Independence House

Stage 3 Fire Strategy Report

Wimhurst Pelleriti

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Executive Summary

This report describes the fire safety strategy arrangements for the proposed Independence House Residential development on Lower Mortlake road, Richmond, London. The development is a single building compromising for five stories (basement -third) and has a height of 12.4m when measured to the top occupied storey. Ground – Fourth level consist of residential accommodation whilst basement level provides parking, bike storage and a resident's gym. A rooftop terrace is provided on level 3.

The key elements of this fire strategy are as follows;

- The fire strategy is based on BS 9991
- Elements of Structure throughout the building are to be protected with 60 minutes fire resistance
- The building is to be provided with a category 2 sprinkler system designed in accordance with BS9251:2021
- The evacuation strategy is based on a defend in place strategy;
- Escape from apartments is to be based on the following principals;
  - An LD2 fire detection system is to be provided within apartments provided with an entrance hall
  - Entrance halls are to be formed of fire resisting construction achieving at least 30 minutes fire resistance with FD30 fire doors (which need not be self closing). The furthest point within the entrance hall is to be 9m from the entrance door
  - An LD1 fire detection system is to be provided within apartments with an open plan layout
  - The furthest point within the open plan flats is to be within 20m
- Escape from common areas is based on;
  - All apartments will discharge into a single common lobby on each floor;
  - The common lobby is to be provided with a natural smoke ventilation system which is to be activated by an L5 fire detection and alarm system;
    - Most common lobbies are served by a natural smoke shaft providing a 1.5m^2 minimum cross sectional area
    - There is a ground floor lobby which will be served by a vertical AOV of 1.5m^2 free area direct to outside
    - The level 3 lobby will be provided with a horizontal 1.5m^2 AOV direct to outside at roof level
  - Travel distances within the common lobby do not exceed 15m
- Escape from ancillary accommodation is based on table 14 of BS9991
  - Escape from ancillary accommodation is generally acceptable however the following is noted;
    - A marginal extension in travel distance from the storage pods is observed but considered reasonable subject to agreement with the approving authorities
    - The basement carpark requires two directions of escape, it should be confirmed by the architect that the access ramp is compliant with Approved Document M for access and escape
- The building has been assessed and does not pose any risk of fire spread between buildings;
- The building is to be provided with a dry rising fire main at all levels

Contents

1.0

Introduction

1.0 Introduction

Wimhurst Pelleriti has commissioned Cundall to prepare a fire safety strategy report for **Independence House, Richmond**.

1.1 Objective of the report and assumptions

The objective of this report is to:

- Demonstrate to the statutory authorities how the relevant fire safety requirements of the Building Regulations will be satisfied;
- Provide advice to the design team/contractor to ensure that they can incorporate any fire safety requirements into the aspects of the design they are responsible for;
- Provide relevant fire safety information to assist those responsible for the management of the building and the safety of the occupants.

For the purposes of this strategy, it has been assumed that fire is an accidental event and that there is a single seat of fire. No account is taken of the potential for arson, which may typically be characterised by multiple seats of fire and the use of accelerants. However, it should be recognised that a number of the fire safety measures provided will also help to reduce the risk and consequences of arson, e.g. compartmentation, etc.

There is also no reliance placed on the fire service for rescue from the building; the assumption being that people should be able to escape from the building using their own unaided efforts.

The dimensions given for the escape routes in this strategy are the minimum required for the stated population. Wider doors and corridors may be required to satisfy other legislation, such as Part M of Schedule 1 to the Building Regulations, or for functional reasons. Therefore, wider doors etc., will be able to accommodate larger numbers of people.

It has been assumed that all building work carried out in accordance with Regulation 7 of the Building Regulations. Therefore, to ensure that the proposed fire safety system detailed within this report achieve the appropriate fire performance, it is recommended that all products, components, materials or structures relating to the fire strategy are installed using competent companies/persons and, where applicable, third party accreditation/certification.

Additional measures may be required for the purpose of property protection and business continuity, which are outside the scope of the Building Regulations. We do not expect there to be any additional measures required, however, it is recommended that the Client and their insurers are also consulted together with any other relevant parties. This fire strategy also does not address any environmental effects resulting from a fire within the building.

1.2 Building description

The proposed development on Lower Mortlake road, Richmond, London (See Figure 1-1)is an existing office building which is being converted into a multi-storey block of flats. The building consists of 5 storeys (Basement – Third Floor) and has a height of 12.4m measured from the fire service access level (see Figure 1-2). Ground – Fourth level consist of residential accommodation whilst basement level provides parking, bike storage and a resident's gym. A rooftop terrace is provided on level 3.

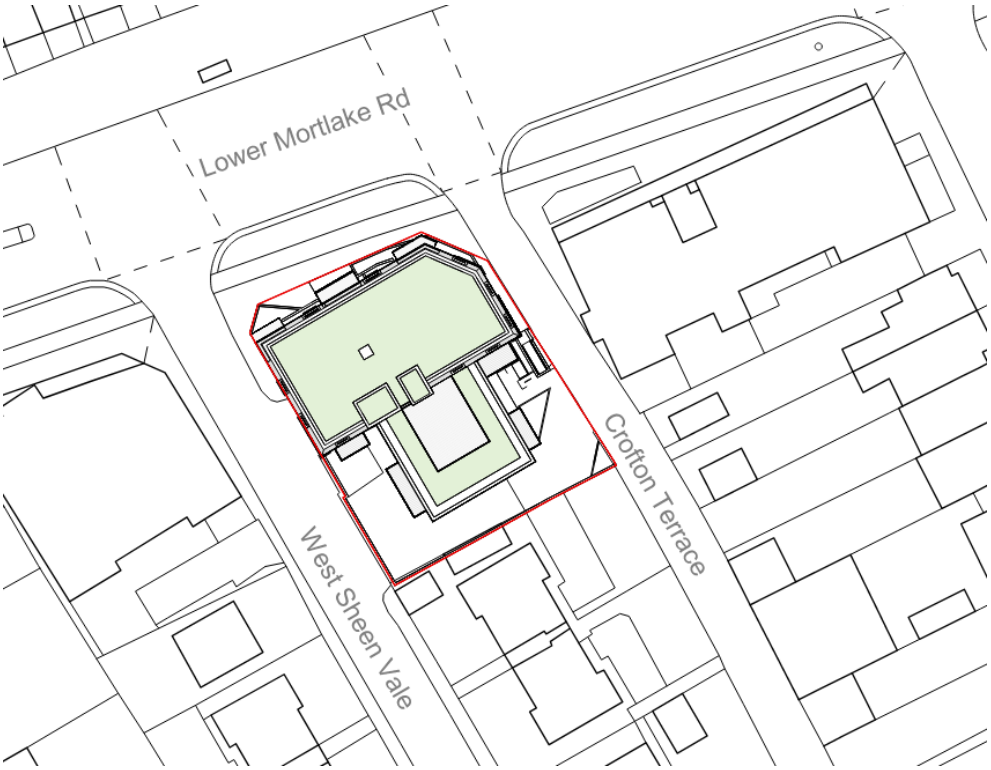


Figure 1-1 Site Plan

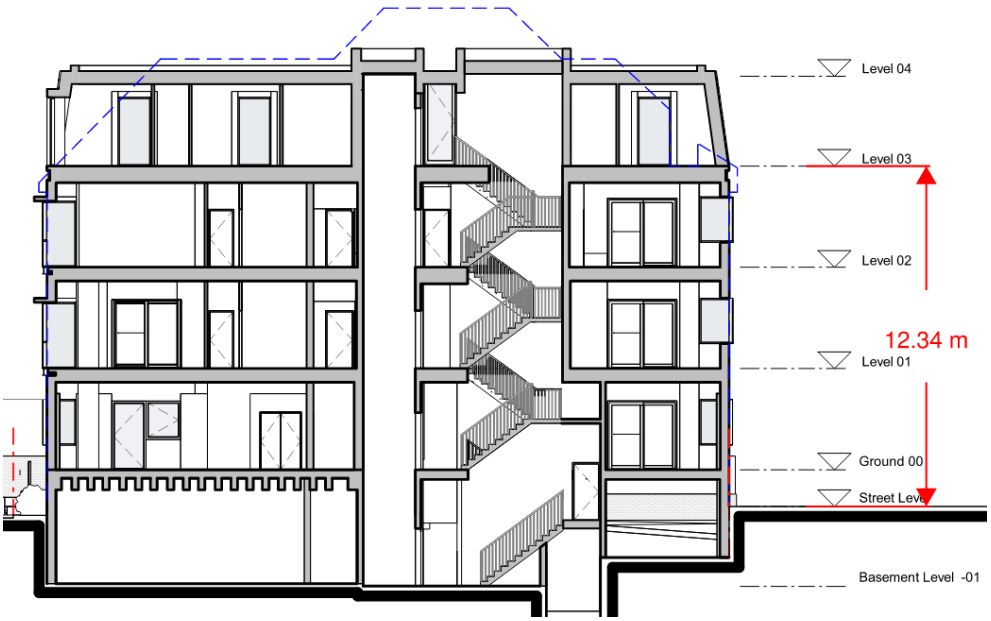


Figure 1-2 Building Height

1.3 Drawings and documents

This report should be read in conjunction with the following architectural drawings that demonstrate the proposed fire strategy:

Table 1-1 - Drawing List

Author	Number	Name	Revision	Date	Scale
Wimshurst Pelleriti	0810-WPA-0100	Proposed Site Plan	B	19/10/2023	1:500
Wimshurst Pelleriti	0810-WPA-0108	Proposed Basement	F	26/10/2023	1:200
Wimshurst Pelleriti	0810-WPA-0109	Proposed Street Level	E	19/10/2023	1:200
Wimshurst Pelleriti	0810-WPA-0110	Proposed Ground Floor Plan	F	26/10/2023	1:200
Wimshurst Pelleriti	0810-WPA-0111	Proposed Level 1 & 2 Plan	E	19/10/2023	1:200
Wimshurst Pelleriti	0810-WPA-0113	Proposed Level 3 Plan	E	19/10/2023	1:200
Wimshurst Pelleriti	0810-WPA-0114	Proposed Level Roof Plan	F	26/10/2023	1:200
Wimshurst Pelleriti	0810-WPA-0201	Proposed Section AA	D	19/10/2023	1:200
Wimshurst Pelleriti	0810-WPA-0202	Proposed Section BB	D	19/10/2023	1:200
Wimshurst Pelleriti	0810-WPA-0300	Proposed Section BB	D	19/10/2023	1:200
Wimshurst Pelleriti	0810-WPA-0301	Proposed Section BB	D	19/10/2023	1:200
Wimshurst Pelleriti	0810-WPA-0302	Proposed Section BB	D	19/10/2023	1:200
Wimshurst Pelleriti	0810-WPA-0303	Proposed Section BB	D	19/10/2023	1:200

2.0

Applicable legislation and guidance

2.0 Applicable legislation and guidance

2.1 Legislation

2.1.1 Building Regulations 2010

With few exceptions, all buildings built in England and Wales must comply with the England and Wales Building Regulations 2010.

