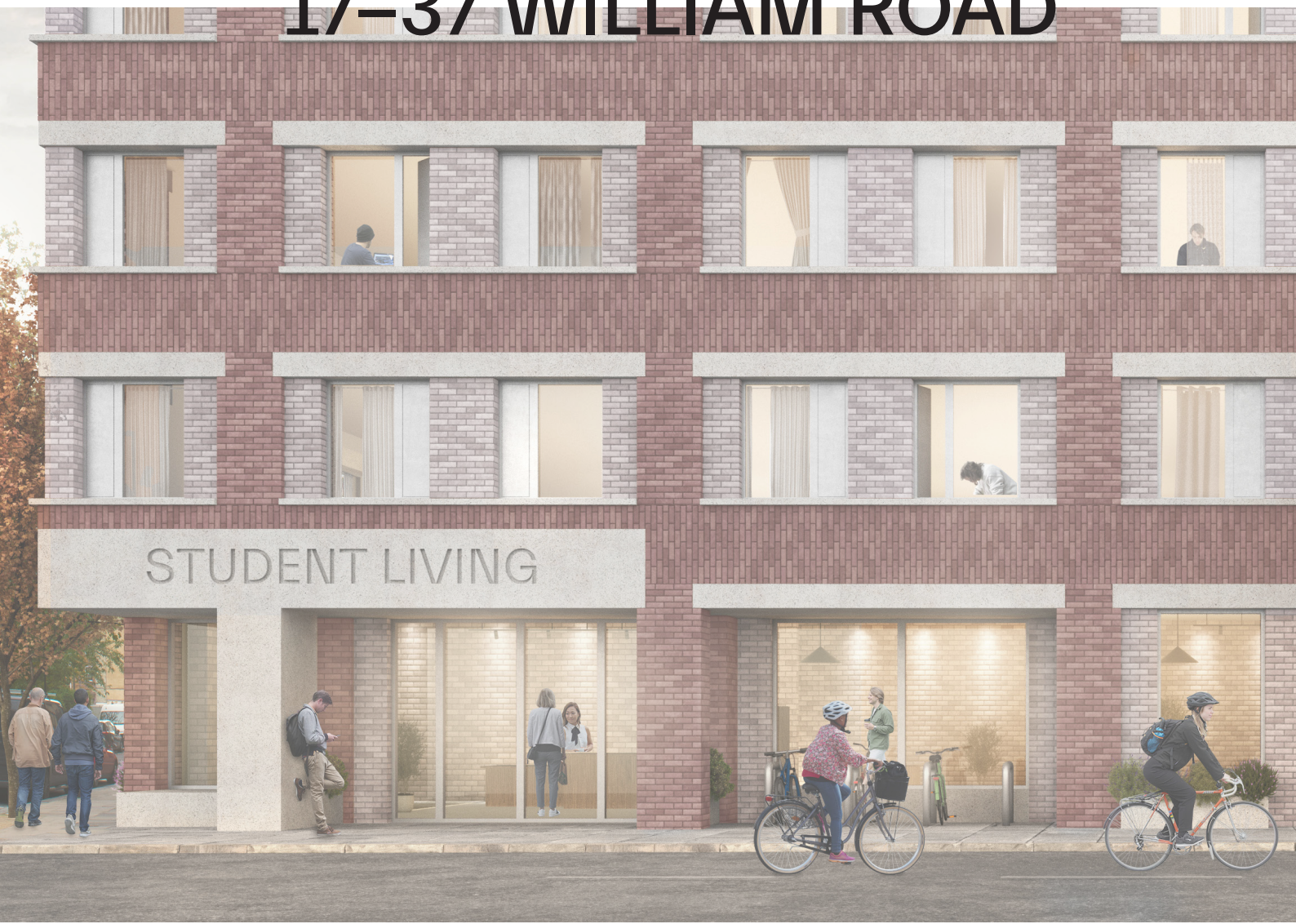
Fire Strategy
November 2020
JGA

17–37 WILLIAM ROAD



Report

Project	17-37 William Road
Report Title	Outline Fire Strategy
Our Ref	EL7081/R1 Issue 3

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Report No. EL7081/R1
Issue No . Issue 3
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1.0 INTRODUCTION

1.1 Description of building

The Site is located at 17-37 William Road, London Brough of Camden.

The Site comprises two adjoining buildings situated to the south of William Road:

- No. 35-37 (Plot A) comprises a dated part two-storey, part six-storey office building with basement level, situated on the corner of William Road and Stanhope Street.
- No. 17-33 (Plot B) comprises a seven-storey building with ancillary office accommodation at ground floor level and residential units above.

The proposed redevelopment of the Site includes the following:

- Demolition of no. 35-37 and redevelopment of the site to provide a student accommodation-led scheme comprising a 15-storey building with basement level;
- Retention of no. 17-33 and provision of a 1,255m^2 (GIA) of affordable workspace at ground floor level, delivered alongside improvements to the existing ground floor façade, providing active frontages along William Road;
- Provision of 168 high-quality student units (239 bedspaces), including 84 affordable units (35% of overall total), alongside shared internal and external amenity spaces;
- Delivery of public realm improvements along William Road and Stanhope Street through the addition of planters and trees providing an enhanced pedestrian experience;
- Provision of 36m^2 (GIA) of replacement ancillary residential storage space serving existing residents within no. 17-33;
- Provision of secure cycle parking in line with emerging London Plan standards; and
- Improved servicing strategy to maximise servicing options.

The topmost occupied storey is greater than 30m above ground at approximately 41m from the ground level.

