as 130.

X will remain as 3.485mm/person.

The north stair is 1200mm wide. However, it could be 1100mm without having a negative impact on escape capacity. As such, Sup has been taken as 1100mm.

Therefore: -

$$W_{FE} = (130 * 3.485) + (0.75 * 1100)$$

$$W_{FE} = 1278mm$$

The same calculation is applied to the door to the south stair where the basement will merge with the upper floors. As such, the door to the stair will be at least 1200mm.

Both stairs have a final exit of 1750mm. As such, the merging flows will be readily accommodated.

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JENSEN HUGHES