The Building Regulations do not require anything to be done except for the purpose of securing reasonable standards of health and safety for persons in or about buildings, and for the conservation of energy in buildings. They cannot be applied retrospectively and make no recommendations relating to property protection, loss prevention or business continuity.

In England and Wales, the Regulations relating to fire safety are expressed in the form of six functional requirements, these being:

- Requirement B1 Means of warning and escape;
- Requirement B2 Internal fire spread (linings);
- Requirement B3 Internal fire spread (structure);
- Requirement B4 External fire spread;
- Requirement B5 Access and facilities for the fire service; and
- Regulation 38 Fire safety information.

2.1.2 Regulatory Reform (Fire Safety) Order 2005

All existing fire safety legislation, except that relating to the Building Regulations, has been gathered together under a single Order. This Order encompasses the previous requirements made under the Fire Precautions Act 1971 and the Fire Precautions (Workplace) Regulations 1997 and extends them to include a requirement to take precautions to safeguard other persons who may be affected by a fire in a building. This legislation is based on a risk-appropriate compliance and requires a fire risk assessment to be carried out once the building has been occupied.

This strategy document may be used as the basis for the fire risk assessment.

2.1.3 Construction (Design and Management) Regulations 2015

Projects undertaken in Great Britain and Northern Ireland are subject to the requirements of the Construction (Design and Management) Regulations 2015 (CDM). The objective of CDM Regulations is to reduce risk to health and safety during construction and maintenance of construction sites and occupied buildings.

To fulfil their duties under the CDM Regulations, the contractor should ensure, so far as reasonably practicable, the early installation and operation of fire protection measures contained within this report and any others required as part of the Contractor's construction phase fire safety plan.

Where any conclusions or recommendations, contained in this report, may result in significant or unusual risks during the construction, operation, maintenance or refurbishment of the proposed building, these will have been assessed in accordance with CDM Regulations 11 and 18 (duties for designers) and will be captured in the project risk register.

2.2 Design guidance

The guidance presented in this report has been based on the recommendations of BS 9991:2015: *Fire Safety in the design management and use of Residential buildings – Code of practice* and the associated British and European Standards (BS and EN respectively).

The recommendations of these standards are based largely on fire engineering principles and allow a greater degree of flexibility in the design when compared to other standards, such as Approved Document B: *Fire safety*. Using this approach will result in a more efficient and cost-effective design, without compromising on fire safety.

As with all British Standard Codes of Practice, these standards provide guidance and recommendations relating to its subject matter. It does not contain mandatory clauses or prescriptive requirements, and it is acceptable to develop alternative solutions from the recommendations made, provided such alternative designs are supported by adequate evidence that the functional requirements of the Building Regulations will be met, and other aspects of the standard are not compromised.

The Standard also acknowledges that in some circumstances it may be necessary to use one guidance document to supplement another and confirms that this is acceptable provided the overall approach is fully integrated into the final design solution.

Where an alternative approach has been taken, this is highlighted in the relevant section of the report, along with the necessary information to demonstrate compliance with the relevant requirements.

3.0

Fire Safety Systems

3.0 Fire safety systems

3.1 Fire detection and alarm systems

The building will be provided with automatic fire detection systems designed in accordance with the BS 5839-1 and BS 5839-6. The details of the proposed system are summarised below.

It is expected that the relevant designers and installers will develop the design of the system and will be responsible for providing the necessary certification and obtaining the necessary approvals. Where a variation is required to the recommendations of BS 5839-1, these will be identified and agreed with all relevant parties to ensure that the objectives of this fire strategy are satisfied.

3.1.1 Category of system and coverage

3.1.1.1 Apartments

Each apartment will be provided with a standalone system designed in accordance with BS 5839-6. The building is provided with apartments which are accessed via a protected entrance hall and those which are provided with an open plan layout.

For the apartments which accessed via a protected entrance hall, the system will be a Grade D2, Category LD2 system. This requires detectors to be located in all circulation areas of the apartments and any high fire risk areas, including kitchens.

For the apartments which accessed via a protected entrance hall, the system will be a Grade D1, Category LD1 system. This requires detectors to be located in all areas of the excluding bathrooms.

3.1.1.2 Common areas serving apartments

At Category L5 system designed in accordance with BS 5839-1 will be provided in the common areas of the building. This is provided only to operate the fire safety systems in the common areas. This will include:

- Smoke ventilation systems;
- Automatic hold open devices to doors;
- Any HVAC systems serving the common areas;
- Electronic access control systems will release where located on egress routes.

3.1.1.3 Ancillary spaces

The following ancillary spaces will be provided with an L2 automatic fire detection in accordance with BS 5839-1;

- Car Park
- Cycle Store
- Gym
- Storage pods

3.1.2 Audible and visual alarms

3.1.2.1 Apartments

The alarm signal will be distinct from any other alarms or signals used and the audibility of the alarm signal will not be less than 75 dB(A) at the bedhead within the apartments. Elsewhere within an apartment, the audibility will be not less than 65 dB(A), although this may be reduced to 60 dB(A) in enclosures of no more than 60 m^2 in area. Where the background noise is greater than 60 dB(A), the sound pressure level of the alarm signal will be 5 dB above this level, but not greater than 120 dB(A).

In addition to audible alarms, visual alarms satisfying the recommendations of BS 5839-1 will be provided in areas where it is anticipated that persons with impaired hearing may be located in relative isolation.

Rooftop plant areas will be provided with both audible and visual alarms as required.

3.1.2.2 Common areas serving apartments

No audible alarm will sound within the common areas due to the evacuation arrangements. The system is only provided to operate the fire safety systems.

3.1.2.3 Ancillary spaces

The alarm signal within these areas will activate a local sounder to alert any occupants within these spaces but will not trigger an alarm in other areas of the building.

3.1.3 Connection to other systems

Any systems that are designed to operate automatically in the event of a fire, provide an input to the fire alarm panel, or are required to shut down will be connected to the fire alarm system. Such systems will include:

- Background music, which will be cancelled on operation of the fire alarm system in the relevant fire zone;
- Smoke ventilation systems;
- The automatic sprinkler systems;
- Automatic hold open devices to fire doors;
- HVAC systems, e.g. closing of dampers, shutting down of fans;
- Electronic access control systems will release where located on egress routes;

3.1.4 Cause and effect

A full fire alarm cause and effects matrix for the fire alarm system will be created by those responsible for the design of the fire alarm system. This will be produced during the design stage of the system and agreed with the building management, and relevant authorities, prior to commissioning and handover.

The matrix will include the evacuation arrangements detailed in Section 4.0 of this report and all devices and systems connected to the fire alarm system and describe how the system is designed to operate. This will then be used as part of the commissioning process and any future fire alarm testing and maintenance. Any changes and modifications to the system will require the fire alarm cause and effects matrix to be updated accordingly.

3.2 Fire suppression systems

3.2.1 Sprinkler system

Due to the building possessing residential accommodation with a floor level 11m above fire service access level, the building is to be provided with an automatic sprinkler system. The sprinkler system is to be a Category 2 sprinkler system designed in accordance with BS 9251.

In accordance with BS 9251, the system may be permitted to serve as fire suppression in limited areas of non-residential accommodation subject to a maximum compartment area of 100m^2. Sprinkler heads within these areas will be quick-response heads and based on a discharge density of 5mm/min.

Coverage will include the external parking spaces at lower ground floor level which are located underneath the residential apartment, which shall be a wet-pipe installation which is to be provided with suitable trace heating to protect from frost.

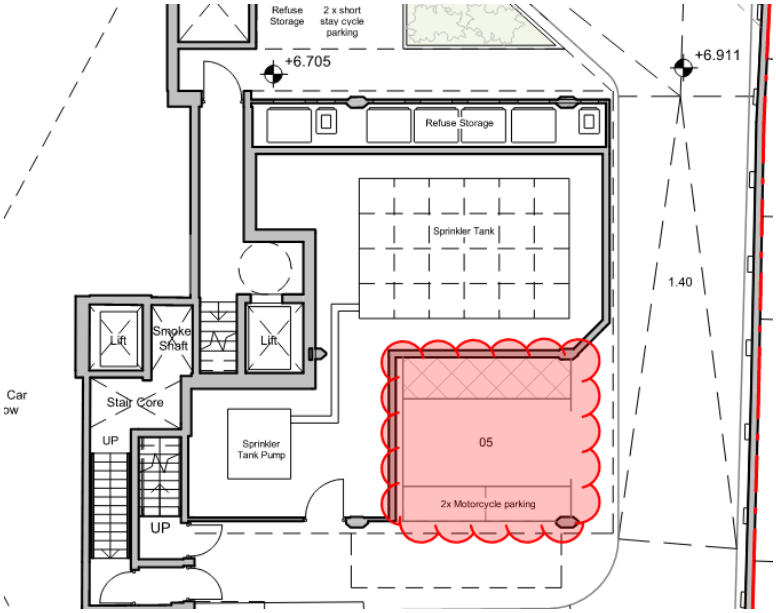


Figure 3-1: External car park to be provided with sprinkler coverage

3.3 Emergency lighting

Emergency escape lighting will be designed, installed and maintained in accordance with the appropriate recommendations of BS 5266-1 and BS EN 1838. The system will be self-contained and maintained, with a duration not less than 180 minutes.

