

Residential Sprinkler & Portable Water Tank	48.2	30	2
Ground Floor Total			39
First Floor:			
Southwest Block Flats	N/A	No. of Beds	22
Northeast Block Flats	N/A	No. of Beds	22
First Floor Total			44
Second Floor			
Southwest Block Flats	N/A	No. of Beds	22
Northeast Block Flats	N/A	No. of Beds	22
Second Floor Total			44
Third Floor:			
Southwest Block Flats	N/A	No. of Beds	22
Northeast Block Flats	N/A	No. of Beds	22
Third Floor Total			44
Fourth Floor:			
Southwest Block Flats	N/A	No. of Beds	22
Northeast Block Flats	N/A	No. of Beds	22
Fourth Floor Total			44
Fifth Floor:			
Southwest Block Flats	N/A	No. of Beds	22
Northeast Block Flats	N/A	No. of Beds	22
Fifth Floor Total			44
Sixth Floor:			
Southwest Block Flats	N/A	No. of Beds	15
Northeast Block Flats	N/A	No. of Beds	16
Sixth Floor Total			31
Building Total			398

4.4.8 Number of Escape Routes

In the event of a fire within the building, occupants should be provided with a sufficient number of exits to ensure a prompt evacuation of the building prior to escape routes becoming blocked by the effects of fire and smoke.

In accordance with BS 9999: 2017, where more than 60 people are likely to be present within a space at one time, a minimum of two escape routes should be provided. The minimum number of escape routes required from each area is determined based on the maximum expected occupancy of the area, as outlined within Table 5.

Table 5 Minimum number of escape routes

Maximum Expected Occupancy	Minimum Number of Routes / Exits
Up to 60	1
61-600	2
More than 600	3

Currently, the lower ground level car park is considered to have a combined occupancy of 94 people. The lower ground floor is provided with four escape routes via the either stair core serving the northeast (one route) and southwest blocks (one route), fire escape direct to external from the car park adjacent to the southwest bin room, or the car park access ramp and is therefore considered acceptable. All other areas of the building have been assessed and are considered to meet the requirements outlined in Table 5.

4.4.9 Minimum Required Exit Widths

In accordance with BS9999:2017, exit widths from ancillary areas are to be:

- Not less than required to serve the expect occupancy; and
- Not less than 850mm where unassisted wheelchair access is necessary; and
- Not less than 800m where unassisted wheelchair access is not necessary.

All escape doors from rooms are to achieve an effective width of at least 850mm (or 800mm where the door may be expected to solely serve able-bodied persons; e.g., maintenance access only). Where the occupancy of a room may be expected to exceed 60 persons, it should be ensured that the provided door width is sufficient to serve the expected occupancy and that the door is arranged to open in the direction of escape. However, for doors expected to serve only able-bodied persons (e.g. maintenance access only to plant rooms), 800mm is acceptable.

At this stage, based on the anticipated occupancy level specified in Table 4, giving consideration to the number of escape routes available at all levels and the distribution of occupancy at each level, it is reasonable that exits throughout assumed as having an achieved minimum clear width of at least 850mm is acceptable.

Once spatial coordination in relation to the design and layout of phase 5 of Royal Elm Park has been developed further during RIBA Stage 3, further assessment will be undertaken to confirm the allowable, or confirmed number of occupants by the design team, throughout the development, to ensure acceptability with the above exit width provisions. This includes storey exits. Final exits from stairs, however, should achieve a width at least as wide as the stair to which they serve.

4.4.10 Inner Rooms

There are a number of rooms within the building which are considered as ‘inner rooms’; where the only escape from a room is through another room (the “access room”). The inner rooms within the development are the ‘cycle store’ and the ‘car park sprinkler tank room’ located within the lower ground floor where escape is only afforded via passing through the car park area.

All inner rooms are to meet the recommendations outlined within Clause 16.3.4 of BS 9999:2017 as follows:

- The occupant capacity of the inner room is not to exceed 60 (30 where the occupants may require assistance escaping);
- The inner room is to be entered directly off the access room;
- The escape route from the inner room is not to pass through more than one access room;
- The one-way travel distance from any point in the inner room should not exceed the appropriate given limit;
- the access room is not to be a place of special fire hazard; and
- One of the following arrangements should be provided:
 1. The enclosures (walls or partitions) of the inner room should be stopped at least 500mm below the ceiling; or
 2. a suitably sited vision panel not less than 0.1m² should be located in the door or walls of the inner room; or
 3. the access room should be fitted with a suitable automatic fire detection and alarm system.

In addition to the recommendations of BS 9999:2017 above, in accordance with BS 9991:2024, Clause 5.3, an entrance hall, lobby or corridor within a dwelling should be treated as an access room if it is greater than 11m² in area, or if there is a reasonably foreseeable fire risk.



Based on the proposed Category L3 fire detection and alarm system for the communal and ancillary areas, a smoke detector should be placed within each access room of inner rooms, therefore, the recommendations as specified by BS 9991:2017above are considered to be satisfied.

4.4.11 Door Opening Direction

The door leaf of any doorway or exit, should, where reasonably practicable, be hung to open in the direction of escape, and should always to so where an exit may be expected to serve more than 60 persons for escape in a fire scenario.

4.5 Vertical Means of Escape

Each of the two buildings are served by two protected escape stairs each, with one of the two designed as a firefighting stair. In both buildings, the stairs are located in close proximity to each other, with each stair paired with a corresponding firefighters' lift, which can also be used as an evacuation lift until recalled via the firefighters' lift switch, and an associated protected lobby.

4.5.1 Protected Escape Stairs

In accordance with clause 10 of BS991:2024, in buildings with a storey 18m or more above ground level, one or more common stairs should be designed as firefighting stairways. As phase 5 of Royal Elm Park is divided into two separate residential blocks both ascending greater than 18m high, a firefighting core has been provided to both.

The building should meet the following recommendations:

- d) No storeroom should open directly into a common stair;
- e) If any storey or part of a storey is required to have more than one escape route, common stairs should be sited such that access to alternative common stairs is possible from any point on that storey without passing through any other such stairway;
- f) If a common stair forms part of the only escape route from a dwelling, it should not be connected to any ancillary area on the same storey as that dwelling.

In accordance with subclause 27.2.1 of BS 9991:2024, access hatches for service shafts should not be situated within an escape stairway, unless the service shaft provides smoke control or pressurisation for that stair.

Additionally, where a stair provides access to an ancillary area, a ventilated protected lobby/corridor should be provided at that level, as specified in Table 1 of BS 9991:2024 and outlined in Section 3.2.3.

4.5.2 Lobbies and Corridors to Protected Stairways

In accordance with Section 13.1 of BS 9991:2024, lobbies and corridors giving access to protected stairways should meet the following requirements:

- a) If a stair provides access to an ancillary area, there should be a ventilated protected lobby or ventilated protected corridor at that level;
- b) If a stair serves an area of higher fire risk, there should be a ventilated protected lobby or ventilated protected corridor at that level;

- c) If a stair connects the ground or upper storeys with a basement storey(s) or serves only basement storeys, there should be a protected lobby or protected corridor at every basement level.

4.5.3 Required Stair Widths

According to Section 55.3.4 of BS 9991:2024, stairs used for evacuation should have a width not less than the minimum value given in BS 5395:2010.

The two firefighting stairs should achieve a minimum width of 1100mm. The secondary protected stair in each of the two cores may be provided with a minimum clear width of 1000mm in accordance with Clause 9 of BS 9991:2024. This width should be maintained clear for a vertical distance of 2.0 m, measured from the pitch line or landing floor level. The following exceptions apply when calculating the unobstructed stair width:

- a) stringers, each intruding into the stair not more than 30 mm; and
- b) handrails, each intruding into the stair not more than 100 mm.

Additionally, in accordance with Annex B of the London Plan Guidance Sheet Policy D12(B), where a stay-put strategy has been designed, provisions should be made to ensure means of escape remain sufficient in the event of a full simultaneous evacuation. While this exceeds the recommendations of BS9991:2024, it will be accounted for in the design to align with the London Plan requirements.

In lieu of guidance in BS9991:2024 for the appropriate width per person for a stair, the width per person has been taken from Table 13 of BS9999:2017 for a stair serving more than 10 floors. A risk profile of C3 has been used which indicates sleeping occupants and a high fire growth rate. This is noted to be conservative as there will not be a high fire load present within the residential areas of the development and sprinklers are present which should reduce the fire growth rate further. Therefore, the minimum width per person is 2.60mm per person.

Block	Floors	No. of persons per floor ^[1]	Total no. of persons	Total no. of persons required to use each stair ^[2]	Calculation	Required final exit width
Southwest	1 st to 5 th	22	125	63	63 × 2.6mm = 847.6mm	1100mm ^[3]
	6 th	15				
Northeast	1 st to 5 th	22	126	63	63 × 2.6mm = 670.8mm	1100mm ^[3]
	6 th	16				

Notes:

- 1. Assuming full simultaneous occupancy of all dwellings in the event of activation of the EAS system.
- 2. Assuming an equal distribution of occupants between the two available escape stairways in each residential block.
- 3. The minimum clear width of a firefighting stair is 1100mm. Where the stair is not a firefighting stair the minimum clear width may be 1000mm.

Therefore, each stair would be able to suitably accommodate simultaneous evacuation in the event of activation of the EAS system as per Section 4.3.5 for the anticipated occupancy level.



4.5.4 Construction of Escape Stairs

As per Clause 9 of BS 9991:2024, flights and landings should be constructed of materials achieving class A2-s1, d0 or better.

4.5.5 Stair and Evacuation Lift Discharge

Protected stairways should discharge either directly to a final exit or into a protected corridor leading to a final exit which is itself lobbied from any accommodation according to Section 15.1 of BS 9991:2024.

Any protected corridor leading to a final exit should provide the same standard of fire-resisting enclosure and lobby protection as the stairway and/or evacuation lift it serves. This ensures a consistent level of protection along the entire escape route, maintaining the same fire safety standard as that provided between the stair and/or evacuation lift and the accommodation on other storeys.

Additionally, in accordance with subclause 15.1e) of BS 9991:2024, where exit passageways leading from adjacent lobbies of two or more stairs providing alternative means of escape adjoin, they should be separated by imperforate construction, meaning there should be no openings, such as doors, in the separating element common to both passageways until they discharge from the building to the open air.

All stairs discharge directly to street level. Within the Southwest block, the firefighters' stair and lift, and protected stair and evacuation loft discharge via an entrance lobby. This arrangement is considered acceptable provided that the fire load within the lobby is controlled (for example, by enclosing any post boxes within fire-rated enclosures). ***This this arrangement remains subject to agreement with the Approving Authority and the local Fire and Rescue Service.***

It is responsibility of the management/concierge to ensure packages/parcels of additional fire loading do not occur. Fire rated letterboxes are to be specified as the design develops.