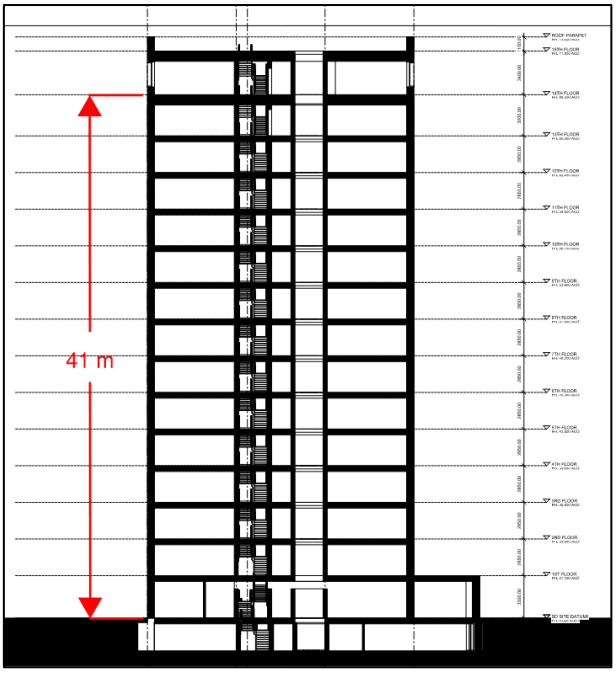

Figure 1 - Building Height

1.2 Aim of Report

This report summarises the outline fire strategy for the William Road development in the London Borough of Camden to demonstrate compliance with the Building Regulations for life safety only.

Student residential buildings are permitted to be designed as apartment buildings. Therefore, this report draws from guidance in *BS 9991: 2015 Fire Safety in the design, management and use of residential buildings – code of practice* which is the principle document for fire safety in new student residential buildings constructed as blocks of flats.

The strategy for the office and social spaces at basement, ground and 14th floor will be developed using *Approved Document B Volume 2: 2019.*

The design of the scheme is intended for a compliant strategy; However, fire engineering solutions are proposed where the design does not comply with the prescriptive guidance. These will be developed in detail after planning and will require discussion with Building Control in the following stages.

This report is intended for issue to the design team and client for design team information to support the planning application. A detailed fire strategy report will be prepared at a later stage to support the Building Regulations application.

This report will be submitted for initial discussions with Building Control.

2.0 ACTIVE FIRE SAFETY SYSTEMS

2.1 Sprinklers

The top floor height of the building is greater than 11m above ground floor therefore sprinklers will be required to meet the Building Regulations guidance which comes into effect on the 26th November 2020. Sprinklers will not be required in the common corridors and staircase.

The provision of sprinklers to the building will also permit the following:

- Increased travel distances within common corridors;
- Open plan layouts of flats;
- Increased travel distances within student apartments.

The building should be provided with a residential sprinkler system conforming to the draft *BS 9251: 2020 – Sprinkler Systems for Residential and Domestic Occupancies*. It is proposed to adopt the draft design guidance for future proofing purposes.

The office accommodation and other ancillary accommodation at basement, ground floor and 14th floor amenity space should be provided with a commercial sprinkler system conforming to *BS EN 12845:2015_A1:2019 – Fixed Fire Fighting Systems. Automatic Sprinkler Systems. Design, Installation and Maintenance.*

2.2 Fire Detection and Alarm

Fire detection and alarm system will be provided to an LD1 standard within the student apartments in accordance with BS 5839-6.

An L5 standard of detection will be provided in the common areas in accordance with BS 5839-1 to activate the smoke control systems which include:

- Automatic openable vents in the common corridors and at the heads of the stair.
- mechanical smoke extract in the stair lobby.

The following areas will be provided with fire detection and alarm to at least an L3 standard in accordance with BS 5839-1:

- Office;
- Other ancillary accommodation at basement, ground floor and 14th floor amenity space;

The PBSA and the ground floor office will be treated as a separate evacuation zone. In order to reduce business disruption, only the effected zone will be evacuated in the event of a fire.

2.3 Evacuation Alert System

At present in England there is also no requirement to install an Evacuation Alert System (EAS) that is for use by the fire and rescue service only. However, the Grenfell Inquiry Phase 1 report recommends that such systems be installed in all new and existing blocks of flats. In addition, the Ministry of Housing, Communities and Local Government (MHCLG) carried out a public consultation on the requirement for such provision in all new high-rise blocks of flats. It is therefore recommended that an EAS designed to BS 8629, should be considered for the development for future proofing purpose.

Given that the building will be managed the provision of EAS will often provide more flexibility in managing the building evacuation in the event of a fire.

3.0 MEANS OF ESCAPE

3.1 Evacuation Strategy

The evacuation strategy for the Purpose-Built Student Accommodation (PBSA) will be designed similar to a residential building with a high level of compartmentation and a single stair serving all student apartments in line with the recommendations of BS 9991: 2015.

The building can therefore operate as a standard residential building with a “defend-in-place” evacuation strategy where only the affected student apartment would evacuate in the first instance.

In general, there are two types of student apartment provided in the building:

- Open plan two-bed apartment
- Single bed studio apartment;

Each of the unit will be treated as an individual student apartment.

The building will be managed, and student residential building operators often require more flexibility in managing the building evacuation in the event of a fire. The fire strategy will therefore be developed so that a simultaneous evacuation strategy could also be implemented by the end operator if required.

3.2 Escape within Student Apartments

In accordance with BS 9991, open plan apartments should achieve the following:

- Be provided with sprinkler protection and LD1 automatic fire detection;
- Have maximum principal dimensions of 16 m x 12 m;
- Have ceiling height of at least 2.25 m;
- Be located on a single floor;
- Open-plan flats with principal dimensions exceeding 8m x 4m will have enclosed kitchens; the kitchens should be located remotely from the entrance where the flats are less than 8m x 4m.

All open plan apartments or studios will be provided to meet the BS 9991 guidance with the exception of the kitchens which will be located relatively near to the entrance of the apartments (see Figure 2 for a worst case arrangement) . Due to the apartment’s configuration, the cooking hob is located along the escape path. The escape route is past the hob, with 1.64m between the centre of the hob and the opposite wall of the escape route.

The location of the cooking hob is considered acceptable based on the following: -

- Occupant will only be escaping past the cooking hob for a short period of time, with limited exposure to the radiant heat. Once past the hob, occupants will be moving away from the fire. See Appendix A for detailed analysis;
- All apartments will be sprinklered;

- All apartments will be installed with induction type hobs which will be maintained by the management on a regular basis;
- All induction hobs will be linked to the fire alarm to disconnect power to hob if alarm within the apartment activates.