Emergency luminaires being provided to the following areas:

- All internal circulation areas, open plan areas greater than 60 m^2 in area and any windowless accommodation;
- At every storey exit and final exit door;
- External escape routes and external areas in the immediate vicinity of exits;
- In all escape stairs to ensure that, each flight receives direct light. Lighting to escape stairs should be on a separate circuit from that supplying other parts of the system;
- At any changes in floor level and any changes in direction of escape routes;
- Close to (typically within two metres of) all fire safety, or other safety equipment;
- All toilets accommodation greater than 8 m^2 in area; and
- All plant rooms.

3.4 Ventilation systems

3.4.1 Smoke ventilation (common areas of blocks of flats)

3.4.1.1 Ground Floor

An Automatic Opening Vent (AOV) of minimum 1m^2 is to be provided at the ground floor to serve the corridor highlighted in Figure 3-2.

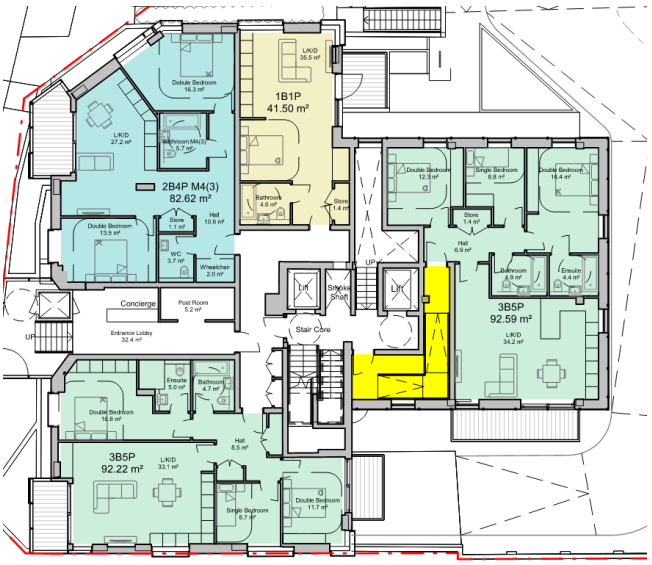


Figure 3-2 Ground Floor Corridor to be Ventilated by AOV

3.4.1.2 Ground – Second Floor

A natural smoke shaft is to be provided to serve the residential corridors on ground to second floor level. The smoke shaft and corresponding corridor are highlighted red and yellow respectively in Figure 3-3 for level 1. The smoke shaft will be designed in accordance with 14.2.3.2 of BS 9991, of which the key requirements are:

- The smoke shaft will provide a minimum free cross-sectional area of 1.5m^2
- The smoke shaft should extend a minimum of 2.5m above the highest storey served by the shaft and 0.5m above any obstructions within 2m of the shaft at roof level
- The shaft shall be served on each floor by AOVs providing a minimum free area of 1.0m^2.

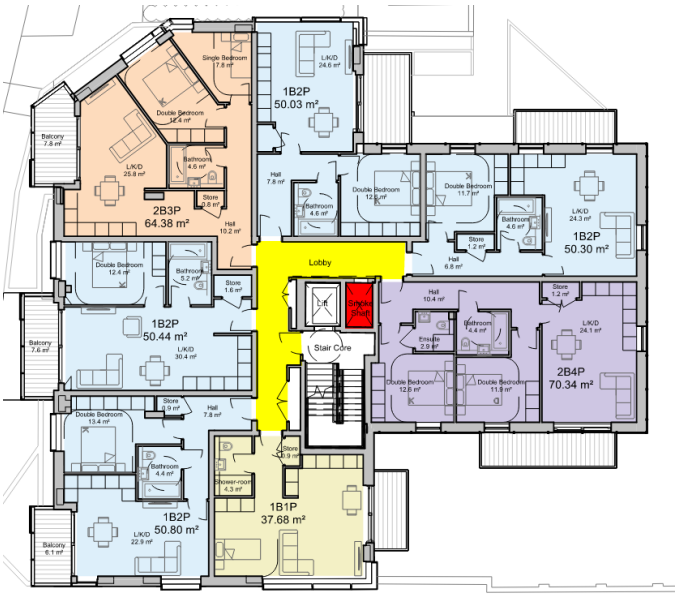


Figure 3-3 Corridor to be Ventilated by Natural Smoke Shaft

3.4.1.3 Third Floor

The third-floor common lobby will be provided with a roof-mounted AOV with minimum free area 1.5m^2 providing direct smoke ventilation to outside. The smoke shaft will not serve this lobby so that the projection of the shaft at roof level is minimised.

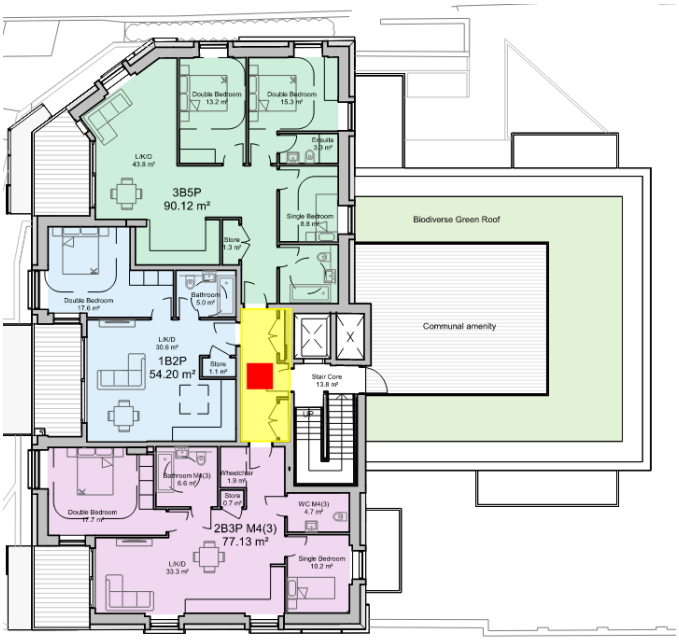


Figure 3-4: Lobby to be ventilated by roof-mounted AOV

3.4.2 Smoke ventilation (basements)

In accordance with clause 14.2.1.3 of BS9991, a basement should be provided with a smoke ventilation system where it is more than 3m below ground level or has a floor area of more than 200m^2. Additionally, because the basement will be sub-divided into compartments to satisfy the maximum compartment area outlined in Section 3.2, each compartment should be provided with smoke ventilation which does not rely on the opening of doors between compartments.

Basement compartments are to be provided with natural smoke outlets to the external air with smoke outlets providing a minimum ventilation area of 2.5% of the floor area of the compartment.

3.4.3 Smoke ventilation (car parks)

A smoke and heat ventilation system is to be provided from the covered basement car park designed in accordance with BS 7346-7. This may comprise a natural smoke ventilation system providing not less than 2.5% of the car park floor area with half of the ventilation provided on opposing faces of the car park to provide cross flow.

3.4.4 Heating, ventilation and air conditioning systems (HVAC)

Ductwork will be designed in accordance with the recommendations of BS 9999, fire dampers will be provided within the thickness of the fire separating elements where non-fire resisting ductwork passes through fire resisting construction. Ductwork should be arranged so that it does not pass through the protected stairs and protected escape routes. Where this is not practicable, then a combination of fire resisting ductwork and fire dampers operated by the fire alarm system may be required. For the purposes of the ductwork design, protected escape routes comprise the following:

- Common staircases
- Stair corridors / lobbies at ground floor and above

Where practicable air transfer grilles should avoid being provided within fire-resisting walls and doors. However, intumescent type grille may be fitted where the construction does not form a protected escape route. Where the wall or door forms part of a protected escape route, air transfer grilles should be avoided or fire and smoke dampers provided that operate on operation of the fire alarm system.

3.5 Access control systems, door fastenings, and hold-open devices

Where doors are normally secured against entry, they will only be fitted with a lock or fastening, which is readily operated, without the use of a key and without having to manipulate more than one mechanism. Where the door is likely to be used by more than 60 persons, panic hardware complying with BS EN 1125 should be installed on the side approached by persons making their escape.

Where electrically powered locks are provided, then they should return to the unlocked position under the following conditions:

- On operation of the fire alarm system;
- On loss of power to the system;
- On system error;
- On activation of a manual door release unit positioned on the side of the door approached by occupants making their escape.

Where hold-open devices are provided to fire doors, these will release the door automatically on operation of the fire alarm system, following the agreed cause and effect. In addition, the door hold-open device will release the door on failure of the power supply. Door hold-open devices will be in accordance with the relevant requirements of BS EN 1155.

3.6 Active fire curtains and barriers

Active fire curtains/barrier assemblies in buildings will be self-closing under gravity and should be tested and installed in accordance with BS 8524-1 and BS 8524-2. The activation of a curtain will be initiated by an appropriate automatic detector located locally to the fire curtain/barrier. Where located on an escape route suitable re-tract controls will be provided on the side approached for escape.

The location of fire curtain barriers required is shown in Figure 3-5 below.