4.6 Evacuation Assembly Points

Assembly points should be located sufficiently far from the premises to minimise interference with the fire and rescue service or danger from falling debris. However, they should also be accessible so as not to discourage people from assembling. The assembly points should adhere to the following guidelines:

- Escape routes should allow for possible egress in cold weather as well as day and night-time conditions. i.e., emergency lighting on escape routes and suitable illumination of the assembly point.
- Final exits should not present an obstacle to wheelchair users and other people with disabilities. Where a final exit is accessed without the need to traverse steps, then a level threshold and, where necessary, a ramp should be provided.
- Final exits should be apparent to persons who may need to use them. This is particularly important where the exit opens off a stair that may continue down, or up, beyond the level of the final exit.
- Final exits should be sited so that they are clear of any risk from fire or smoke in a basement (such as the outlets to basement smoke vents), or from openings to transformer chambers, refuse rooms, boiler rooms and similar risks.
- A backup assembly point should be established for use in the event that the primary location cannot be used.

At this stage of design, it is expected that the assembly points in the event of an evacuation will be at suitable locations such as across the road from the main entrance.

This is to ensure occupants can assemble a safe distance away from the building in an evacuation incident as well as not to impede on the Fire Service access to the site. The designation of assembly points is the responsibility of the client and will require confirmation at a later stage.

4.7 Final Exits

In accordance with subclause 5.1.2 of BS 9991:2024, final exits should:

- Be apparent to people who might need to use them;
- Be accessible to all building occupants, preferably with a level threshold leading to level ground;
- Have an effective clear opening width that is not less than the greater of the following:
 - a) the width of the widest stair leading to the exit; or
 - b) where communal facilities are present, or the means of escape need to be sufficient for a full simultaneous evacuation, a width calculated for the maximum number of people expected to be using the exit at any one time and based on a factor of 4.1 mm/person.
 - c) A width that accounts for the following, by increasing the effective clear opening width by a factor of 4.1mm/person for every additional person over the stair capacity:
 - i. Merging flows of occupants at the convergence of a stair: and
 - ii. Any escape routes from final exit level; and
 - iii. Routes below final exit level;
- Be sited so that they are clear of any risk from fire or smoke, including outlets to smoke vents, openings to transformer chambers, refuse chambers, boiler rooms, or other similar risks;
- Facilitate the rapid dispersal of persons from the vicinity of the building, ensuring they are no longer in danger from fire, smoke, or falling debris, with access to a street, passageway, walkway, open space, or an external pathway leading to a safe waiting space such as a muster point.
- If necessary, be suitably guarded and provided with emergency escape lighting in accordance with BS5266-1.

Therefore, final exit widths are to achieve at least the minimum width of the stair its serving and all final exits are to achieve a minimum width of 1100mm.

4.8 Escape Signage

Fire safety signs will be installed where necessary to provide clear identification of fire precautions, fire equipment and means of escape in the event of fire. Escape signage designed and installed in accordance with BS5499-4:2013 is to be provided within the common escape routes. Signage utilised throughout the building is to be consistent and in accordance with BS ISO 3864-1:2011.



Escape signage should consist of the following:

- Clearly and easily understood
- Include a pictogram
- Text may be used alongside a pictogram
- Signs above doors or open spaces should be mounted between 2m and 2.5m from floor level (allowing the sign to remain readily seen)
- Signs mounted on walls should be between 1.7m and 2.0m from floor level

Refuges should be clearly identified by appropriate fire safety signs. Where a refuge is in a lobby or stairway the sign should be accompanied by a blue mandatory sign worded “Refuge – keep clear”

Additional signage for firefighter wayfinding is described in Section 8.6.

4.9 Provisions for Disabled Occupants

The Equality Act became law in October 2010. It replaced previous legislation (Disability Discrimination Act 1995) and provides employers and employees information on what they need to do to make their workplaces a fair environment and comply with the law.

With regard to fire safety, it is generally assumed that disabled occupants will be able to escape to a place away from danger without assistance from the Fire Service. However, there will be a certain proportion of building occupants, such as those who are non-ambulant disabled, i.e. wheelchair users, who will not be able to negotiate stairs unaided; therefore, an evacuation management procedure for disabled occupants will need to be incorporated into the Fire Safety Management Strategy. This is the responsibility of the end user of the building or ‘The Responsible Person’.

Fire safety procedures will therefore, where appropriate, make provision for occupants who might need assistance to make their way to a place of ultimate safety in a fire. If there is a need to make specific arrangements, then it is assumed that consultation with the individual(s) or representative organisations should take place at the earliest opportunity.

4.9.1 Emergency Voice Communication (EVC) Systems

To facilitate the effective evacuation of people from refuges, an emergency voice communication system (EVC) system allowing two-way communication should be provided to all evacuation lift lobbies. It should be possible for the occupants of each refuge to alert other people they are in need of assistance, and for them to be reassured that this assistance is forthcoming.

Therefore, EVC’s will be provided at all evacuation lift lobbies within the building. Evacuation lift lobbies are provided in both stair cores from first to sixth floor, however, additionally provided at basement levels to serve any residential amenity areas at this level. In accordance with Figure 31 of BS 9991:2024, it is not considered necessary to provide ventilation at the ground floor/terminating point of the Evacuation lift lobby.

The EVC should conform to BS 5839-9:2021 and consist of Type B outstations which communicate with a master station located at a suitable control point at Fire and Rescue Service access level.

4.9.2 Emergency Evacuation Plans

All buildings must have an emergency evacuation plan outlining general arrangements for all occupants. This plan should ensure that everyone can move away from danger, exit the building, and reach a place of ultimate safety.

It is the responsibility of premises management to assess the evacuation needs of all individuals when formulating emergency plans, as outlined in Annex A of BS9991:2024. Emergency evacuation plans should not rely on assistance from the fire and rescue service.

Where it is identified that an individual may require assistance during evacuation, a more specific Personal Emergency Evacuation Plan (PEEP) should be created. The duty holder, such as the owner, occupier, or building manager, must ensure that a PEEP is in place for any residents, staff, or frequent visitors who need one.

A log should be maintained for residents requiring assistance, and the fire and rescue service should be informed of its location. The log may be included in the fire safety manual for the premises and should be stored in the secure information box (see Section 8.5).

4.9.3 Personal Emergency Evacuation Plans (PEEP’s)

PEEPs should be produced for all people requiring assistance to leave the building. Individual PEEP’s should be produced for disabled people who are regularly on the premises, such as staff and for any visitors or building users.

Provision of an accessible means of escape should be an integral part of fire safety management in all buildings. Fire safety management should consider the full range of people who might use the premises, paying particular attention to the needs of disabled people

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

It cannot be assumed that facilities provided in a building to make it accessible will be usable in a fire evacuation. For example, lifts that are not appropriately designed for emergency evacuation might not be usable for evacuation. This should be considered at the design stage when it is relatively easy to incorporate accessible escape features which will make evacuation planning more effective, an evacuation easier to manage and help to preserve the dignity of disabled people in an evacuation.

Personal emergency evacuation plans (PEEPs) are recommended for all people requiring assistance to leave the building. Through the recording of PEEP’s, the management team or Responsible Person shall be made aware of the amount of support or provision required for each evacuation.

Individual PEEP’s should be developed for occupants (occupying for long term) requiring assistance to evacuate the building. Following discussions with an individual, a plan can be developed for their specific needs, which should contain details of how they will evacuate the premises. By considering the individual needs of a person when preparing a PEEP, management will be able to make any reasonable adjustments to the premises or procedures that are necessary.

It is recommended the Responsible Person carry out frequent monitoring and review of residents requiring PEEP’s. PEEPS should be one of the three following types:

1. **Individual PEEP for disabled people who are regularly in the premises, for example staff and regular visitors.** Following discussions with an individual, a plan can be developed for their specific needs which



should contain details of how they will evacuate the premises. By considering the individual needs of a person when preparing a PEEP, management are able to make any reasonable adjustments to the premises or procedures that are necessary. They are also able to make provision for actions to be taken in the event of a false alarm, or if the person cannot return to the building after a fire.

2. **PEEPs for visitors who will makes themselves known to staff, such as expected guests.** Visitors who are likely to require assistance in the event of an evacuation should be encouraged to make themselves known to staff on arrival. Management should be encouraged to have available, especially at reception, staff who are trained in disability awareness. This makes the process more comfortable for disabled people and more effective for management. The generic PEEP should provide a wide range of guidance for differing disabilities and be adapted for the individual premises. They should include what the visitor needs to do in an evacuation, and what the management response will be. They should also reflect what specific fire safety provisions are provided for disabled people on the premises, e.g. fire alarms adapted for people who are Deaf or hard of hearing. The generic PEEP should be discussed with each visitor and their particular needs taken into account where possible.
3. **PEEPs for visitors not previously identified to staff, such as unexpected visitors / audience members.** The standard evacuation plan should include measures to make evacuations suitable for all persons on the premises. Information for disabled people should be noted in fire action notices and in the fire management plan. Staff should be trained so that they are aware of the facilities and their responsibility to evacuate disabled people, and know how to use features such as evacuation lifts or refuges. Enough staff should be available at all times to make sure that evacuation plans are viable, including situations where features such as carry-down procedures are to be adopted to evacuate mobility-impaired people.

4.9.4 Evacuation Lifts

As per requirements of London Plan Policy D5 (B5), all developments where lifts are installed, as a minimum at least one lift per core (or more subject to capacity assessments) should be a suitable sized fire evacuation lift to be used to evacuate people who require level access from the building.

At least one evacuation lift should be provided for each escape stairway, or more if required by capacity assessment, according with Section 7.4.1 of BS9991:2024 and BS EN 81-20 to provide disabled occupants with a dignified and independent means of escape.

In line with Section 7.4.2 of BS9991:2024, the enclosure to an evacuation lift should be constructed as a protected shaft providing a minimum period of fire resistance not less than that recommended in Section 5 of the fire strategy. The temporary waiting space for an evacuation lift should be provided with an emergency voice communication system in accordance with BS5839-9, where communication points should be at least 500 mm from any wall.

The temporary waiting space should be located within either an escape stair enclosure or a lobby to the stair.

In accordance with Section 7.4.3 of BS9991:2024, where the temporary waiting space is in the stair lobby there should only be access to the evacuation lift, an escape stair, and any of the following:

- Other passenger/firefighting lifts;
- The adjoining corridor (either ventilated or unventilated); and
- service risers (that do not contain motorised equipment or similar with the potential to malfunction and cause fire) and distribution boards.

Any lobby housing a temporary waiting space should have dimensions no smaller than the minimum shown in Figure 13, or as determined by the emergency evacuation plan for people with mobility impairments (see Section 4.3.3.2), whichever is larger. The walls of the lift landing and temporary waiting space, the lift door, and both the landing and lift floors should visually contrast, with a contrasting floor surface of at least 1,500 × 1,500mm provided outside the lift door area. It should be noted that the required lift car size has now increased due to the release of BS EN 81-76:2025 as discussed below from the previously specified 1,00mm x 1,400mm shown in Figure 13.

Additionally, the temporary waiting space should be provided with an emergency voice communication (EVC) system, in accordance with BS5839-9:2021, to enable occupants to request assistance.

An evacuation lift, the associated voice communication system, and lighting to both the lift car and temporary waiting space should have both primary and secondary power supplies, as outlined in Section 3.4

An evacuation lift should include a driver-assisted evacuation operation. In buildings without 24-hour staffing, driver-assisted evacuation should be supplemented with automatic rescue operations. This supplementation may also be provided in buildings with 24-hour staffing.