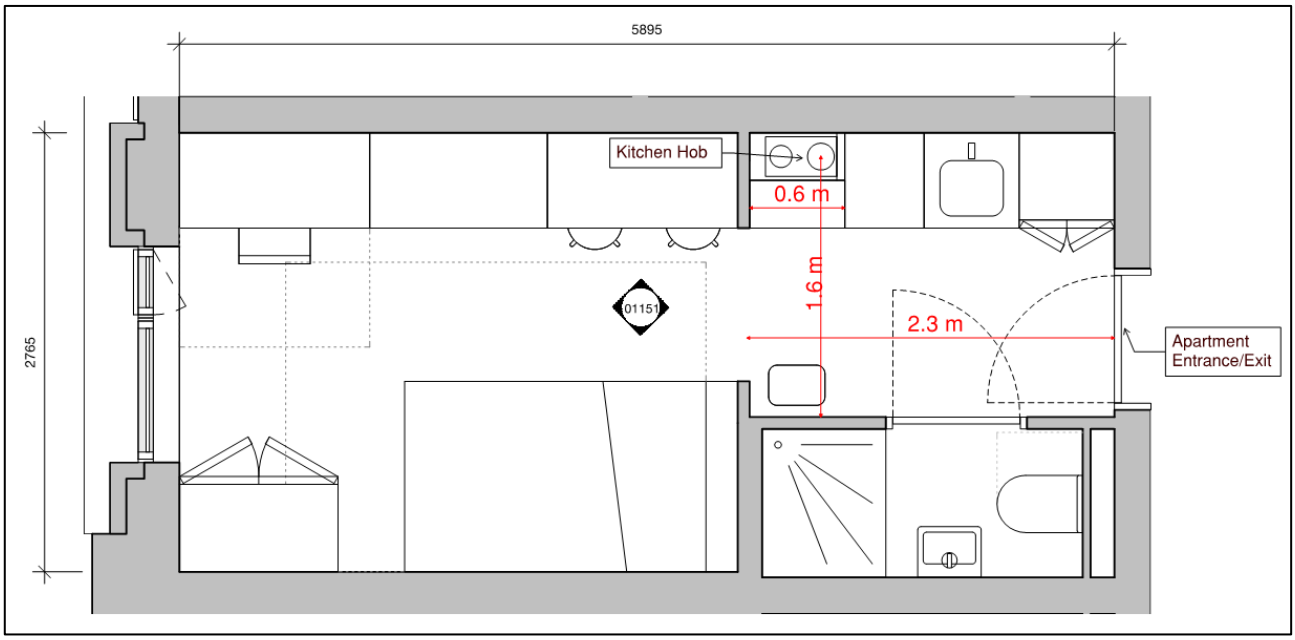

Figure 2 – Cooking Hob Location

Based on the provision of sprinklers and LD1 automatic fire detection, it is permitted to increase the travel distance from the furthest point of the student apartment to the unit exit to 20m. Travel distances within the student apartments are compliant.

3.3 Common Areas

Guidance recommends travel distances are limited to 7.5m in a single direction from the furthest flat entrance door to the stair/lift lobby door. However, with the provisions of smoke venting and an automatic fire suppression system a travel distance of up to 15m is permitted.

Floors 1-7 indicate an extended travel distance in which is above 7.5m, however below 15m. These corridors will be smoke ventilated via a 1.5sqm automatically opening vent (AOV) which will be situated on the external elevation. This smoke venting method will only be implemented on the floors in which are below 30m above ground. The remaining common corridors do not require smoke ventilation as they are below the recommended 7.5m travel distance. The ventilation techniques are indicated in Figures 2 to 5.

Guidance also recommends that the area directly adjacent to the stairs should be smoke vented. The lobby in which is adjacent to the stairs will be served with a mechanical smoke extract system on all floors. The smoke extract system is usually between 0.6-0.8sqm in cross sectional area achieving an extraction rate of approximately 3-5m^3/s. This will need to be confirmed by a specialist supplier.