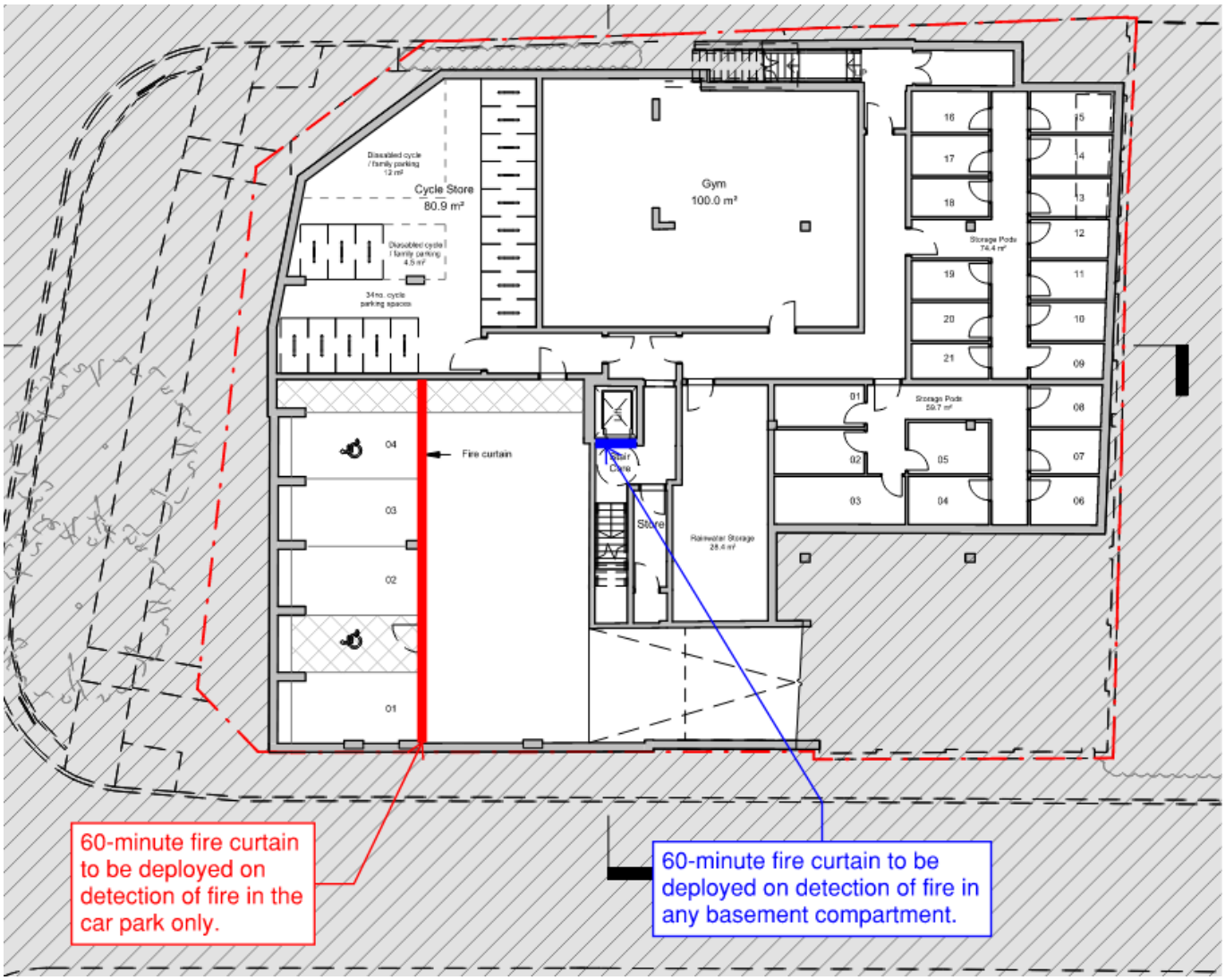


Figure 3-5 Ancillary Accommodation Fire Curtains

3.7 Evacuation lifts

To satisfy policy D5(B5) of the 2021 London Plan, the building lift will be designed for evacuation purposes to provide a suitable and dignified means of egress for mobility impaired persons. Evacuation lifts will be designed and installed in accordance with Annex G of BS 9999 and BS EN 81-20 and BS EN 81-70 where practicable. Two evacuation-capable lifts are to be provided, as illustrated in Figure 3-6. The evacuation lift highlighted in yellow is to provide access from all floors to ground floor level whilst the evacuation lift highlighted in blue is to assist navigation of the level change between ground floor and street level.

The design of the lift may be based on one of the following approaches:

- If the building is to be provided with a 24/7 concierge or other form of permanent staff, then the evacuation lift will be designed and certified as an evacuation lift in accordance with BS 9999 annex G, BS EN 81-20 and BS EN 81-70. The lift shall be programmed to descend to ground floor, the doors open and controls be disabled on activation of either the L5 common fire detection or basement fire alarm systems. Override controls for a member of staff to assume control of the lift will be provided at level 00.
- If the building is not provided with 24/7 concierge, the lift will be designed to follow the recommendations for secondary power supply, spatial dimensions and other features of fire protection as per the relevant British Standards, however the lift shall be programmed to remain operational to enable mobility-impaired occupants to self-evacuate using the lift. The lift should be interlinked with the L5 common detection system and programmed to prioritise lift call signals from the fire-affected storey.

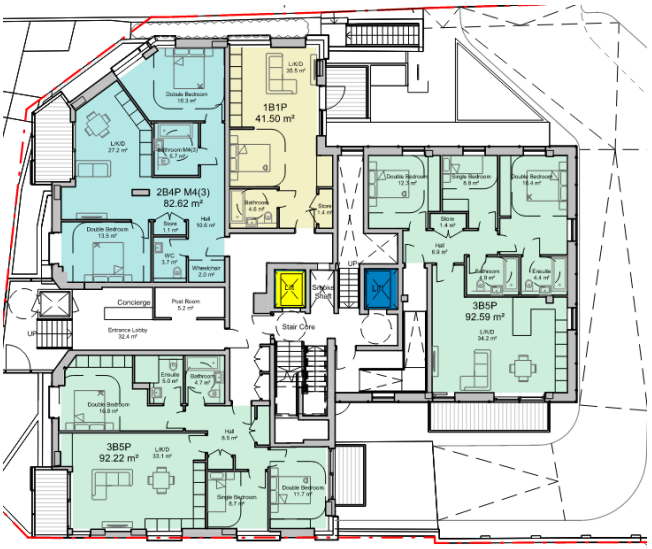


Figure 3-6 Evacuation Lifts

3.8 Water supplies for fire-fighting

3.8.1 Hydrants

There should be sufficient hydrants located near to the building for use by the fire service. The location and suitability of hydrants and the flow rates will need to be determined by the fire service based on their risk assessment.

Typically, where there are existing hydrants within 90 m of the building, there are no additional requirements for the purposes of Building Regulations. If new hydrants are required, then consultation should be undertaken with the fire authority to determine the number and location of hydrants. All new hydrants should be designed and installed in accordance with BS 9990.

3.8.2 Fire mains

Dry rising mains will be provided in accordance with BS 9990. The location and arrangement of the dry rising mains will be in accordance with Section 7.0 of this report.

3.9 Emergency power supplies

Secondary power supplies will be required to all life safety and fire-fighting systems, e.g. fire-fighting lifts, mechanical ventilation systems etc. The secondary power supply should ensure that these critical systems remain active on loss of normal power service to the building. The arrangement of the power supplies should be in accordance with BS 8519.

3.10 Fire safety signage

Every escape route, other than those in ordinary use, will be distinctively and conspicuously marked by emergency exit signage of adequate size. The signage will be consistent throughout the building and will comply with the recommendations of BS ISO 3864-1 and BS 5499-4 and comprise of a graphical symbol, directional arrow and supplementary text.

Consideration needs to be given to any fit-out design and position of furniture, partitions, and fixings that could obscure signage or the escape route. Therefore, this should be reviewed as part of any on-going fire risk assessments once the building is occupied.

Fire safety signs to identify fire-fighting equipment, fire alarm call points and disabled refuges along escape routes will be provided in accordance with Section 10.4.3 of BS 9999. Signs, in accordance with BS EN ISO 7010 will be provided on fire doors to indicate that they should be kept shut. An exception to this is any fire door held open by electromagnetic devices connected to the fire alarm.

All fire safety signs which indicate escape routes shall be illuminated by means natural lighting or artificial lighting. To cater for power failure, emergency lighting will be located to provide sufficient illumination to these signs such that they are clearly distinguishable by occupants.

4.0

Means of escape

4.0 Means of escape

4.1 Evacuation arrangements

The evacuation arrangements for the residential areas of the buildings are based on a defend in place approach, where only the occupants of the apartment of fire origin will be expected to evacuate. Occupants within other areas of the building will not receive an alarm, but if they consider it necessary to evacuate, then fire safety measures have been incorporated into this fire strategy to allow them to do so.

4.2 Escape from Residential Areas

4.2.1 Escape From Apartments with an entrance hall

Where apartments are based on an entrance hall design, occupants should be able to escape from either:

- The furthest point within the apartment in a 9m travel distance; or
- The further point in the entrance hall within 9m provided that the entrance hall is a protected entrance hall formed of 30 minutes fire rated construction with FD 30 fire doors (these need not be self-closing);

Based on the current design, all entrance halls are considered acceptable provided they are protected entrance halls. Alternatively, based on the provision of an automatic sprinkler system throughout the building, if these apartments are provided with an LD1 automatic fire detection system, the allowable travel distance is extended to 20m and thus may be considered compliant without the entrance halls requiring protection.

4.2.2 Escape From Apartments with an Open Plan Layout

All apartments with an open plan layout should be capable of escape within a 20m travel distance. All open plan apartments have been reviewed and are considered compliant within this limit.

Cooking facilities within open plan apartments are recommended to be sites such that occupants are not required to escape within 1.8m of the cooking appliance with an escape route width of 0.9m.