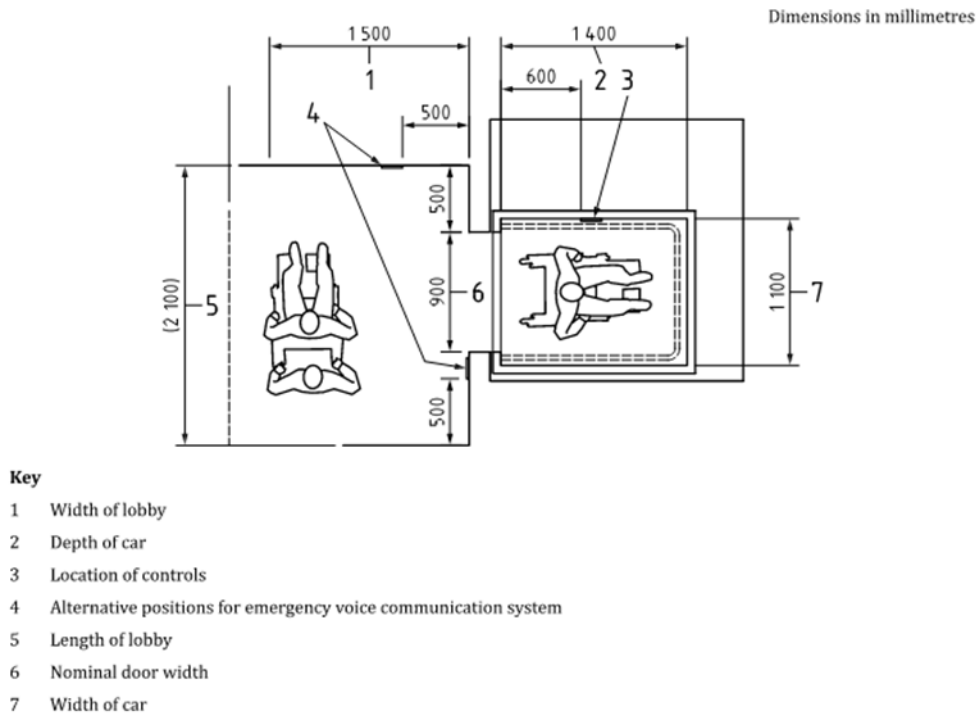


Figure 13 Lift and lobby minimum dimensions (Figure 14 of BS9991:2024)

Evacuation lifts are to follow the guidance of BS 81-76:2025 and BS EN 81—20:2020. The evacuation lifts are to be a Class B in the instance that the building is considered complex and a firefighting lift is also required in accordance with BS EN 81-76:2025. A class A lift is specified where:

- the highest floor is such that a firefighter's lift would not be required, and
- the evacuation strategy does not require more than one evacuation exit landing for the lift in question, and
- the evacuation strategy does not require prioritization of evacuation lift service for specific landings, and



- a secondary power supply is not available; the evacuation plan can accommodate an evacuation lift with an automatic rescue operation.

Evacuation lifts are to be designed to meet the following requirements:

- **Protected Shafts and Lobbies:** A designated temporary waiting area adjacent to the lift on each floor (often at least 1,500 x 2,100 mm of clear space) where wheelchair users or other persons can wait for the lift in relative safety should be provided. Providing this requires allocating floor space and incorporating it into the architectural layout.
- **Secondary Power Supply:** It shall be instructed that the power supply system of a class B evacuation lift consist of a primary and a secondary power supply. The secondary power supply should also supply car lighting and the evacuation communication systems. It shall be instructed that, in addition to the primary supply, the control and monitoring equipment for a remote evacuation operation is fed from a secondary power supply or has a backup supply. It shall be instructed that the secondary power supply is sufficient to operate the evacuation lift at the rated load and rated speed for at least a period equal to the defined duration of the evacuation. It shall be instructed that the selection of the secondary power supply considers the lift's acceleration current and the regenerated power. It shall be instructed that the secondary power supply is effectively independent from the building's normal power supply.
- **Lift Operation:** Evacuation lifts are to remain operational during a fire and can be operated independently by an occupant, without management override. Where the evacuation lift sees dual use for firefighting and evacuation, remote assisted evacuation operation is specified by BS EN 81-76:2025, Subclause 4.5.3.3 for evacuations lifts defined as Class B.
- **Lift Car Size:** Evacuation lifts conforming to BS EN 81-76:2025 will be larger than firefighters lifts (specified to BS EN 81-72:2020) and or evacuation lifts previously specified to BS 9991:2024, of which had dimensions 1,100mm wide x 1,400mm deep as depicted in Figure 13. Lift car sizes to BS EN 81-76:2025 should be either Type 3 or Type 4 to BS EN 81-70:2020, where:
 - Type 3: 1,100mm wide x 2,100 deep, or
 - Type 4: 1,400mm wide x 1,600mm deep or 1,600mm wide x 1,400mm deep

It should be noted that due to the recency of the implementation of BS EN 81-76:2025 that lead times on evacuation lifts conforming to the new standard sizes may be impractical. In this instance, Stantec recommend the following:

- Where practicable and where the project is at an early design stage, the size of lift shafts for evacuation lifts to accommodate a Type 3 or 4 car, as per dimensions referenced above.
- Where not practicable to size car as above, Stantec consider for projects at an advanced design/construction stage it is adequate to continue to follow the current guidance in BS 9999:2017 (Annex G).

Given the expected number of occupants of the development and defined evacuation strategy, providing one evacuation lift per core is deemed adequate.



5 Internal Fire Spread (Linings)

Functional Requirement B2:

1. To inhibit the spread of fire within a building, the internal linings shall –
- a. Adequately resist the spread of flame over their surfaces; and
 - b. Have, if ignited, either a rate of heat release or a rate of fire growth, which is reasonable in the circumstances.
2. In this paragraph, ‘internal linings’

5.1 Internal Fire Spread (Linings)

The choice of materials for walls and ceilings can significantly affect the spread of a fire and its rate of growth, even though they are not likely to be the materials first ignited. It is particularly important in circulation spaces where linings may offer the main means by which fire spreads and where rapid spread is most likely to prevent occupants from escaping.

For the purposes of satisfying Requirement B2 of Schedule 1 to the Building Regulations 2010 (as amended) the internal wall and ceiling linings should adequately resist the spread of flame over the surfaces and have, if ignited, a rate of heat release/growth rate which is reasonable in the circumstances.

Therefore, the internal surface linings are to be in accordance with Table 6 throughout the building in line with Section 26.2 of BS9991:2024.

Table 6 Internal lining requirements

Location	European Performance Class ^[2]
Non-residential rooms having an area of not more than 30m ²	D-s3, d2
Residential rooms having an area of not more than 4m ²	D-s3, d2
All other rooms	C-s3, d2
Circulation spaces within dwellings	C-s3, d2
Other circulation spaces	B-s3, d2

For the purposes of internal surface lining requirements, the following definitions should be noted:

Room: An enclosed space within a building that is not used solely as a circulation space. The term includes not only conventional rooms, but also cupboards that are not fittings and large spaces such as warehouses and auditoria. The term does not include voids such as ducts, ceiling voids and roof spaces;

Circulation space: A space (including a protected stairway) mainly used as a means of access between a room and an exit from the building or compartment.

Table 7 outlines the inclusions/exclusions regarding the definitions for walls and ceilings for the purposes of internal surface spread of flame requirements.

Table 7 Internal lining inclusions/exclusions

	Walls	Ceilings
Definition includes	- The surface of glazing (except glazing in doors) - Any part of a ceiling which slopes at an angle of more than 70° to the horizontal	- The surface of glazing - Any part of a wall which slopes at an angle of 70° or less to the horizontal - The underside of a mezzanine or gallery - The underside of a roof exposed to the room below
Definition excludes	- Doors and door frames - Window frames and frames in which glazing is fitted - Architraves, cover moulds, picture rails, skirtings and similar narrow members - Fireplace surrounds, mantle shelves and fitted furniture	- Trap doors and trap door frames - The frames of windows or rooflights and frames in which glazing is fitted - Architraves, cover moulds, picture rails, exposed beams and similar narrow members



6 Internal Fire Spread (Structure)

Functional Requirement B3:

- The building shall be designed and constructed so that, in the event of fire, its stability will be maintained for a reasonable period.*
- A wall common to two or more buildings shall be designed and constructed so that it adequately resists the spread of fire between those buildings.*
- Where reasonably necessary to inhibit the spread of fire within the building, measures shall be taken to an extent appropriate to the size and intended use of the building, comprising either or both of the following:*
 - Sub-division of the building with fire-resisting construction; and*
 - Installation of suitable automatic fire suppression systems.*
- The building shall be designed and constructed so that the unseen spread of fire and smoke within concealed spaces in its structure and fabric is inhibited.*

6.1 Elements of Structure

For the purposes of the Fire Safety Strategy, the top occupied storey of the building is between 18m and 30m at 20.0m for the for the Northeast block and 23.5m for the Southwest block above ground level. Therefore, the elements of structure of the building of structure should achieve the required fire resistance of 60 minutes (with regard to load-bearing capacity) in accordance with Table 6 of BS9991:2024.

6.1.1 Roof Structure

Generally, as outlined within Section 22.3 of BS 9991:2024, the structure of the roof and the structure that supports only the roof does not need to be fire rated unless the roof:

- Forms part of an escape route; or
- Functions as a floor; or
- Is part of a portal frame structure where the roof and the supporting stanchions form a single element of structure; or
- Is integral to the stability of a fire-resisting external wall.

It is noted the roof level supports both PV arrays and other plant. Therefore, Stantec recommend the roof slab is designed to achieve 60-minutes REI.

6.2 Compartmentation

In accordance with Section 23.1 of BS 9991:2024, all of the following should be compartment walls and compartment floors achieving at least the level of fire resistance required in Table 5 of BS 9991:2024:

- Any floor and wall separating a flat from another part of the building;

- Any floor and wall enclosing a refuse storage chamber;
- Any floor and wall common to two or more buildings.

Compartment walls should be designed to be able to accommodate the deflection of the floor and roof structure.

6.3 Additional Fire Resistance Requirements

Fire resistance to achieve the required compartmentation and protection to escape routes is to be provided in accordance with BS9991:2024 as outlined in Table 8.

Table 8 Fire resistance requirements

Space		Minimum Fire Resistance ^[1] (minutes)			Method of Exposure
		Load-bearing Capacity (R)	Integrity (E)	Insulation (I)	
Structural Frames, Beams and Columns		60 ^[2]	-	-	Exposed faces
Load-bearing Wall Elements		60 ^[2]	-	-	Each side separately
Compartment Floors		60 ^[2]	60 ^[2]	60 ^[2]	From underside
Roofs ^[5]	Any part forming part of an escape route	30	30	30	From underside
	Any part forming the function of a floor	60 ^[2]	60 ^[2]	60 ^[2]	From underside
External Walls	Any part within 1m of a relevant boundary	60 ^[2]	60 ^[2]	60 ^[2]	Each side separately
	Any part more than 1m from a relevant boundary ^[3]	60 ^[2]	60 ^[2]	60 ^[2]	From inside building
	Any part within 1.8m of an external escape route	30	30	-	From inside building
Protected Shafts	Between shaft and protected lobby or corridor	30	30	30	Each side separately
	Between shaft any other accommodation	60 ^[2]	60 ^[2]	60 ^[2]	Each side separately
Firefighting Shafts	Between firefighting stair, lift and lobby	60	60	60	Each side separately
	Between firefighting shaft and any other accommodation	120	120	120	From outside of shaft
	Between firefighting shaft and any other accommodation	60	60	60	From inside of shaft
Protected Lobbies and Corridors		30	30	30	Each side separately
Protected Stairway and Lift Shafts		120	120	120	Each side separately
Corridor Sub-Division		30	30	30	Each side separately
Ancillary Accommodation		^[3]	^[3]	^[3]	Each side separately

Notes:

- When tested in accordance with the relevant parts of BS476 or equivalent European standard.