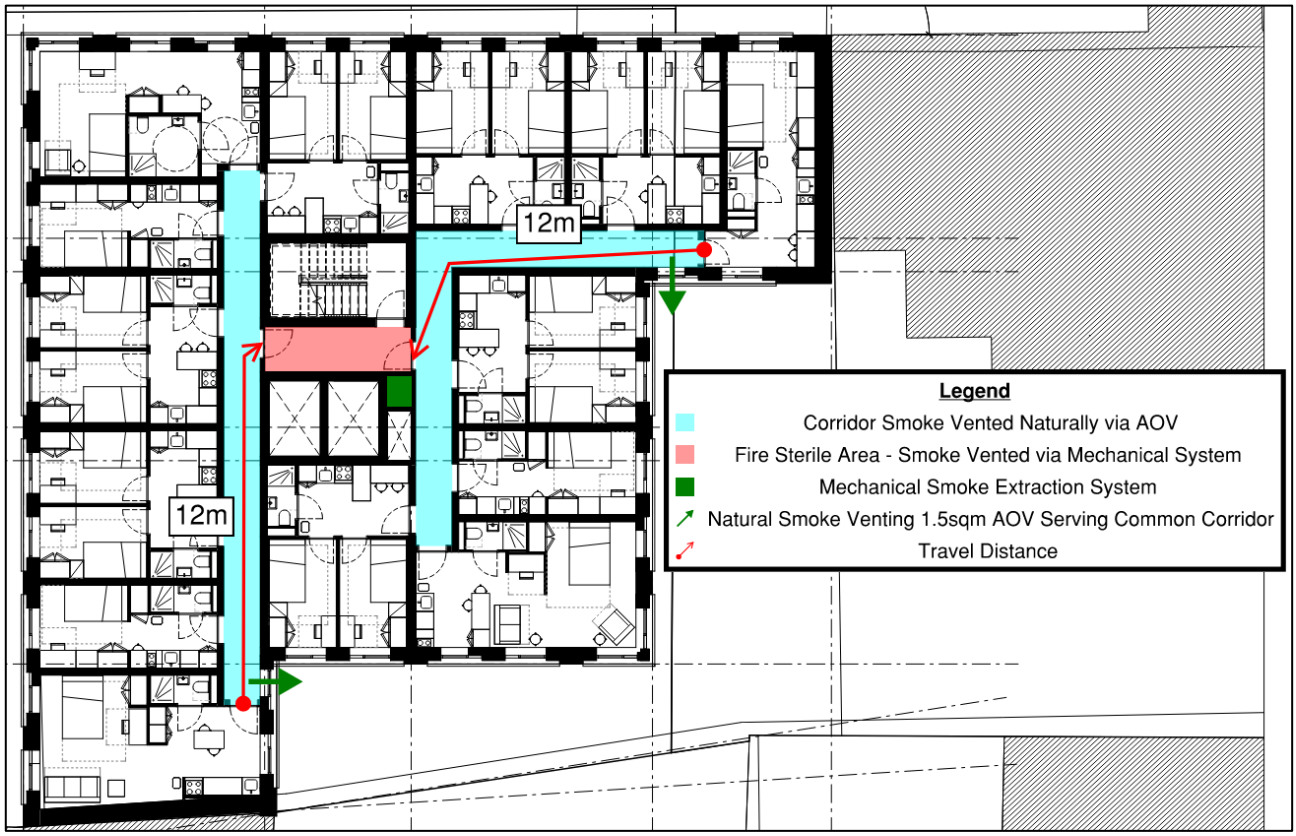

Figure 3 - Travel Distance and Smoke Venting of Common Areas at 1st-3rd floor

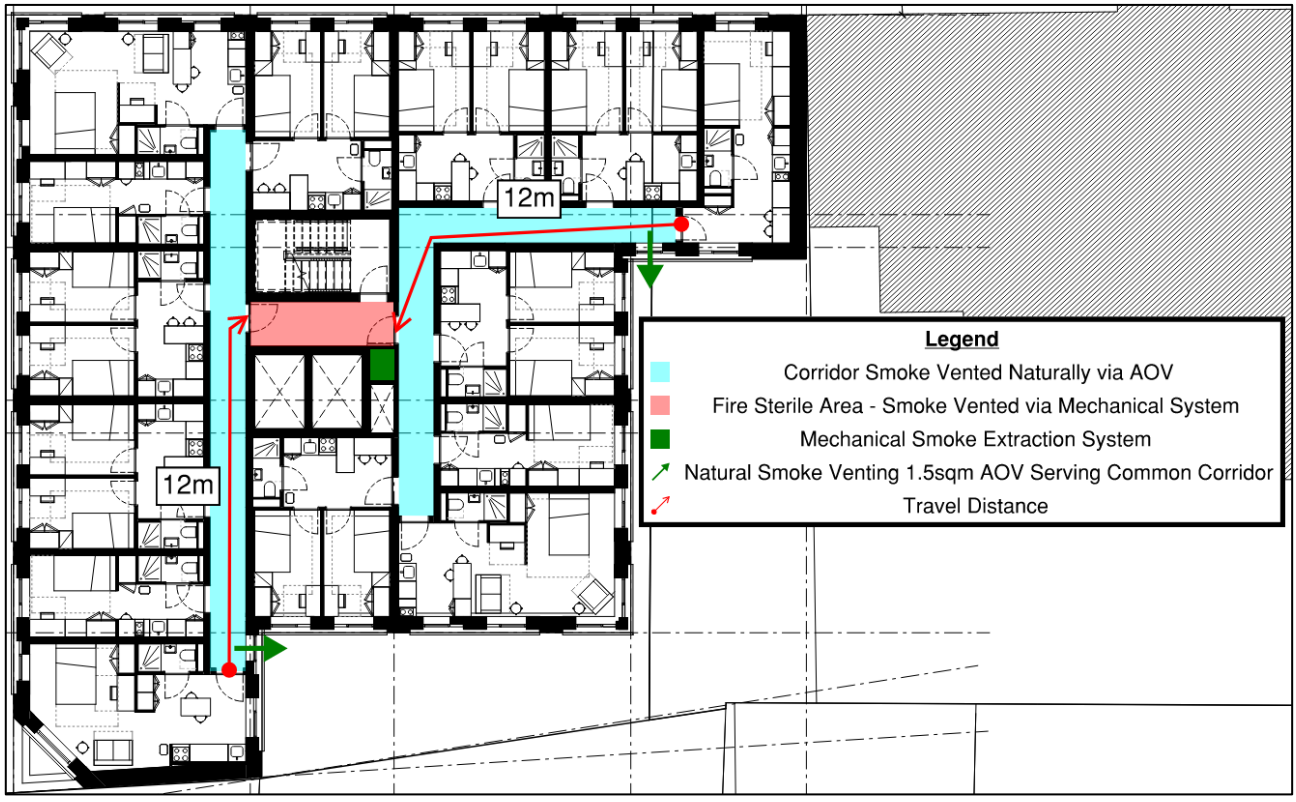

Figure 4 - Travel Distance and Smoke Venting of Common Areas at 4th-5th Floor

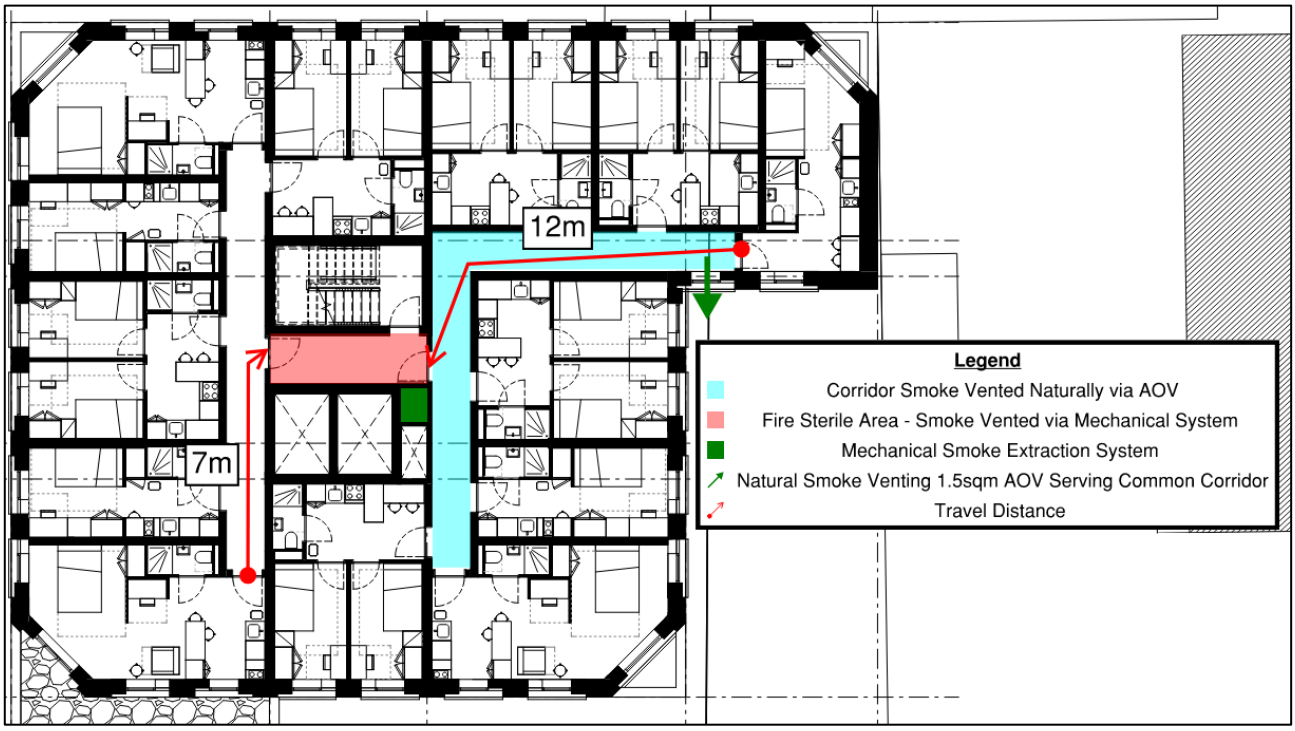

Figure 5 - Travel Distance and Smoke Venting of Common Areas at 6th-7th Floor

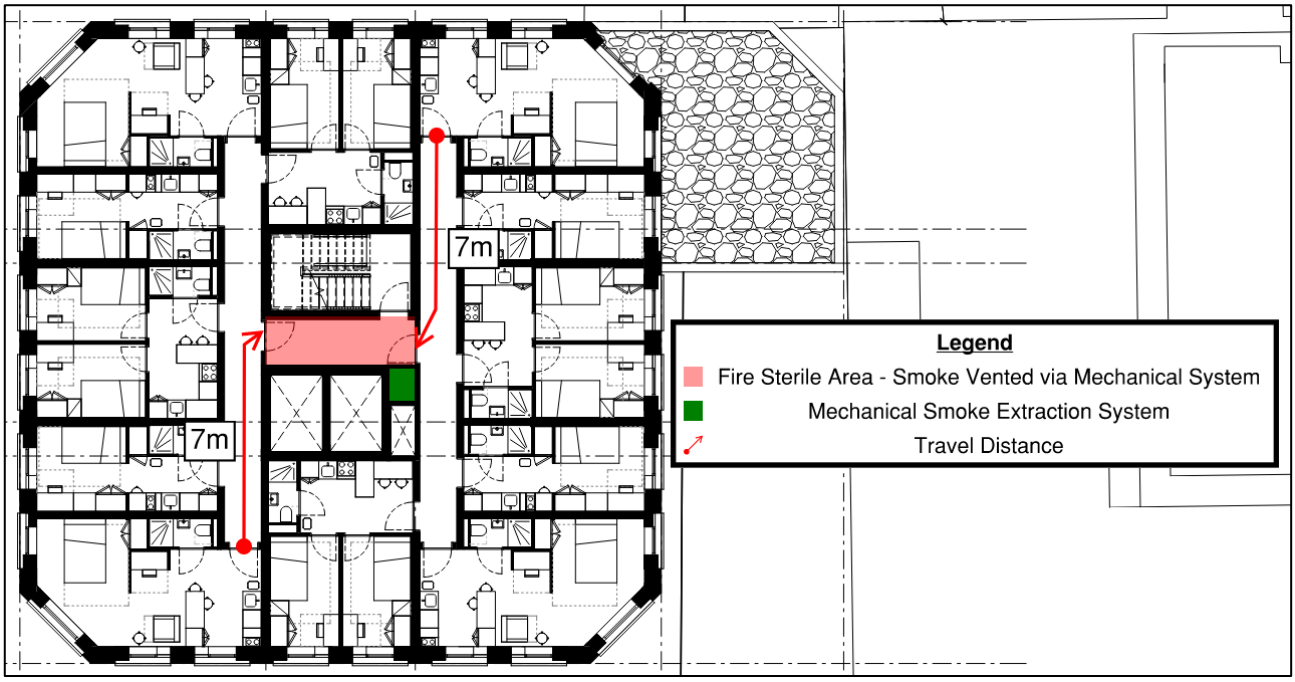

Figure 6 - Travel Distance and Smoke Venting of Common Areas at 8th-13th Floor

3.4 Single Stair

The escape stair will be at least 1.1m clear width.

A 1m^2 automatically opening vent (AOV) will be provided at the head of the stair.

3.5 Evacuation of Mobility Impaired Occupants

Each apartment has its own self-contained smoke alarms with a 'defend in place' strategy whereby only the occupants of the apartment on fire would escape initially. The occupants of all other unaffected apartments will stay in place.

Under the current guidance there is no requirement to provide disabled refuges within the common areas of the apartment floors. If necessary, any occupant who is unable to escape using the stair will wait for assistance either in the protected corridor/lobby or stair. The building operator will develop a Personal Emergency Evacuation Plans (PEEPs) to assist any mobility impaired occupants to evacuate.

Disabled refuges will be provided to other non-residential levels i.e. basement and 14th floor. Refuges will be at least 900mm x 1400mm and will include Emergency Voice Communication (EVC) system with a link to the building management office.