4.2.3 Escape From Common Areas

The building is provided with a single stair core, however it should be noted that this core is divided into two separate escape stairs at street level. One stair provided downwards escape from Ground – Fourth Level and one stair providing upwards escape from basement level. This is best observed at Street Level as illustrated in --- with the basement stair highlighted in yellow and the residential stair highlighted in blue. Both stairs are to be separated from each other by fire resisting construction achieving at least 60 minutes fire resistance. It is noted that the lift core (highlighted in blue) passes through and provides access to both stairs at various levels, it is therefore proposed to provide a fire curtain in front of the lift at basement level to maintain the separation between both stairs (see section 3.0)

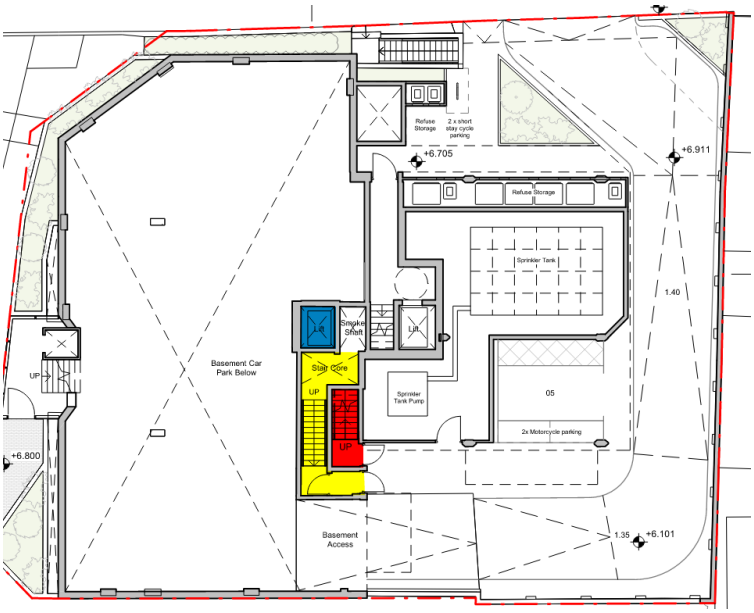


Figure 4-1 Stair Discharge and Separation

4.2.3.1 Ground – Third Level

Means of escape of ground – fourth level is based on a protected lobby approach in accordance with figure 6b of BS9991. The acceptable travel distance in a protected lobby approach based on travelling through a ventilated space (noting the provision of an automatic sprinkler system in the building) is 15m. All travel distances on ground – fourth level have been reviewed and are considered acceptable. This is illustrated in Figure 4-2.

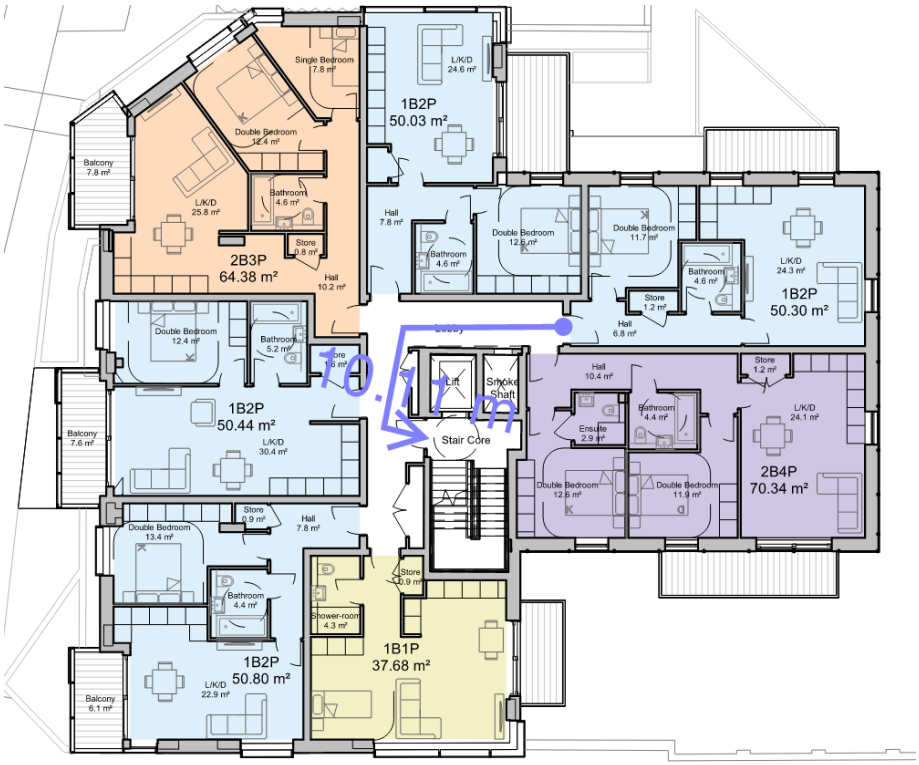


Figure 4-2 Residential Common Area Travel Distance

4.2.3.2 Basement Level

In accordance with table 14 of BS9991, the acceptable travel distance for a common amenity area is 18m in the single direction and 45m where two directions of travel are provided. This has been reviewed and is generally considered acceptable as illustrated in Figure 4-3. However, there are two travel distances of note on the basement level;

- The single direction travel distance from the furthest car parking space to the protected stair exceeds the maximum allowable travel distance (measured at 19.2m to the staircase entrance door). This is generally considered to be acceptable as the travel distance within the car park itself is less than 18m and the fire risk within this room will be contained by the proposed fire curtain. Additionally, escape is immediately into a protected corridor where the travel distance to the protected staircase is short (1.2m).

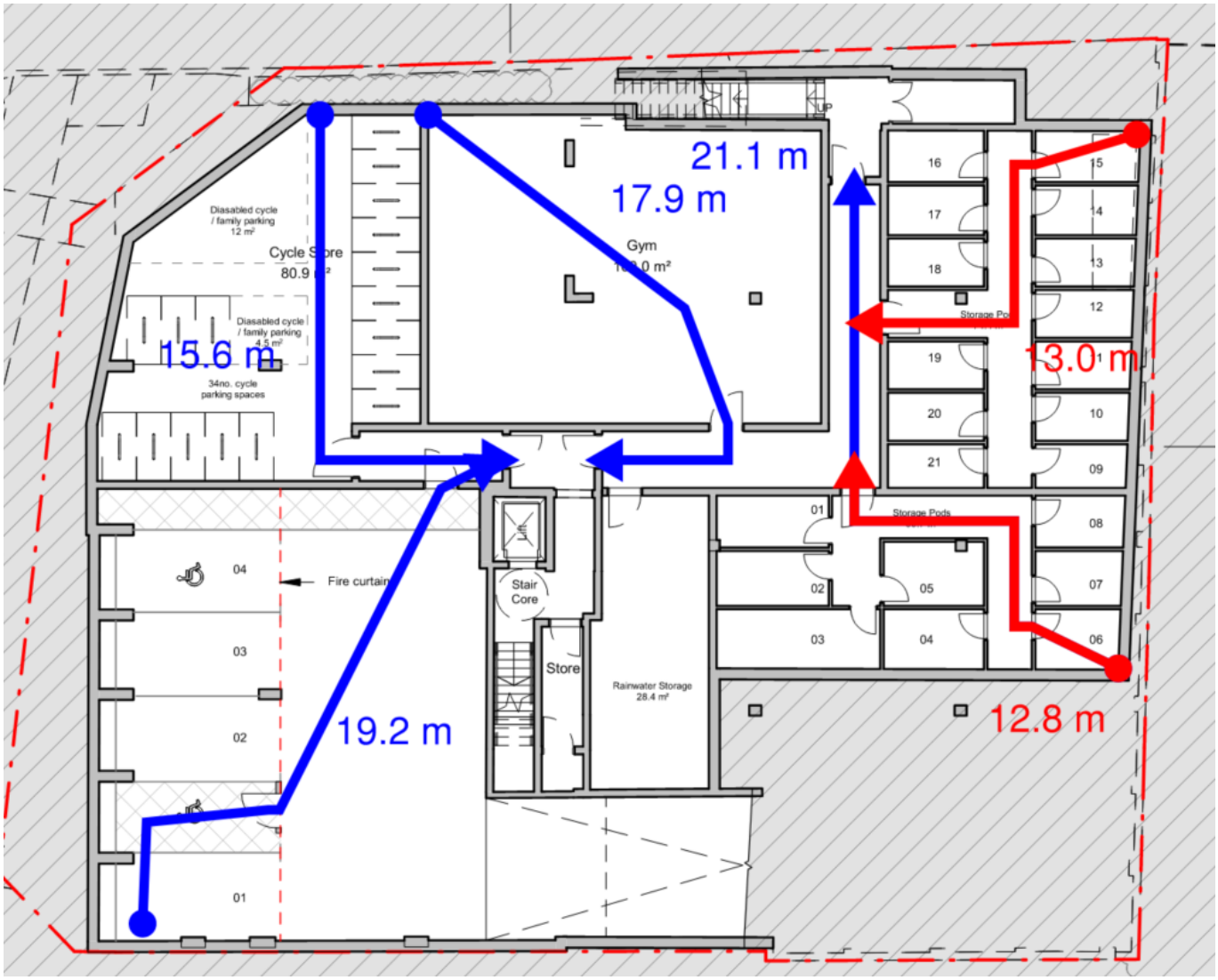


Figure 4-3 Basement Area Travel Distance

4.3 Stair and Exit Widths

4.3.1 Doors and Corridors

For the purposes of satisfying the fire safety strategy, doors and corridors that are of sufficient width to satisfy other aspects of the building regulations will be suitable for use as a means of escape.

Doors should be hung in a manner that they do not reduce the width of common escape routes when opened.

4.3.2 Stairs

The minimum width of a common stair in BS 9991 is 750 mm. However, whilst the stair does not form part of a firefighting shaft, it will be used for firefighting purposes. Therefore, it is recommended that this stair is has equal width as a firefighting stair, thus this should be increased to 1,100 mm. This width should be kept clear for a vertical headroom of at least 2 m.

For the purposes of escape, the handrails can be discounted when determining the stair width, provided they do not intrude more than 100 mm into the stair width.

Both stairs within the development have been reviewed and are considered in line with the above recommendations.

4.4 Means of escape mobility impaired occupants

In the current arrangement, it is proposed to provide a two fire curtains at either side of a fixed partition in the basement car park to limit the overall compartment size of the car park. However, the proposed arrangement currently presents a hazard to occupants requiring a wheelchair in that they may have to travel between a car and the curtain to escape. It is therefore recommended that an additional partition and fire door is installed as illustrated in Figure 4-4.