2.

Equivalent to that required for elements of structure as defined in Section 6.1
3.

Refer to Section 6.4.

6.4 Ancillary Accommodation

The required fire rated enclosures to areas of ancillary accommodation are outlined in Table 9.

Table 9 Ancillary accommodation fire resistance requirements

Space	Minimum Fire Resistance ^{[1] [2] [3]} (minutes)
Comms Room	30REI
General / Cleaner’s Store	30REI
LV Switch room	60REI
Heating/ Cooling Plantroom	60REI
Cold Water Plantroom	60REI
Residential Sprinkler & Portable Water Tank Room	120REI ^[4]
Car Park Sprinkler Tank Room	120REI ^[4]
Cycle Store	60REI
Bin Store	60REI
Substation	120REI ^[5]
Notes	
1. When tested in accordance with the relevant parts of BS476 or equivalent European standard.	
2. Where two adjacent enclosures share a partition (wall and/or floor), the more onerous of the two fire resistance requirements is to be provided	
3. Method of exposure from both sides	
4. Plant rooms housing electrical equipment for life safety and firefighting equipment should be enclosed within 120 minutes fire-resisting enclosure	
5. To be confirmed by the energy supplier where they may alternatively specify 120-minutes REI.	

6.5 Fire Doors

Fire doors are to be provided in all fire rated partitions noted in Sections 6.3. The fire resistance requirements for the doors are outlined in Table 10.

Table 10 Fire door fire resistance requirements

Location	Minimum Fire Resistance ^[1] (minutes)
Compartment Wall	Between residential unit and common space FD30S
	Enclosing a protected shaft forming a protected ^[2]

	stair wholly or partly above ground level
	Enclosing a protected shaft forming a protected stair below ground level
	Enclosing a protected shaft forming a lift well or service shaft ^[2]
	All other compartment walls ^{[4] [5]}
Compartment Floor	^[5]
Protected Stairway or Lift Shaft (which is not considered a protected shaft)	FD30S
Within Protected Stairway (separating upward and downward flights or a basement stair)	FD30S
Common Protected Lobby / Corridor	^[2]
Protected External Escape Route	FD30
Corridor Sub-Division	FD30S
Ancillary Accommodation	^[5]
Notes	
1. When tested in accordance with the relevant parts of BS476 or equivalent European standard	
2. At least half the period of fire resistance required of the wall in which it is fitted but not less than FD30 and with a smoke seal (S)	
3. At least half the period of fire resistance required of the wall in which it is fitted but not less than FD30	
4. Smoke seal only required where compartment wall is utilised for progressive horizontal evacuation	
5. As for the wall or floor in which it is fitted	

A fire door that is required to resist the passage of smoke at ambient temperature conditions (i.e. with suffix ‘S’) should either:

- a. have a leakage rate not exceeding 3m³/h/m, when testing in accordance with BS 476-31.1 with a threshold taped and subjected to a pressure of 25Pa; or
- b. meet the classification requirement of Sa when tested in accordance with BS EN 1634-3.

6.6 Service Shafts

In accordance with subclause 27.2 of BS9991:2024, lift wells (other than within a protected stairway) and service risers penetrating compartment floors should be enclosed throughout their height with fire-resisting construction in accordance with Table 8.

Access hatches for service riser shafts should not be situated within an escape stairway (including the associated exit passageway) unless the service shaft provides smoke control or pressurization for that stair.



Where building services run horizontally within common access corridors and lobbies, including corridor access for firefighting shafts, they should either be enclosed with fire-resisting construction or meet all of the following criteria:

- a. the exposed surface of the material/product used is class B-s3, d2 or better;
- b. the supports and fixings in the cavity are class A1;
- c. any pipe insulation system is class B-s3, d2 or better; and
- d. any electrical wiring in the cavity is laid in metal trays or metal conduit as per Section 3.4.

Services running horizontally in the refuge lobby will be separated by a fire resisting ceiling achieving 60 minutes fire resistance from each side separately.

6.7 Fire Protection of Ductwork

Where air handling ducts pass through compartmentation/fire-resisting construction, the integrity of these compartments should be maintained. There are four basic methods in order to prevent smoke and flame spread through the building/compartment:

Method 1 – Thermally actuated fire dampers

- Fire dampers that are thermally operated can be provided where ductwork penetrates through fire resisting construction.
- Fire dampers only actuated by fusible links are not suitable for protected escape routes or sleeping risk.

Note: Method 1 is not suitable for ductwork serving kitchen extracts.

Note: Fire dampers should conform to BS EN 15650:2010 and have a minimum E (integrity) classification of 60 minutes or to match the integrity rating of the fire-resisting partition it is passing through (whichever is higher).

Method 2 – Fire-resisting enclosures

- The fire-resisting enclosures should achieve the same fire resistance as the wall the ductwork penetrates which forms a compartment known as a protected shaft. This allows a multiplicity of services to be transferred together with the duct to traverse a number of compartments within the building without the need for further subdivisions. Fire dampers (actuated thermally or by an automatic fire detector) will only be required where the ductwork enters or leaves the protected shaft.
- Method 2 can only be used on ductwork that passes through an escape route providing the ductwork does not serve the escape route it passes through (unless adequate fire dampers are provided).

Method 3 – Protection using fire-resisting ductwork

- The ductwork itself forms a protected shaft. The ductwork should achieve the same fire resistance as the wall the ductwork penetrates. The fire resistance can be achieved by the ductwork material itself, or through the application of a protective material.
- Method 3 can only be used on ductwork that passes through an escape route providing the ductwork does not serve the escape route it passes through.

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

Method 4 – Automatically actuated fire and smoke dampers triggered by smoke detectors

- Method 4 may be used for extract ductwork passing through the enclosures of protected escape routes, both where the ductwork does and does not serve the escape route.

Note: Method 4 is not suitable for serving kitchens.

6.7.1 HVAC Systems Within Individual Dwellings

Ducted HVAC systems should prevent the transfer of fire and smoke from the room of fire origin, ensuring safe use of protected internal escape routes and preventing the spread of fire. For dwellings with floors over 4.5m above ground level, the following recommendations apply, in accordance with Clause 32 of BS 9991:2024:

- Air transfer grilles should not be fitted in walls, ceilings, floors, or doors enclosing protected internal hallways or stair enclosures.
- Where practicable, ducts should not pass through protected internal hallways or stair enclosures. If ducts must pass through, they should comply with one of the following:
 1. Fire dampers should be installed where ducts penetrate fire-resisting enclosures. These dampers must be accessible for maintenance, conform to BS EN 15650, be tested according to BS EN 1366-2, and have an ES classification in accordance with BS EN 13501-3:2005+A1, ensuring they achieve the same fire resistance as the compartment barrier; or
 2. The duct should be fire-resisting and have at least the same fire resistance as the compartment barrier when tested from the inside; or
 3. The ceiling zone of the protected hall or stair enclosure should be of fire-resisting construction, with surfaces made of class A1 materials.
- For HVAC systems that recirculate air and serve protected hallways or stairways, smoke detectors should be installed within the ductwork to shut down the system upon detection of smoke.
- HVAC ducts linking dwellings or serving common areas must comply with Clause 33 of BS9991:2024.

6.8 Fire Stopping

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

- In line with fire rated walls and floors where there is a penetration of the wall/floor in order to maintain the fire resistance integrity of the wall/floor;
- Between fire rated walls/floors (where the floor forms part of a fire rated enclosure of a compartment floor) and an external wall to ensure the fire resistance integrity of the wall/floor is maintained to the external wall.



Where fire stopping is provided, it is to achieve the same level of fire resistance as required for the wall/floor it replaces. For more information see Section 30.4 of BS9991:2024.

6.9 Cavity Barriers

In accordance with BS9991:2024, cavity barriers are to be provided in the cavity of:

- an external wall at all cavity edges and around all openings in the external wall (i.e. windows);
- an external wall in line with a compartment floor where it meets the external wall;
- an external wall in line with a compartment wall where it meets the external wall;
- an internal cavity wall at the junction with a fire-rated wall/floor.

It should be noted that cavity barriers need not be provided within internal or external cavity walls where the following conditions are met:

- Cavity closers are provided around all edges and openings in the cavity wall; and
- The cavity is enclosed within two leaves (one either side) of either concrete or masonry each at least 75mm thick.

Cavity barriers should also be provided in cavities to prevent the excessive spread of unseen fire and smoke. Cavity barriers are to be provided to ensure the maximum dimensions of undivided concealed spaces do not exceed the requirements outlined in Table 11.

Table 11 Maximum dimensions of concealed spaces

Location of Cavity	Class of Surface/Product Exposed in Cavity	Maximum Distance in Any Direction
	European Class ^[1]	
Between Roof and Ceiling	Any	20m
Any Other Cavity	Class A1, Class A2, Class B or Class C	20m
	Any Other Class	10m
Notes		
1. Relates to performance determined in accordance with BSEN13501-1:2018		

Where provided, cavity barriers are to achieve at least 30 minutes of fire resistance for integrity and 15 minutes of fire resistance for insulation. Refer to Section 25.1 of BS9991:2024 for further information with regard to cavity barrier provision, construction and fixing requirements.



7 External Fire Spread

Functional Requirement B4:

- 1. The external walls of the building shall adequately resist the spread of fire over the walls and from one building to another, having regard to the height, use and position of the building.*
- 2. The roof of the building shall adequately resist the spread of fire over the roof and from one building to another, having regard to the use and position of the building.*

7.1 External Walls

External walls must be constructed using a material that does not support fire spread and therefore endanger people in or around the building. It is essential to control flame spread over or within an external wall construction to avoid creating a route for rapid fire spread bypassing compartment walls or compartment floors. Additionally, external walls near relevant boundaries should be made from non-readily ignitable materials to mitigate the risk of fire spreading between buildings.

Therefore, in accordance with Section 24.1 of BS 9991:2024, in a building with a storey 11m or more above ground level, the external wall construction should be class of A2-s1, d0 or better materials, with the following exceptions per Regulation 7(3):

- Cavity trays when used between two leaves of masonry;
- Any part of a roof pitched at an angle of 70° or more if that part is connected to an external wall;
- Door frames and doors;
- Electrical installations;
- Insulation and waterproofing materials used below ground level;
- Intumescent and fire-stopping materials where the inclusion of the material is necessary to meet recommendations;
- Membranes (these should be of class B-s3, d0 or better materials);
- Seals, gaskets, fixings, sealants and backer rods;
- Thermal break materials where the inclusion of the materials is necessary to meet regulatory requirements for thermal bridging;
- Window frames and glass;
- The operating mechanisms for adjustable solar shading devices; and
- External walls of buildings that comprise only masonry construction, or in which combustible materials are limited to insulation within the cavity of double-leaf masonry walls.