Facilities for the evacuation of mobility impaired occupants in high rise buildings have come increasingly into focus in the past few years. Documents such as the London Plan (although this has currently been put on hold) have made recommendations to ensure that buildings provide suitable escape routes to allow all occupants to escape in a dignified manner.

For the development, it is proposed to incorporate an evacuation lift into the lift core adjacent to the firefighting lift. Evacuation lifts are typically sized to accommodate a bed. However, this wouldn't be needed here based on the occupancy type. To facilitate fire-fighting operation, it is proposed that the evacuation lift be upgraded to also serve as a firefighting lift. This would allow the lift sizes to remain the same, would be suitable as part of an evacuation strategy, and has additional benefits for fire fighters later on in the firefighting phase once evacuation is complete. A two firefighting lift solution also provides more resiliency if one of the lifts needs to be taken out of service for maintenance.

A management strategy for the evacuation of mobility impaired occupants will need to be developed by the building operator.

3.6 Final Exit from Stair

Guidance recommends that the stair discharges direct to outside or via a protected route with no internal connection to ancillary accommodation. The protected route directly to outside from the stairs has a connection to the refuse store. This is not in line with the current guidance. However, this arrangement is considered acceptable based on the following fire engineering justifications:

- The route from the stair to outside will be a fire sterile area;
- The refuse store will be separated from the protected final exit via a smoke vented lobby which will contain 1m^2 permanent ventilation. This in turn means that the stairs will be protected by a double lobby protection one of which being smoke vented.
- Occupants can escape through an alternative escape route either through the protected route directly to outside or through the reception area. This route is also supported through the mechanical smoke extraction system in which serves the lift lobby.

Figure 7 - Final Exit from Stair

3.7 Basement

Guidance recommends that in a single stair building the stair in which serves the floors above should not continue down to basement level. It is proposed for the main stair to connect to basement. This is proposed based on the provision of a double lobby protection one of which being smoke vented between the stair and ancillary accommodation. The ancillary accommodation at basement level will also be sprinklered and smoke vented using a mechanical system.

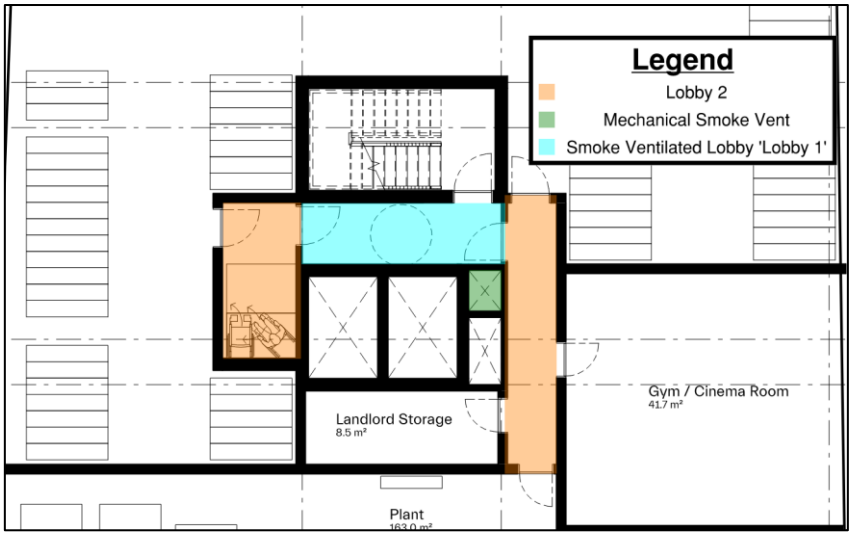

Figure 8 - Basement Stair Protection

3.8 Ground Floor Amenity Space

The ground floor amenity area contains two exits, one direct to outside and the other through a reception area.

Based on the exit widths, it is proposed that the occupancy of the amenity should be limited to 110 occupants after discounting the largest exit.

The amenity space contains an inner room in the form of a courtyard. The dead-end escape distance within the courtyard is approximately 12m. This is within the recommended 18m limit. To meet the guidance for inner room escape it is proposed that the access room (amenity space) be provided with automatic fire detection

such that any occupants in the courtyard will receive early means of warning should a fire occurs in the access room.

3.9 14th Floor Amenity Space

Building Regulations guidance recommends that at least two exits should be provided for non-residential uses that have a floor over 11m above ground. The 14th floor is 41m above ground and is served only by a single stair.

A single stair would not be appropriate for a public access building of this height, e.g. a bar, restaurant or office. However, the amenity space will be accessible to residents only. Occupants on the 14th floor will be awake and familiar with the area, as they will be residents of the building, unlike a public access leisure area. Therefore, a single stair serving the 14th floor is reasonable.

Where a single exit is provided from a floor, the escape capacity should be limited to 60 i.e. the total occupancy of 14th floor would be limited 60. However, based on the seating layout, it is intended to accommodate 103 people at this level. The proposal occupancy is considered acceptable based on the following:

- The 14th floor is provided with two exits which are well spaced apart and both provide lobby protection to the stair. There is also an additional protection to the lobby adjacent to the stair (double lobby protection). Therefore, if fire discounts one exit, the occupants will be able to escape through the alternative exit. Based on ADB, a 900mm wide door would be sufficient to accommodate 110 people.
- The maximum travel distance is relatively short (12m). This is well within the 18m recommended limit.
- The amenity space will be provided with fire detection and alarm to an L3 standard.
- For smoke detection in any of the common areas at any level including ancillary accommodation at basement/ground floor, the alarm will sound throughout the 14th floor amenity space to commence the evacuation.