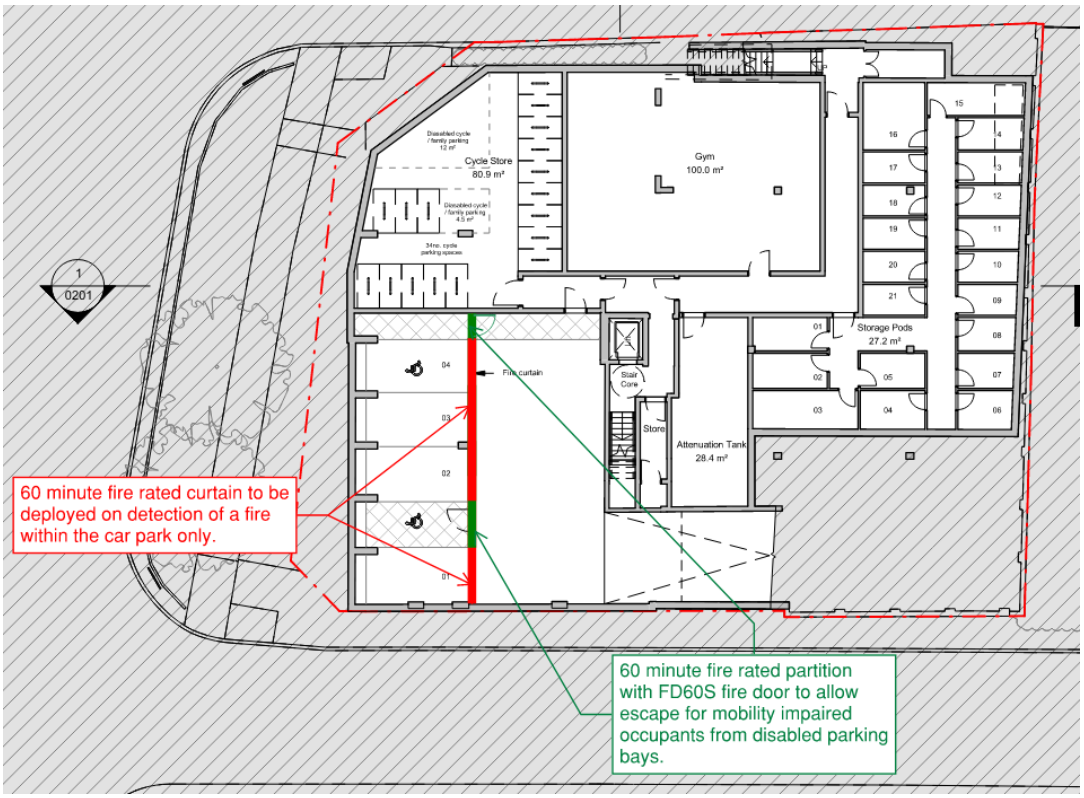


Figure 4-4 Mobility Egress Arrangements in basement Car Park

4.4.1 Evacuation Lifts

Two evacuation lifts are to be installed within the building to provide a means of escape for mobility impaired occupants on all floors.

5.0

Internal fire spread

5.0 Internal fire spread

5.1 Linings of walls and ceilings

Although they are not likely to be the materials first ignited, the interior wall and ceiling surfaces can have a significant influence on how fast a fire may spread through the building. This is particularly important in circulation spaces, where the rapid spread of fire is most likely to prevent occupants from escaping. Therefore, any new linings of the walls and ceilings within the building should satisfy the surface spread of flame classification outlined in Table 5-1 below.

These provisions do not apply to the upper surfaces of floors and stairs and exclude door and window frames, architraves, skirting, picture rails and fixed furniture.

Table 5-1: Classification of linings of walls and ceilings

Location		European Classification (In accordance with BS EN 13501-1)
Non-residential (i.e. basement)	Rooms not more than 30 m^2 in area	D-s3, d2
Residential	Rooms not more than 4 m^2 in area	
All other rooms		C-s3, d2
Circulation spaces		B-s3, d2

Thermoplastic materials that do not meet the performances set out in Table _ above, can however still be used in windows, roof-lights and lighting diffusers in suspended ceilings so long as they comply with the recommendations set out in AD B. Roof-lights used in circulations spaces and rooms may be used so long as they are constructed of a thermoplastic material if:

- The lower surface has a TP(a) rigid or TP(a) classification;
- The size and disposition of the roof-lights accords with the limits in Table 5-2 below.

Table 5-2: Limitations applied to thermoplastic roof-lights and lighting diffusers in suspended ceilings and Class 3 plastic roof-lights

Minimum classification of lower surface	Use of space below the diffusers or roof-light	Maximum area of each diffuser panel or roof-light (m^2)	Max. total area of diffuser panels and roof-lights ad percentage of floor area of the space in which the ceiling is located (%)	Minimum separation distance between diffuser panels or roof-lights (m)
TP(a)	Any except protected stairway	No limit	No limit	No limit
Class 3 or TP(b)	Rooms	5	50	3
	Circulation spaces except protected stairways	5	15	3

5.2 Loadbearing elements of structure

The load-bearing elements of structure will be provided with not less than 60 minutes fire resistance.

Elements that only support the roof of the building need not necessarily require fire resistance. However, where the roof forms the function of a floor, e.g. rooftop plant areas, structural elements supporting these areas should be provided with fire resistance. It is noted that the lower-level room provides a communal terrace, therefore the structure supporting this roof should be achieve 60 minutes fire resistance.

In addition, structure supporting compartment walls or protected areas of external wall also needs to achieve the same level of fire resistance as the elements it supports.

5.3 Compartmentation and fire resisting enclosures

5.3.1 Compartmentation floors

As the building contains a sleeping risk, all floors will be constructed as compartment floors and achieve not less than 60 minutes fire resistance from the underside. These will form a complete barrier with all openings, joints, and services will be suitably fire-stopped where they pass through the floor, unless they are located within a protected shaft.

5.3.2 Compartment walls

All residential apartments are to be designed as 60-minute fire resisting compartments and enclosed in walls which achieve a fire resistance of not less than 60-minutes.

All compartment walls and floors will form a complete barrier between the compartments they separate, with compartment walls running the full storey height.

At the junction of a compartment wall and internal non-fire resisting cavity wall (see Section 6.1.3 for junctions with external walls) a cavity barrier will be provided to maintain the integrity of the junction. This cavity barrier will achieve not less than 30 minutes fire resistance (integrity) and 15 minutes (insulation). The following are also considered to be acceptable as cavity barriers within internal cavity walls without any required test evidence or certification.

- Steel at least 0.5 mm thick; or
- Timber at least 38 mm thick; or
- Polythene-sleeved mineral wool, or mineral wool slab, in either case under compression when installed in the cavity; or
- Calcium silicate, cement-based or gypsum-based boards at least 12 mm thick.

The above also applies to around any openings, e.g. doors, located within fire resisting cavity walls.

The compartment walls will be designed to resist the deflection of the floor above: either by having a suitable head detail between the wall and floor; or can resist the additional vertical loads from the floor as it deflects.

Where a compartment wall meets the underside of the roof, the wall will be taken to the underside of the deck or roof covering and suitably fire stopped. The roof either side of the compartment wall will achieve a classification AA, AB, or AC (national classes) or B_{ROOF}(T4) (European class) for a distance of 1,500 mm (See also Section 6.3 for classification of roofs in general).

5.3.3 Fire resisting enclosures

In addition to the compartment described above, the following rooms and spaces will be enclosed in fire resistance construction:

- All ancillary accommodation on the basement level is to be enclosed in fire rated construction achieving a fire resistance of not less than 60-minutes, including each storage pod as each is under a different ownership.

5.4 Concealed spaces (ceilings and floors)

Cavity barriers will be provided to sub-divide any cavities, so that they do not exceed 20 m in any direction (this can be increased to 40 m where the space below the cavity is open plan, provided that the surfaces within the cavity achieve Class 1 or better, and there are cavity barriers above any walls bordering the open-plan room).

Additional cavity barriers should be provided to close any cavities, and also be located above/below any fire resisting construction forming a protected escape route.

All cavity barriers should achieve a minimum of 30 minutes fire resistance (integrity) and 15 minutes fire resistance (insulation). They should be tightly fitted in accordance with the manufacturer's instruction and, where practicable, mechanically fixed in position.

Around any openings, e.g. fire resisting door frames, windows, etc., the cavity barriers may be formed of:

- Steel at least 0.5 mm thick; or
- Timber at least 38 mm thick; or
- Polythene-sleeved mineral wool, or mineral wool slab, in either case under compression when installed in the cavity; or
- Calcium silicate, cement-based or gypsum-based boards at least 12 mm thick.

Note: *In some instances, additional cavity barriers may be required where it has been identified that fire detectors are omitted from ceiling cavities as part of a fire risk assessment.*

5.5 Fire stopping of openings and services

All openings and joints between fire separating elements will be adequately fire stopped and all openings for services that pass through fire separating elements will be:

- Kept as few in number as possible;
- Kept as small as practicable; and
- Fire stopped (which is the case of pipes or ducts allow for thermal movement).

The selection of fire stopping products and materials will take account of the size and nature of the gap and any anticipated differential movement.

5.5.1 Fire doors, shutters and curtains

Doors within fire resisting construction will be fire doors achieving the same level of fire resistance as the wall and fitted with self-closing devices, unless the fire door is normally kept locked shut, e.g. storerooms. Fire doors to protected stairs and any service risers may be half the fire resistance of the wall, but in no case less than 30 minutes fire resistance.

Cold (flexible-edged) smoke seals will be provided to all doors forming part of protected escape route, i.e. the protected stairs and to dead-end corridors.

Hold open devices, which release the door on activation of fire alarm system, may be provided where the doors could provide a hindrance to normal circulation. The doors provided with these devices will be determined by the client, design team, and/or fire risk assessor.