By ensuring compliance with the above requirement, the building will meet the provisions outlined in Regulation 7(2) of the Building Regulations, which mandates that all materials used in external walls or specified attachments of

'relevant buildings' must achieve a Class A2-s1, d0 or better classification, except for those exempted under Regulation 7(3).

Although considered exempt under regulation 7(3), section 24.1 of BS9991:2024 states that for buildings greater than 11m in height, all membranes within the external wall construction should achieve Class B-s3, d0 or better.

The external wall is defined as 'anything located within any space forming part of the wall' – refer to the Building Regulations (as amended) for further information, definitions, and permitted exceptions.

The proposed design will incorporate a standard concrete frame and traditional brickwork external walls. All primary components of the external wall system should meet classification A2-s1,d0 or better.

7.1.1 External Wall Construction

At this stage, the exact external wall build-up is yet to be confirmed. However, it is intended that the external wall construction will meet the required classification of A2-s1, d0 or better. This will be confirmed upon input and final design details provided by the façade specialist.

7.2 Fire Spread to Adjacent Properties

In order to prevent fire spread between properties it should be ensured sufficient separation distance is provided between fire compartments within the building and the relevant boundaries based on the extent of unprotected area to the fire compartments.

External fire spread analysis has been conducted based on the enclosing rectangle method as described in BR187:2014.

It is noted that the provided elevation drawings do not reflect the latest general arrangement plans provided, and the extent of doors and openings in the façade differs. The following external fire spread is therefore indicative only, and updated elevation drawings should be provided.

7.2.1 Enclosing Rectangle Method

The enclosing rectangle method considers each fire compartment within the building separately. The methodology for this analysis is summarised as follows:

- A plane of reference (from which the boundary distance is calculated) is defined as the parallel plane to the relevant boundary, which touches all or part of the building elevation;
- A rectangle is constructed enclosing all unprotected areas on the elevation. The dimensions of this rectangle are then rounded up to the nearest dimensions defined in the tables of BR187:2014;
- The unprotected area on the elevation projecting onto the plane of reference is taken as a percentage of the area of the 'enclosing rectangle';
- The tables in BR187:2014 are then used to determine the required minimum distance between the plane of reference and the relevant boundary based on the dimensions of the enclosing rectangle and the percentage of unprotected area;



- The methodology of the enclosing rectangle analysis may also be carried out in 'reverse' based on a known boundary distance to determine the maximum percentage unprotected area on the elevation.

7.2.1.1 Enclosing Rectangle Analysis Assumptions

External fire spread analysis in accordance with BR187:2014 is based on the following assumptions:

- All parts on the elevation to the fire compartment are considered 'unprotected' except the following:
All parts of the elevation that meet the fire resistance requirements for elements of structure with regard to integrity (i.e. 60 minutes) and 15 minutes for insulation.
- Small unprotected areas (less than 1m²) and groups of unprotected areas (within an area not exceeding 1m²) that are separated from all other unprotected areas on the compartment elevation by at least 4m (reduced to 1.5m where one of the unprotected areas does not exceed 0.1m²).
- Unprotected areas to protected shaft that is enclosed within at least 60-minute fire rated construction.
- The relevant boundary distance is taken from the plane of reference to the adjacent site boundary except where the adjacent boundary is to a public roadway or river etc. In the case the adjacent boundary is a public roadway or river the relevant boundary distance may be taken to the middle of the road or river etc.
- Analysis for each fire compartment is to be conducted based on the relevant occupancy characteristic of the compartment (i.e. residential, etc.).
- The analysis will consider the 'worst-case' scenario for each elevation (i.e. compartment with greatest extent of unprotected area closest to the relevant boundary). Providing the analysis for the worst case demonstrates compliance it is considered acceptable to assume all other compartments on the elevation are also acceptable with regard to external fire spread.
- In accordance with subclause 24.4 of BS 9991:2024, where a building is provided with automatic sprinklers in accordance with BS 9251:2021 or BS EN 12845:2015+A1, the amount of unprotected area or the distance to the boundary may be doubled up.
- As the buildings within the development are designed with compartment floors, the height of the compartments has been measured to account for the thickness of the compartment floor slabs.

7.2.2 External Fire Spread Analysis

The separation distances to the adjacent relevant boundaries are presented below in Figure 14 however, it should be noted that these separation distances are based on the information available to Stantec at the time of writing and will require to be verified and confirmed at a later design stage if there are any design changes proposed. Separation distances have been measured to the centreline of the surrounding access roads with respect to each elevation.

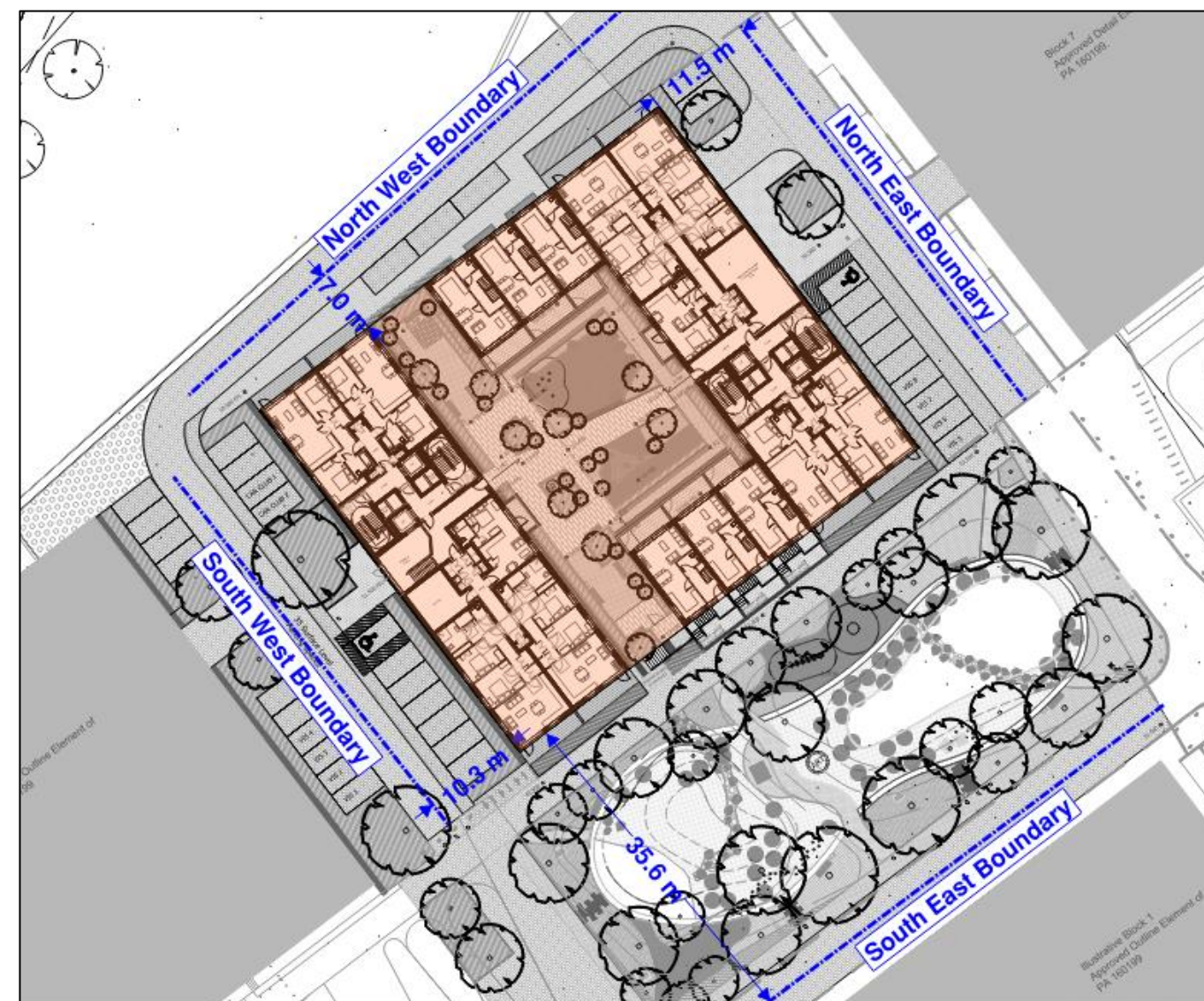


Figure 14 External Fire Spread – Relevant Boundary Distances

The external fire spread analysis was carried out on a compartment-by-compartment basis, assessing the worst-case scenario for each elevation. The worst-case compartments considered across each elevation are annotated within Figure 15 - Figure 18



Figure 15 Northeast Elevation Worst-Case Compartments



Figure 17 Southwest Elevation Worst-Case Compartment



Figure 16 Northwest Elevation Worst-Case Compartments



Figure 18 Southeast Elevation Worst-Case Compartment

The results are summarised in Table 12.

Table 12 Permitted unprotected area external fire spread assessment

Elevation	Use	Compartment size (H x W)	Enclosing Rectangle (H x W)	Boundary Distance	Allowable Unprotected Area ^[4]	Fire Resistance Required to External Walls?
Northwest	Car Park Lower Ground Floor	3.4m x 37.2m	6m x 40m ^[1]	7.0m	100% ^[2]	Not Required
	First Floor Residential Flat	3.2m x 7.0m	6m x 9m ^[1]	7.0m	100% ^[3]	Not Required
	Town House	9.9m x 5.4m	12m x 6m ^[1]	7.0m	100%	Not Required
Northeast	Sixth Floor Residential Flat	3.5m x 18.3m	6m x 21m ^[1]	11.5m	100% ^[3]	Not Required
	Car Park Lower Ground Floor	3.5m x 16.8m	6m x 27m ^[1]	11.5m	100% ^[2]	Not Required
Southwest	Sixth Floor Residential Flat	3.5m x 16.1m	6m x 9m ^[5]	10.3m	100% ^[3]	Not Required
Southeast	Fifth Floor Residential	3.4m x 13.1m	6m x 15m ^[1]	35.6m	100% ^[3]	Not Required

Notes:

1. Per Table B of BR187:2014.
2. Figures outside the bracket from Table B of BR187:2014 were implemented for non-residential use.
3. Figures inside the bracket from Table B of BR187:2014 were implemented for residential use.
4. Following the doubling of the allowable unprotected area due to the provision of automatic sprinklers in accordance with BS 9251:2021 or BS EN 12845:2015+A1 Per Table C of BR187:2014.

On the Northwest elevation, the worst-case scenarios for external fire spread were identified as the car park compartment at lower ground floor, first floor residential flat, and a single town house. As shown in Table 12, the compartments are considered acceptable regarding external fire spread with a maximum of 100% of unprotected area.

On the Northeast elevation, the lower ground floor car park compartment and a sixth-floor residential flat were considered the most onerous scenarios in regard to compartment sizes. Both scenarios have adequate separation from the relevant boundaries, allowing for 100% unprotected area in compliance with the enclosing rectangle method.