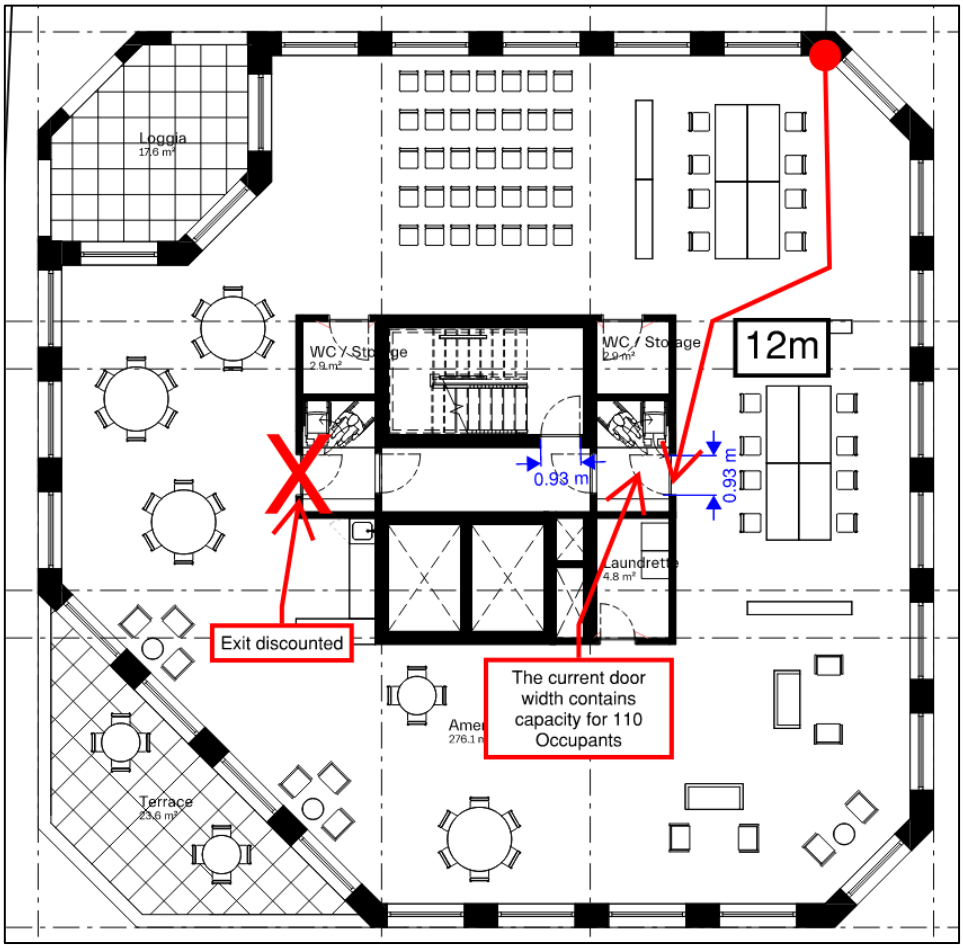

Figure 9 - 14th Floor Amenities space

3.10 Office Accommodation

3.10.1 Occupancy

The office floor has an area of 1220m^2 this gives an occupancy of 204 based on a standard floor space factor of 6m^2.

3.10.2 Storey Exit

The office space is provided with 2 exits located at either end of the office discharging directly onto William Road. If both exits open in the direction of escape and will be at least 1900mm clear width. After discounting the largest exit, the remaining exit provide capacity for 380 occupants which is sufficient for the occupancy.

3.10.3 Travel Distance

Guidance recommends a maximum travel distance of 18m in a single direction of travel and 45m in multiple directions. When analysed the office block shows a maximum single direction of travel of 10m before diverging into two separate directions indicating travel in two directions to be 44m. This is within the recommended limit.

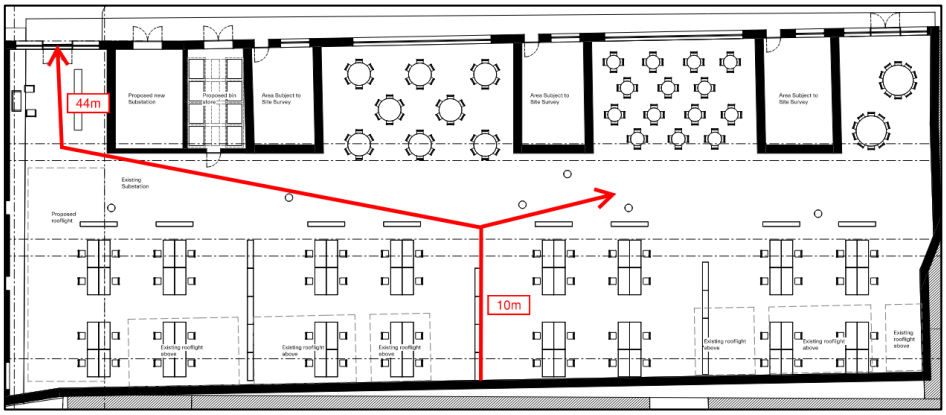

Figure 10 - Block B Office Travel Distance

3.11 Ancillary Accommodation

3.11.1 Bin and Cycle Stores

Guidance recommends travel distances for cycle and bin stores should be limited to no more than 18m in a single direction and no more than 45m where escape is possible in more than one direction.

Travel distances are within the recommended limits in the bin and cycle stores.

3.11.2 Plant Rooms

Guidance recommends travel distances in the plant rooms to the nearest storey exits should be limited to 9m in a single direction and 35m where multiple escape routes are available.

The single travel distances in the basement plant room will be up to 17.5m. This exceeds the limit given in the code guidance but is considered reasonable based on the provision of sprinklers to the building. The fire detection an alarm system will also give early warning of a fire to any occupants in the plant room.

Life safety equipment will be equipped with an alternative power supply as recommended in Section 15 of BS9991.

4.0 FIREFIGHTING

4.1 Firefighting Facilities

The single stair a floor greater than 18m above ground and will therefore be constructed as a firefighting shaft.

The firefighting shaft will include the following:

- Firefighting lifts including backup power supply located within 7.5m of the door to the stair on all floors;
- 1.1m wide firefighting stair;
- 2 hours fire resisting enclosure around the stair and the firefighting lift;
- Dry fire main with an outlet located within the stair enclosure on all floors;
- 1m^2 automatically opening vent at the head of the stairs;

The building will be provided with two firefighting lifts. As part of the fire strategy the one of the firefighting lifts will also be provided to serve as an evacuation lift. This will provide additional benefits for fire fighters in the firefighting phase once evacuation is complete. A two firefighting lift solution also provides more resiliency if one of the lifts needs to be taken out of service for maintenance.