5.5.2 Ventilation ductwork

Where ductwork passes through fire resisting construction, provision should be made to ensure that the integrity of the compartment is maintained. This can be achieved by one of the following methods;

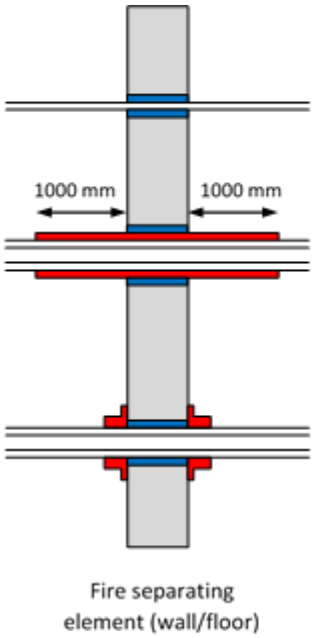
1. Thermally actuated fire dampers. (Note these are not suitable for kitchen extract ductwork or protected escape routes)
2. Fire Rated Ductwork (Note this cannot be used where the ductwork is required to serve both sides of the fire resisting construction is passes through)
3. Fire Rated enclosures (Note this cannot be used where the ductwork is required to serve both sides of the fire resisting construction is passes through)

4. Electronically actuated fire and smoke dampers linked to the fire alarm (Note these are not suitable for kitchen extract ductwork)

For the purposes of the fire safety strategy, it should be noted that all corridors, lobbies and stairs are considered to be protected escape routes and thus option 1 is not suitable for this development.

5.5.3 Fire stopping of pipes

Pipes that pass-through fire resisting construction, unless they are contained within a protected shaft, will satisfy the provisions detailed in Figure 5-1 below:



- **Fire stopping only** – maximum allowable diameters:
  - **160 mm** – non-combustible pipes.
  - **110 mm** – pipes of lead, aluminium, aluminium alloy, fibre-cement or uPVC through protected shafts (excluding stairways and lifts shafts).
  - **40 mm** – pipes of any other material or situation.
- **Sleeving** – pipes of lead, aluminium, aluminium alloy, fibre-cement or uPVC with a maximum diameter of 160 mm can be provided with a sleeve of non-combustible pipe. The sleeving needs to extend 1000 mm either side of the fire-separating element.
- **Proprietary seals** – suitable for any pipe diameter. Install in accordance with manufacturer's instructions.

Figure 5-1 Fire stopping for pipes

6.0

External fire spread

6.0 External fire spread

6.1 Construction of external walls

6.1.1 Material classification

All materials and products (other than those specifically stated below) forming part of the external wall construction will achieve a classification A2-s1, d0 or better, as defined by BS EN 13501-1. This includes any specified attachments, such as balconies, brise soleil, etc. fixed to the external wall.

The following elements are not required to achieve the above classification:

- Internal linings of the external walls will follow Section 5.0 of this report;
- Membranes (these should achieve a minimum Class B-s3, d0);
- Window frames and glass, including laminate glass, (window spandrel panels and infill panels must comply);
- Thermal breaks, where they do not span compartments;

6.1.2 Fire resistance of external Walls

6.1.2.1 Re-entrant Corners

Where an internal fire resisting wall meets the façade at a point a corner is present, there is a risk that fire could spread around the fire resisting enclosure by breaking out of the building and back in. In order to prevent this risk, areas of the external wall should be fire rated to the same level as the internal fire resisting wall. This occurs in one location on the proposed design as illustrated in Figure 6-1.

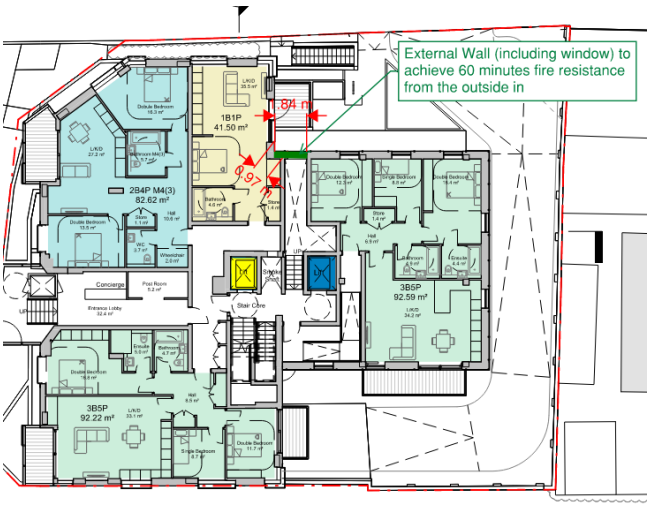


Figure 6-1 Re-entrant corner Fire Resistance

6.1.2.2 External Escape Routes

Where occupants are required to continue travelling past an external wall once they have escaped the building, it should be ensured that a fire cannot break through that external wall and compromise the means of escape. This occurs in two locations on the proposed design as illustrated in Figure 6-2.

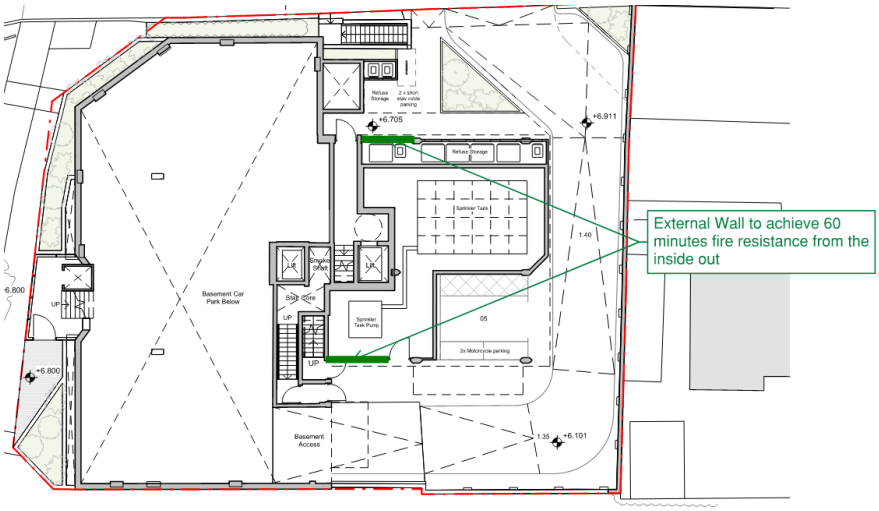


Figure 6-2 External Escape Route Fire Resistance

6.1.2.3 Protected Area to Prevent Fire Spread Between Buildings

Where an area of the façade is required to achieve a fire resistance to prevent fire spread between buildings, this should achieve at least 60 minutes fire resistance with regard to integrity and 15 minutes with regard to insulation from inside the building. The requirement for any protected area is detailed in Section 6.2.

6.2 Space separation analysis

To limit the potential for fire spread between buildings, it is necessary to provide a sufficient separation distance between them. The separation distance required depends on the size of the fire compartment, the amount of unprotected area provided on the opposing façade and the provision of an automatic sprinkler system. The Enclosing Rectangles Method outlined in BR 187: *External fire spread – Building separation and boundary distances Second edition* has been used to determine the requirements for limiting external fire spread for this building.

For the purposes of the analysis, the boundary distance is taken from the face of the façade to the opposing site boundary. Where a roadway is located along the site boundary, then the distance can be extended to the centreline of the road. The relevant boundary for each elevation is illustrated in Figure 6-3. For the purposes of this assessment, it is noted that the height between compartment floors is 3.7m.

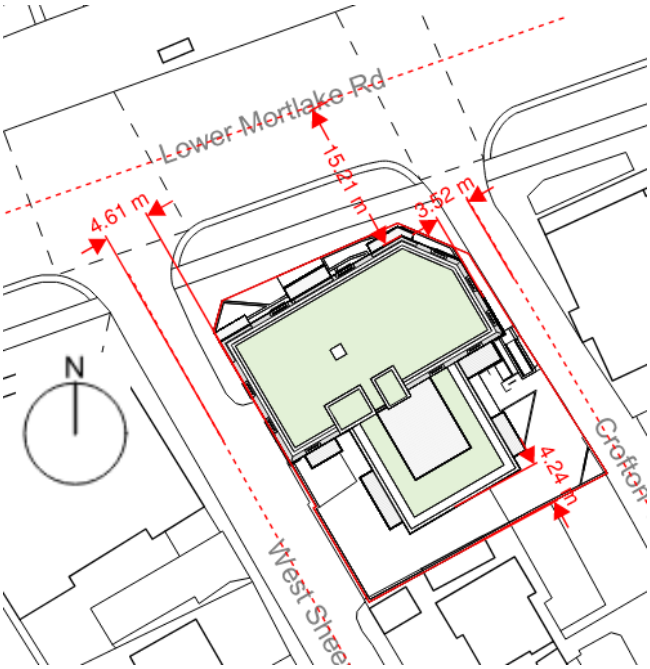


Figure 6-3 External Fire Spread Required Boundaries

Table 6-1: External fire spread analysis

Elevation	Width	Enclosing Rectangle Area	Extent of Area (Assuming 100% Unprotected)	% Unprotected Area	Minimum Required Boundary	Compliant?
North	15.4	6x18 = 108m^2	3.7x15.4 = 57m^2	52.8	2.1m	Y
East	17.2	6x18 = 108m^2	3.7x17.2 = 63.64m^2	58.9	2.2m	Y
South	12.6	6x15 = 90m^2	3.7x12.6 = 63.64m^2	51.8	2.1m	Y
West	7.0	6x9 = 54m^2	3.7x7 = 25.9m^2	47.96	1.45m	Y

Based on the analysis as set out by the worst case scenario in , there is no requirement for any protected area in the development.

6.2.1 Provision of cavity barriers in external walls

Cavity barriers will be provided in any cavities formed within the external wall construction as follows:

- To close any openings, e.g. windows doors, service penetrations, etc;
- In line with any compartment walls; and
- To sub-divide a cavity such that it does not exceed 20 m.

Cavity barriers within the external wall construction will achieve a fire resistance of not less than 30 minutes for integrity and 15 minutes for insulation. Where provided around an opening or in external masonry-walls the cavity barriers may be formed of:

- Steel at least 0.5 mm thick; or
- Timber at least 38 mm thick; or
- Polythene-sleeved mineral wool, or mineral wool slab, in either case under compression when installed in the cavity; or
- Calcium silicate, cement-based or gypsum-based boards at least 12 mm thick.