On the Southwest elevation, a sixth-floor residential flat was considered the most onerous scenarios in regard to compartment sizes. Both scenarios have adequate separation from the relevant boundaries, allowing for 100% unprotected area in compliance with the enclosing rectangle method.

On the Southeast, a fifth-floor residential flat was considered the most onerous scenarios in regard to compartment sizes. Both scenarios have adequate separation from the relevant boundaries, allowing for 100% unprotected area in compliance with the enclosing rectangle method.

7.3 Re-entrant Corners

7.3.1 Dwellings

The building design should prevent fire spread from occurring around walls/floors required to be fire-rated via an external corner in the façade (i.e. re-entrant corners). Therefore, where the internal angle of a corner in the façade between two dwellings is less than 135°, unprotected areas are to be separated by at least 1.0m, as illustrated in Figure 19.

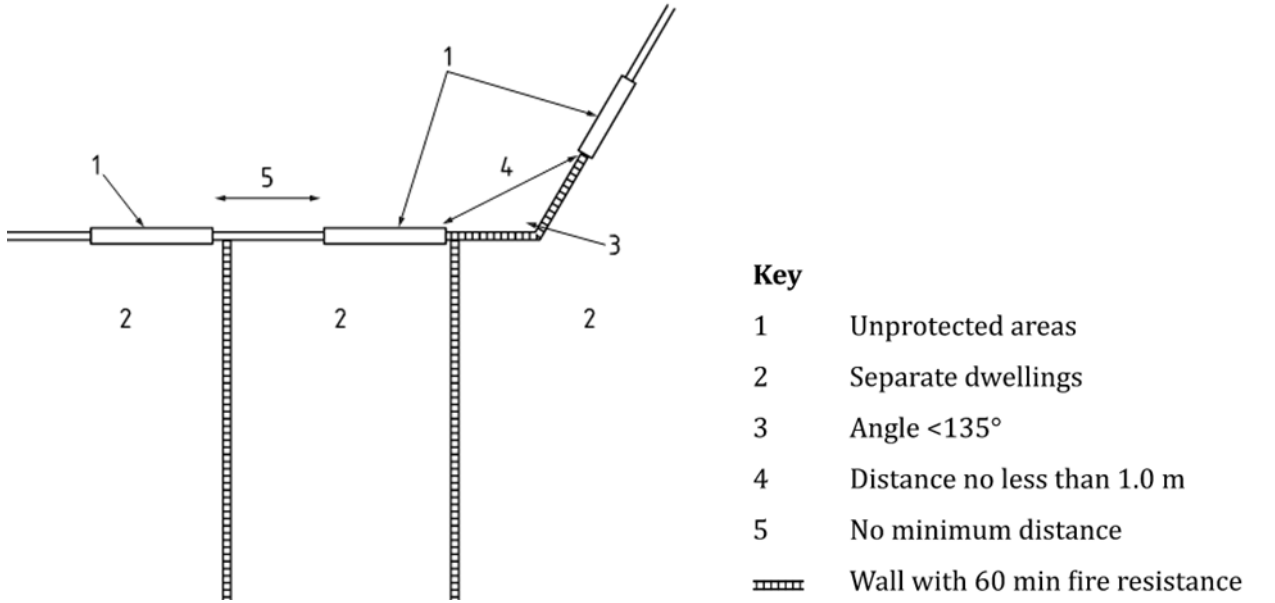


Figure 19 External protection between dwellings within a block of flats or maisonettes (Figure 33 of BS9991:2024)

7.3.2 Firefighting Shafts

If a wall enclosing a firefighting shaft is an exterior wall and the distance from it to adjacent accommodation is less than 5m (as illustrated in Figure 20), either:

- The side nearest the accommodation exterior wall adjacent to the firefighting shaft should have a fire resistance of 120 min; or
- The side internal to the firefighting shaft external wall should have a fire resistance of 120 min.

This also applies to protected corridors providing access to the firefighting shafts on the ground floor, as they are considered part of the firefighting shaft and should maintain the same level of protection.



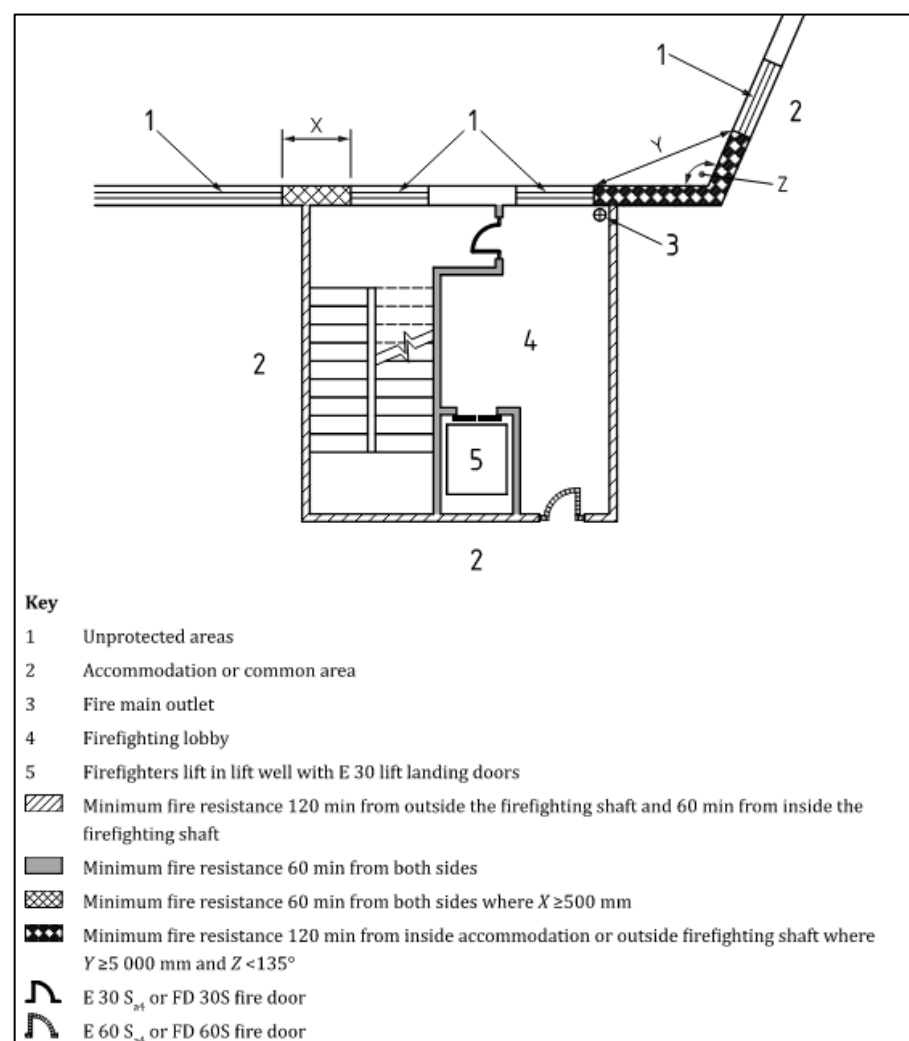


Figure 20: Protection of the firefighting shaft from external fire (Figure 46 of BS9991:2024)

7.4 Roof Coverings

The roof covering is to achieve Euro class $D_{\text{roof}}(t_4)$ as parts of the roof are more than 6 m away from a boundary but less than 12m. However, due to the presence of rooftop PV panels, as per Section 3.6, the roof classification is to meet Euroclass $B_{\text{roof}}(t_4)$.

Where the roof covering passes over a compartment wall, the roof covering should be situated on top of a deck of material of Class A2-s3, d2 or better, for at least 1500mm either side of the compartment wall. It should be noted that this requirement is not considered necessary where the roof achieves a fire resistance (from the underside) equivalent to that of the compartment wall (e.g. where the roof is a concrete slab).

Compartment walls should be fire-stopped up to the roof construction.

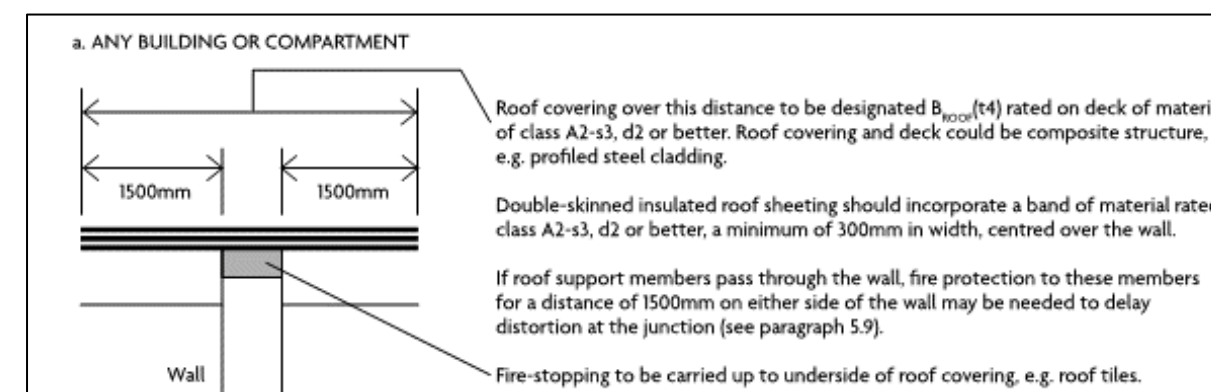


Figure 21: Compartmentation at roof junction

7.4.1 Photovoltaic Panels

PV panels are proposed for the roofs of every building within the development. Where PV panels are provided, care should be taken when installing significant numbers of panels, such that these do not contribute to undue fire spread. As a minimum, the performance of the PV panels should achieve the same classification as the roof coverings applicable to that area to effectively inhibit the rapid spread of fire over the roof coverings. Additionally, it is recommended that an isolation switch be provided for Fire and Rescue Service use, located at the access point to the roof or the associated PV's plant room.

At the time of writing of this report, there is no statutory life safety guidance regarding photovoltaic (PV) panel provisions. However, Stantec recommends adhering to the guidance outlined in RC62, published by the Fire Protection Association (FPA), for best practices.

Furthermore, Stantec recommends the roof structure supporting PV panels achieve the same level of fire resistance as the elements of structure (60-minutes REI) from each side separately to support Fire and Rescue Service operations. Additionally, arc-fault protection and isolated controls for use by firefighters are recommended to be provided, the location of the isolated controls is to be included in the Secure Information Box.

PV arrays should not traverse fire barriers or fire walls, and all cabling should be sealed or contained in order to prevent the spread of fire across fire barriers. Components of PV systems often contain combustible materials. In order to effectively limit the spread of fire via components of PV systems, the following measures are necessary (CFPA-E Guideline No 37:2018 F):

- Components of PV systems with combustible elements, e.g., cables, are not allowed to be passed over a compartment/fire wall. If this cannot be avoided, they should be installed in fire-resistant cable ducts and shafts.
- On roofs, there should be a minimum distance of 2.5 m between the PV modules on each side of the compartment/fire walls. A reduced distance is permitted if the potential for a fire to spread across a compartment boundary is considered low.