Where practicable, the cavity barriers should be tightly fitted to rigid construction and mechanically fixed in place.

6.3 Construction of roofs

As noted in section 5.3, each apartment is to be contained within its own separate fire compartment. On the topmost levels there is a risk that fire could spread over the compartment walls via the roof. To mitigate this risk, the roof should be provided with a covering achieving at least Broof(t4) on a substate or deck of a material achieving at least A2-s3,d2. Both the covering and the substrate should be tested in accordance with the relevant parts of BS EN 13501.

In addition to the above, due to the provision of a Green Roof and PV Panels the below should be considered to address the risk.

6.3.1 Green Roof

It is noted that the lower-level roof is provided with a green roof system. At the time of this report, there is no published guidance in the BS9991 or Approved Document B for the fire safety provisions with regard to green roofs. However, Government sponsored research carried out by Warrington Fire and available on the UK government website notes that for small green roofs (less than 40m in length) are considered to be acceptable provided they comply with the guidance as noted in BS9991. Therefore, no further provisions are required for the green roof on Independence house.

6.3.2 PV Panels

At the time of this report, there is no published guidance in the BS9991 or Approved Document B for the fire safety provisions with regard to PV Panels. However due to the unique risk posed by PV Panels the following should be considered for the PV panel installation at the upper-level roof of Independence house;

- An isolator switch should be provided at fire fighting access level to allow the fire service to manually isolate the PV panels in the event of a roof fire or fire spreading to the roof;
- Clear access/maintenance walk ways should be provided to allow the fire service to access the seat of a fire;
- PV Panels should be spaced as far apart as practical to minimise the risk of fire spread across the roof via the panels

7.0

Access and facilities for the fire service

7.0 Access and facilities for the fire service

7.1 Water supplies

There should be sufficient hydrants located near to the building for use by the fire service. The location and suitability of hydrants will need to be determined by the fire service based on their risk assessment. This is to ensure that there is sufficient flow and pressure in the main to support fire-fighting activities, which can vary based on the location, size, height and use of the building.

Desktop survey has indicated that the site is served by existing fire hydrant located immediately outside the building on the corner of Lower Mortlake Road and West Sheen Vale. Provided that this hydrant is in good working condition and provides acceptable pressure and flow rates for the local fire authority's use, it is expected that further private hydrant connections will not be required. Local hydrants are recommended to be tested and confirmed as acceptable.

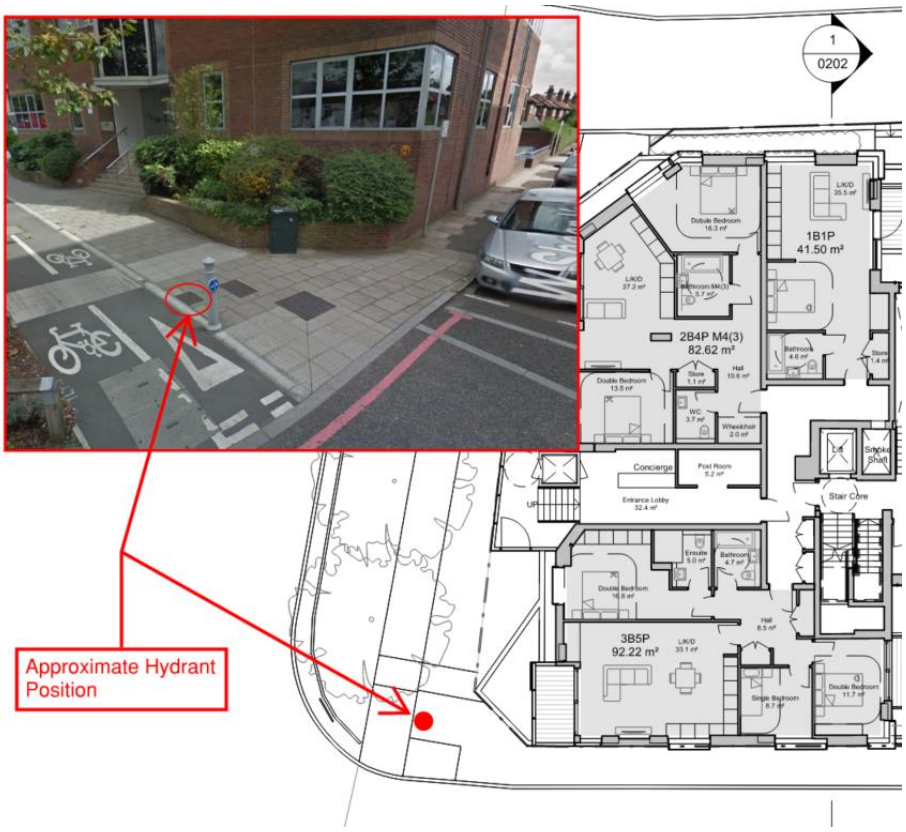


Figure 7-1: Location of existing hydrant

7.2 Vehicle access

Roadways for fire appliances should be a minimum of 3.7 m wide, reduced to 3.1 m between gates and will have a minimum carrying capacity of 12.5 tonnes. Where a roadway forms a dead-end greater than 20 m, suitable turning provisions will be provided.

The fire service have access to the building as illustrated in Figure 7-2 and are able to access the proposed dry riser inlet within 18m of a parking position.

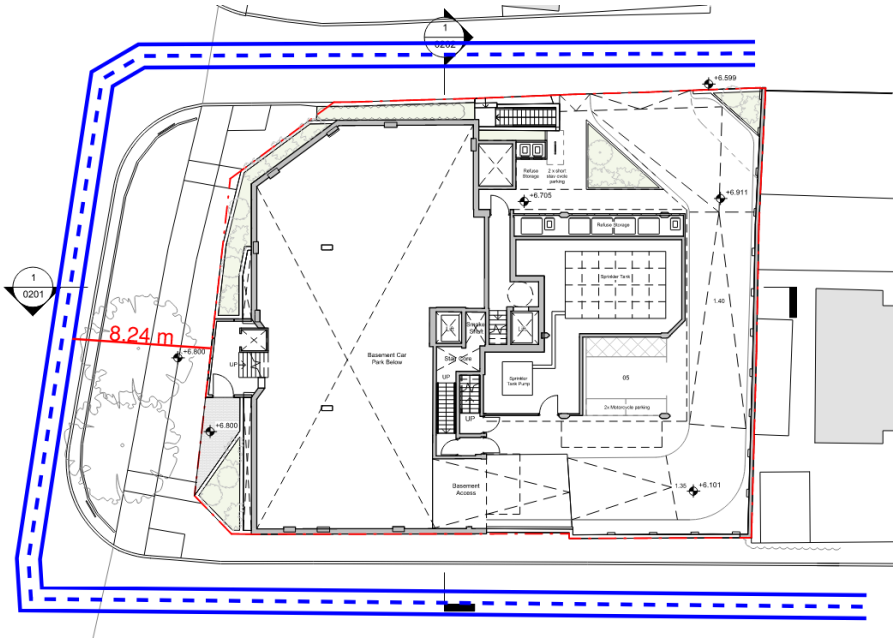


Figure 7-2 Fire Service Vehicle Access

7.3 Internal facilities

Due to the height of the building, the building is to be provided with a vertical dry rising fire main. The design of the dry rising main should be in accordance with BS9990 and comply with the following;

- Should have no horizontal run greater than 18m;
- Should be accessible by the stair landing on every floor level (including street and ground)

In addition to internal fire mains, the fire service should be provided with override switches for all smoke ventilation systems on site.

8.0

Fire safety management

8.0 Fire safety management

Suitable fire safety management plans will be developed by the Landlord and tenants, taking into account the information contained within this fire strategy report.

The management should be able to identify and react to any changes as they occur, e.g. changes to the occupancy and fire growth characteristics, etc. and through a suitable fire risk assessment identify and implement any alternative protection and management measures that may be required as a result.

The management of fire safety should be integrated with other management systems for the building and it is likely that a number of individuals and/or companies, e.g. Landlord, tenants, the fire alarm contractor, etc. will be responsible for fire safety for the building. There is a requirement to ensure that the fire safety measures and responsibilities are shared between all responsible persons and organisations.

Staff should be provided with training appropriate to their role.

Specific fire safety responsibilities for certain staff will include:

- Checking the building to ensure everyone has evacuated;
- Assisting in the evacuation of disabled persons;
- Guiding persons to the nearest exit;
- Using first-aid fire-fighting equipment;
- Contacting and liaising with the fire service.

It is recommended that a fire safety manual is created that contains all the design information and operational records for the building relating to fire safety. The fire safety manual should include:

- A description of the assumptions and design philosophies for the building, i.e. the fire safety strategy (this document);
- Floor plans detailing escape routes, assembly points, fire service access, etc.;
- Evacuation procedure;
- Full description of all passive and active fire protection systems within the building, compartment walls, fire detection systems, etc., including all certification documents;
- Fire risk assessments;
- Maintenance and test records of fire safety systems;
- Staff training records.

The fire safety manual should be kept up to date on a routine and regular basis by the fire safety manager or a competent person nominated for the task and should also record feedback from staff and other users of the building. If any fire safety equipment is found to be unreliable, records should be kept of the problems experienced. If deemed necessary, this information should be provided to the particular manufacturer.

The fire safety manual should be reviewed, and its procedures tested annually, or whenever alterations are made to the building, in accordance with a documented procedure. The review should include:

- All plant and equipment interface controls, to ensure that equipment is all in working order and that maintenance procedures are being followed;
- All staff duties and training procedures;
- Records, as-built drawings and specifications of the fire protection measures;
- Responses to any false alarms, “near misses” or real fires that have occurred since the previous review.

The fire safety manual should aid that those responsible in complying with the Regulatory Reform Order and should be kept on site at all times. At least one maintained identical copy should be retained in a separate location away from the premises.

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