Stantec note the design teams intend to use combustible insulation within the roof buildup. A roof covering of class $B_{\text{roof}}(t_4)$ can be achieved with the inclusion of combustible insulation. However, any and all penetrations by services, including those as part of the PV system, to the roof should either be fire stopped to the same level as the roof construction (60-minutes REI) and or enclosed in 60-minute fire resisting ductwork.

Any perimeter construction within the roof that forms part of an external wall, such as parapets or balustrading, are recommended to be constructed of class A2 s-1, d0 or better materials when classified to BS EN 13501-1, there is further guidance in BS5879 on terraces and materials where adjacent to external wall.

Operation and Maintenance

At the commissioning stage, the nominated operator of the system should have the function and control of the system explained to them by the installer. Full details of the system and its operation should be handed over in an appropriate format, to include:

- the objectives of regular visual inspections
- the nature of damage that might be seen following a gale or thunderstorm
- the cleaning and day-to-day maintenance of the system
- the need for vigilance to identify damage to cable insulation and overheating of components; and
- the requirement for regular scheduled maintenance.

Maintenance requirements vary significantly in scale, depending on the size of the system. However, the fundamental principles are the same for all PV systems and current knowledge of the operational status of each system is key, both from an energy generation perspective and in terms of the general condition of the system. If a system is not working correctly due to a potential malfunction, there are likely to be consequent failure risks that could result in fire.

Solar Energy UK have produced an O&M document, Industry best practice manual 2.0: Guidelines for the operation and maintenance of rooftop solar photovoltaic systems providing a comprehensive guide to best practice in terms of maintenance in the context of rooftop systems. It also recommends inspection of commercial systems at least annually by a competent person.

Rodents, squirrels, and nesting birds can all cause harm and alter the fire safety properties of a PV system. Consideration should be given to the potential impact, and suitable mitigation measures put in place.

Vegetation growth can enter electrical equipment and cover PV modules in a relatively short space of time. Regular inspection and reactive vegetation clearance are essential. Bird droppings and other debris may also cause hotspots which may lead to faults and subsequently fire. Regular cleaning programmes are required by specialist cleaning contractors.

After a storm or extreme weather event, PV systems should be inspected for damage.

If there has been a fire the corrective measures from IEC TR 63226:2021 should be carried out immediately. The first step is to turn off the system at all isolation points and establish exclusion zones around uncontrolled parts of the PV installation, as parts of the system may remain vulnerable to reignition by short-circuits or arcs of an array.

Provisions for the Fire and Rescue Service

Information should be provided for the Fire and Rescue Service at a prominent location, such as the entrance to the PV installation, or at a reception/gatehouse, to include:

- the layout of the site, including plans of large buildings, showing the locations of the PV panels and control equipment;

- the location of isolation switches for PV panels;
- the location of the main electrical intake(s) and consumer units;
- the location of the indicator panel for the automatic fire detection and alarm installation;
- details of any automatic fire suppression system(s) and the location of their controls or valves;
- details of ventilation systems;
- the nature and location of any hazardous substances on the premises;
- contact details for staff who may need to be consulted; and
- the location of hydrants, rising mains, and other sources of water on site or nearby, for firefighting purposes.

The presence of a PV system on a building is not always obvious from ground level. 'PV on the roof' signage should be clearly visible for the Fire and Rescue Service upon arrival at the building, in particular a prominent sign measuring at least 100 mm × 100 mm displayed at the consumer units or supplier's cut-out (see Figure 22).

Where mandated for compliance within BS EN 7671:2018, or due to particular client/insurance requirements for commercial PV installations, a switch (or switches) should be provided in a prominent position readily accessible to firefighters to remotely isolate the DC side of the PV system. Such 'fire service switches' help to ensure the safety of firefighting personnel. Operation of the switch should as a minimum make the DC side of the wiring inside the building voltage-free. The switch should be tested during routine maintenance, with the results recorded. These switches should be placed in safe locations remote from the PV panel arrays and are additional to operational AC and DC isolation switches.

Fire personnel should disconnect PV installations from the mains electricity at the intake to render the AC side of the installation voltage-free and operate the 'fire service switch' if installed.

Fire and Rescue Service personnel should be aware that PV panels produce a DC voltage from daylight and other light sources, including any floodlights used to illuminate the fire ground, even if the AC side of the circuit is isolated from the mains electrical supply. This continuing production of DC voltage may have to be addressed in the risk assessment undertaken before firefighting commences. In many existing installations, a DC disconnect for the DC cables on the roof is not provided.

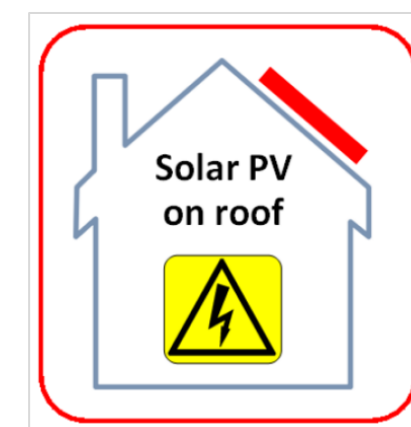


Figure 22 Sign indicating the presence of PV panel installation (reproduced from FPA:2023)

8 Facilities for Firefighting

Functional Requirement B5:

1. The building shall be designed and constructed so as to provide reasonable facilities to assist firefighters in the protection of life.
2. Reasonable provision shall be made within the site of the building to enable fire appliances to gain access to the building.

8.1 General

The following section describes the arrangements for firefighting provisions in the event of a fire in order to comply with B5 of Schedule 1 to the Building Regulations 2010 (as amended).

8.2 Firefighting Access

8.2.1 Vehicle Access

Vehicular access to the premises is via an access road that runs parallel to the Northeast, Northwest, and Southwest elevations.

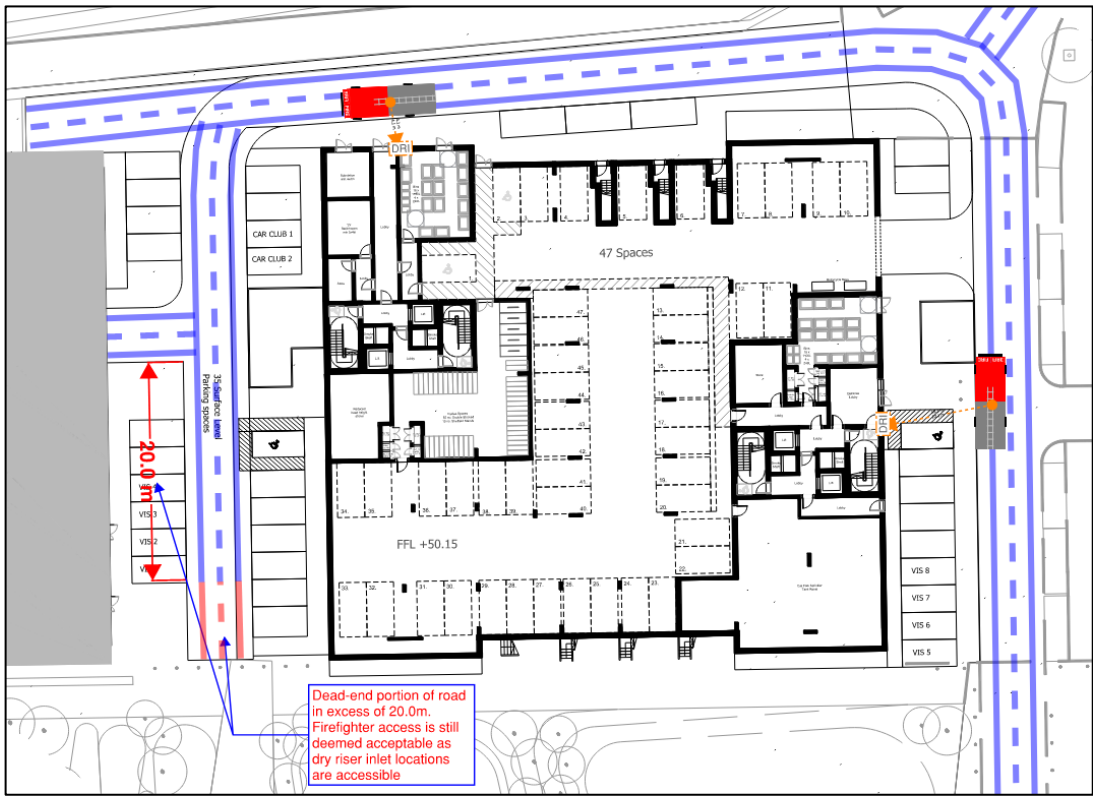


Figure 23 Fire Service Vehicle Access

Fire Service vehicular access to the premises are summarised in Table 13.

Table 13 Example of measurements for a typical vehicle access route

Appliance Type	Min. Width of Road Between Kerbs (m)	Min. Width of Gateways (m)	Min. Turning Circle Between Kerbs (m)	Min. Turning Circle Between Walls (m)	Min. Clearance Height (m)	Min. Carrying Capacity (t)
Pump	3.7	3.1	16.8	19.2	3.7	14.0
High-reach	3.7	3.1	26.0	29.0	4.0	17.0

Notes:

1. The size and mass of fire appliances is not standardised, and the local fire service authority should be consulted to ascertain their recommendations relating to access roads.
2. It should be noted that the London Fire Brigade (LFB) require a more onerous carrying capacity of 14 tonnes.

Turning facilities are to be provided in any dead-end access route that exceeds 20m in length as outlined in Figure 23 noting a portion of the access road running parallel to the Southwest elevation exceeds this limitation. In buildings that are fitted with fire mains, access points should be within 18m of a fire appliance parking position. Stantec deem the proposed access layout acceptable noting dry riser inlet locations are currently assumed and subject to confirmation from the specialist designer.

A swept path analysis should be undertaken by a transport consultant at the later stages once the design has developed further ensuring alignment with the specifications defined Table 13.

8.3 Firefighting Facilities

8.3.1 Firefighting Shafts

As the building's height is greater than 18m above ground level, the building should be provided with firefighting shafts containing firefighters' lifts, stairs, lobby and fire mains.

Where the area served by the shafts exceeds 900m², at least two firefighting shafts should be provided. The maximum floor area of any floor within the Royal Elm Park within one of the two blocks is approximately 660m² and as such only one firefighting shaft is required to be provided to each block.

In accordance with Section 46 of BS 9991:2024, firefighting shafts should serve every storey they pass through and should be enclosed in fire-resisting construction achieving 120 minutes of fire resistance. Only services directly associated with firefighting operations, such as smoke ventilation systems and firefighting shaft lighting, should be permitted to pass through or be contained within the firefighting stairway.

Additionally, the firefighting lift landing doors should be positioned no more than 7.5 m from the fire-fighting stair and are located outside the stair enclosure.



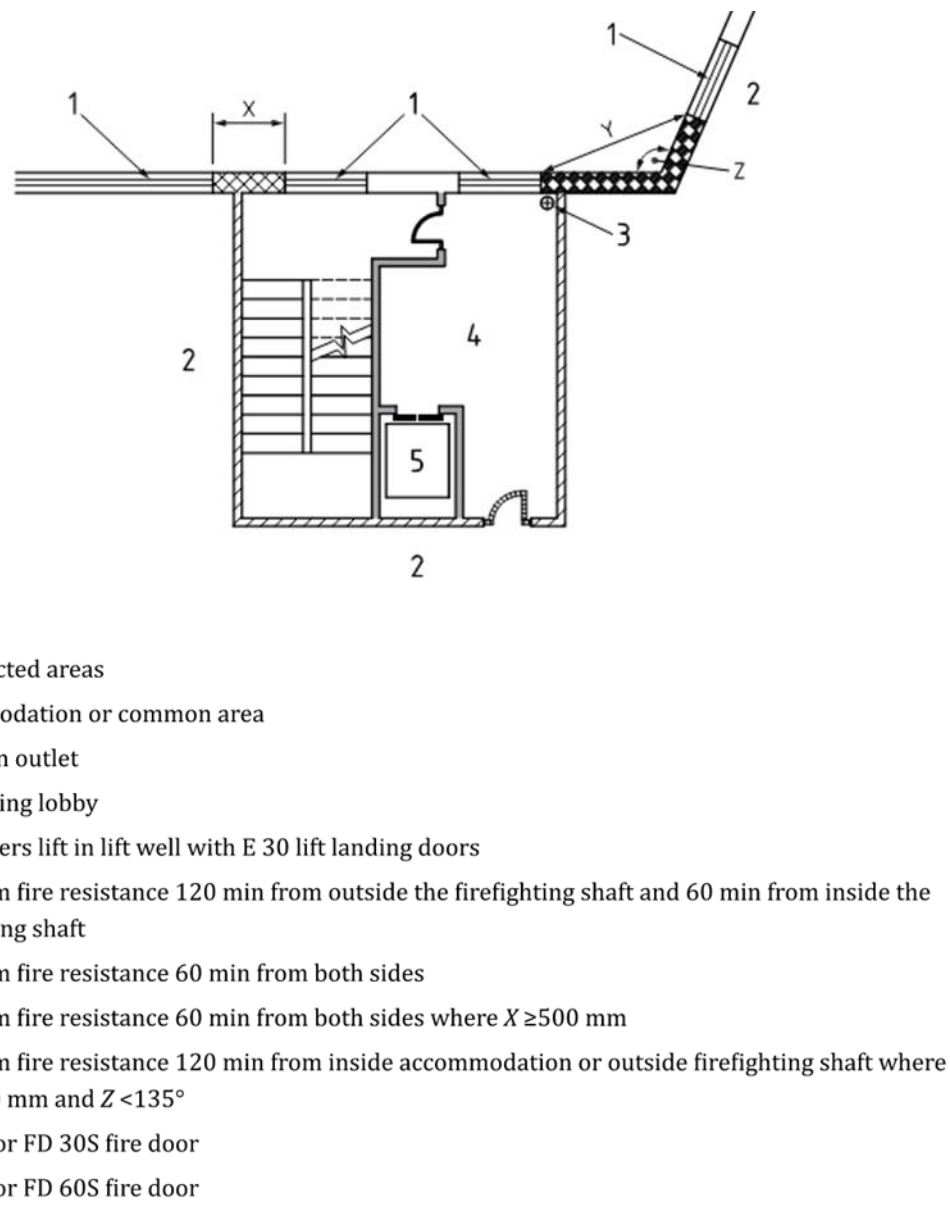


Figure 24 Protection of the firefighting shaft from external fire (Figure 46 of BS9991:2024)

8.3.2 Fire Mains

In accordance with Section 47.1 of BS9991:2024, fire mains should be designed and installed in line with BS9990, and should be provided in any building where:

- a) Any floor is higher than 18m above ground level;
- b) The building is provided with a firefighting shaft; and
- c) The distance from the fire vehicle position to the furthest internal point of the building is more than 45m (or 60m where sprinklers are provided), as measured on a route suitable for laying hose.

As Royal Elm Park exceeds 18m in height, it should be provided with dry fire mains. Dry riser outlets will be provided within the fire-fighting stair enclosures at the full storey landings for the residential floorplates. As the building will be

provided with sprinkler protection throughout, all parts of the floorplates must be no more than 60m from the fire main outlets.

The locations of fire main inlets and outlets within this strategy, as annotated within the Fire Safety Markups attached in Appendix A, are indicative only and should be confirmed by the client and specialist designer.

8.4 Fire Hydrants

In accordance with Section 47.2a) of BS 9991:2024, for buildings provided with dry fire mains, hydrants should be provided within 90m of the dry fire main inlets.

Should sufficient existing fire hydrants not be available on the site, additional hydrants may be required which can be either a private system or extension from the town mains, complying with the criteria outlined above from BS 9991:2024 and BS 9990:2015.

Fire hydrants are required to provide a minimum water supply floor rate of not less than 1.500 l/min in accordance with subclause 6.1 of BS 9990:2015.

The flow and pressure of the hydrants should be checked by the design team and the results communicated with the local Fire & Rescue Service.



8.5 Secure Information Box

The phase 5 of Royal Elm Park has a top storey more than 11m above ground level, therefore, they should be provided with secure information boxes, in accordance with subclause 48.1 of BS 9991:2024, including:

- Floor plans indicating the number of floors and flats, fire resistance provisions, internal access, firefighting facilities, building services, and hazards;
- Information on equipment, active systems (e.g., smoke control), and related access codes or keys;
- Details of any fire engineering strategies affecting the building's performance during a fire;
- Information on preventing environmental damage;
- Information on lifts used for escape or firefighting, including operating instructions, locations of main switches, rescue controls, and machinery spaces;
- Details of any evacuation alert system (EAS) for the fire and rescue service;
- A log of residents requiring assistance.

NOTE: Further guidance is available in the FIA publication Code of practice for the provision of premises information boxes in high-rise residential buildings.

8.6 Wayfinding Signage

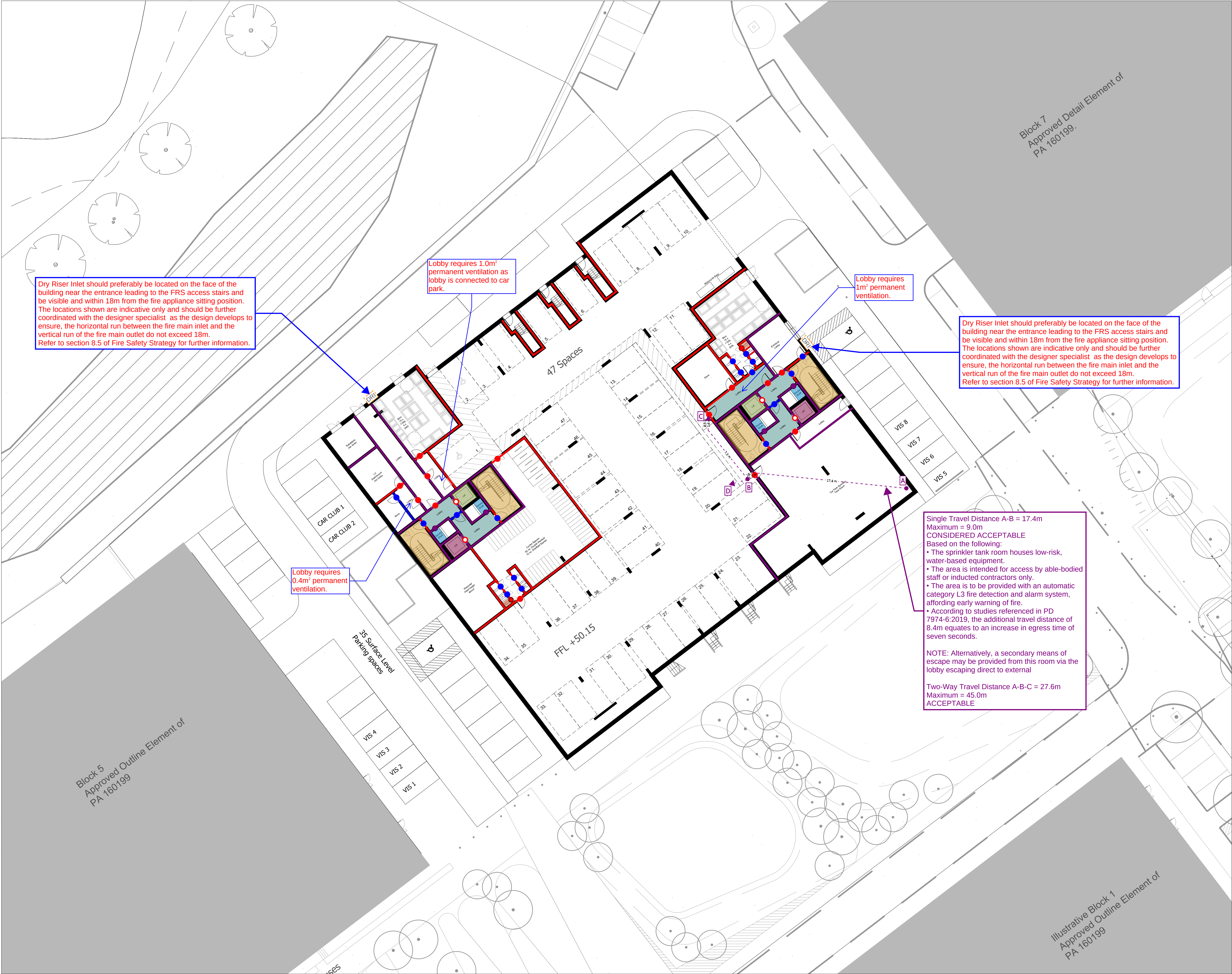
The phase 5 of Royal Elm Park development has a top storey more than 11m above ground level, therefore, floor identification signs and flat indicator signs should be installed on all floors of the development to help the Fire and Rescue Service identify each floor.

Full specifications for wayfinding signage are provided in subclause 48.2 of BS 9991:2024.



Appendix A Fire Strategy Drawings





Notes:

1. This drawing is the property of Stantec Hydrock Limited.
2. All dimensions are to be checked on site before the commencement of works. Any discrepancies are to be reports to the Architect & Engineer for verification. Figured dimensions only are to be taken from this drawing.
3. This drawing is to be read in conjunction with the Fire Safety Strategy Report.
4. Fire Strategy Drawings will require agreement with the local approving authorities and local Fire and Rescue Services

Legend:

- Evacuation lift
- Firefighting lift
- Ventilated corridor
- Ventilated stair
- Natural smoke ventilation shaft
- Mechanical smoke ventilation shafts
- 30 minute fire resistant wall
- 60 minute fire resistant wall
- 120 minute fire resistant wall
- FD30
- FD30S
- FD60
- FD60S
- 60 minute smoke control damper
- 120 minute smoke control damper
- Travel distance
- DRI

P01	06.10.25	S2 - Suitable for Information		HA	AK
Rev	Date	Description		By	Ap
Client					
Architect					
 Stantec					
Project Title					
Royal Elm Park					
Drawing Title					
Fire Safety Mark-ups Lower Ground Floor					
Project Number					
333701707					
Scale @ A1					
1:200				Date	
				06.10.25	
Drawn	Checked	Approved		Rev.	
HA	AK	AK		P01	