An outlet will be provided on the full stair landing on all floors. Hose coverage is sufficiently achieved within 60m of a dry fire main outlet and on all floors as shown in the Figure below.

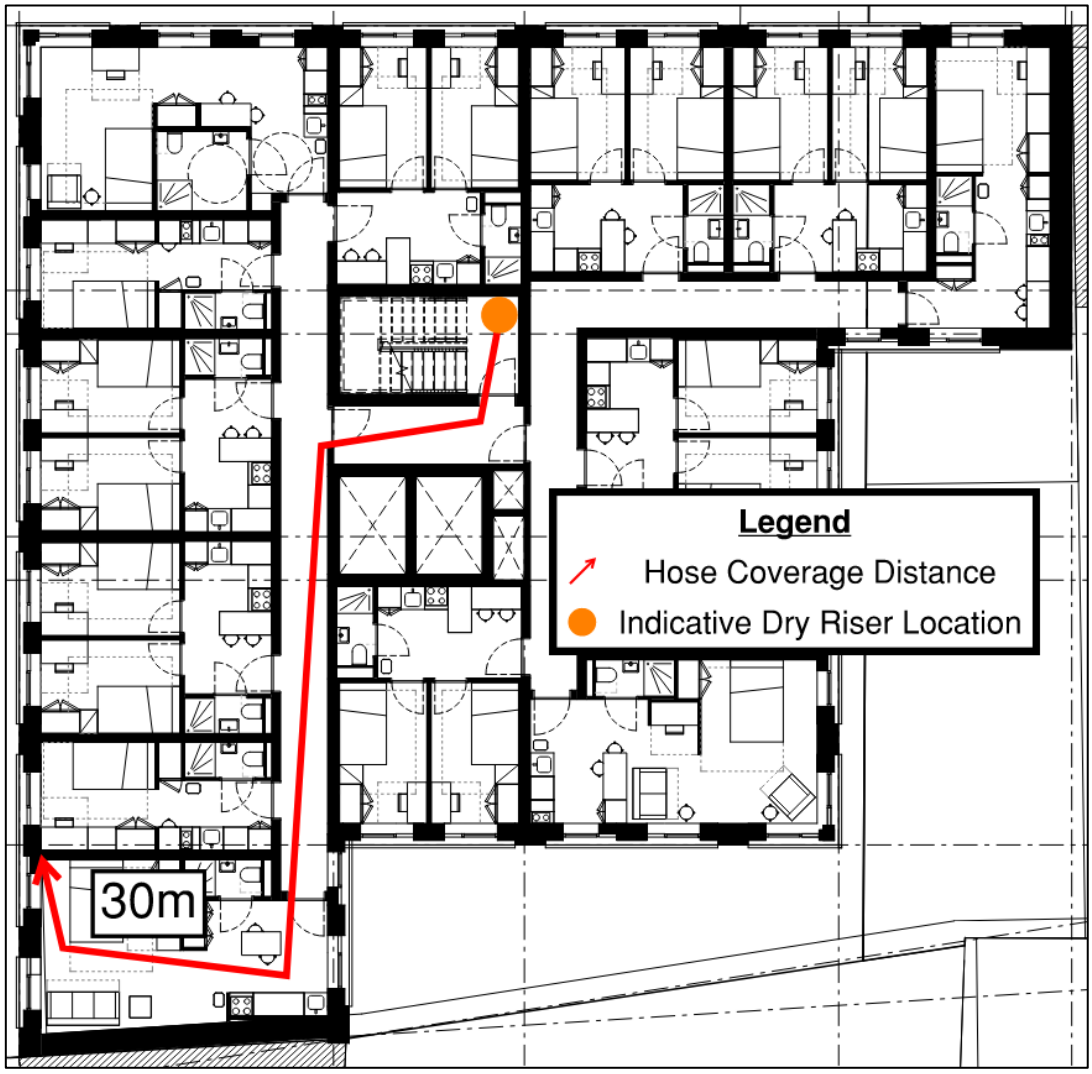

Figure 11 - Hose Coverage

4.2 Site Wide Fire Vehicle Access

Guidance recommends fire vehicle access should be provided to within 18m and in sight of all dry fire main inlets to buildings provided with fire mains.

Figure 12 -Fire Vehicle Access

The office is less than 11m in top floor height and less than 2000m^2 in area therefore guidance recommends perimeter access is possible within 15% of the accessible perimeter. This is sufficiently achieved via William Road.

4.3 Basement Smoke Venting

The basement will be smoke vented via a mechanical ventilation system achieving an extraction rate of 10 air changes per hour.

4.4 Hydrants

The site is well covered by the existing street hydrants. At this stage, it is not expected that private hydrants will be required for the development.

5.0 STRUCTURE AND COMPARTMENTATION

5.1 Structure

The structure of the building will achieve 2 hours fire resistance.

5.2 Compartmentation

All floors will be constructed as compartment floors achieving a 2-hour fire resistance period.

Area	Fire Resistance Period
Enclosure to service risers	2-hour fire resistance
Firefighting stair	2-hour fire resistance
Firefighting lift shaft	2-hour fire resistance.
Walls between office and residential areas	2-hour fire resistance
Plant room containing life safety equipment	2-hour fire resistance
Separation between: - • **Student apartments and the common corridor** • **Student apartments**	1-hour fire resistance.
Stair Lobby/ Common Corridors	1-hour fire resistance.
Walls enclosing communal areas	1-hour fire resistance.
Refuse Store	1-hour fire resistance.
Plant Room – Primary main electrical distribution board	1-hour fire resistance.
Cycle Store	30-minutes fire resistance.
Walls enclosing cluster corridors	30-minutes fire resistance.
Plant Room - LV	30-minutes fire resistance.

Table 1 - Compartmentation

5.3 Cavity Barriers

Cavity barriers will be provided in concealed ceiling voids and floor voids, in accordance with the recommendations of with Section 19 of BS 9991: 2015.

5.4 Fire Stopping

Fire stopping will be provided to maintain the integrity of the fire separating elements in accordance with the recommendations of Section 24.4 of BS 9991: 2015.

5.5 Internal Wall and Ceiling Linings

5.5.1 Residential areas

The internal wall and ceiling linings to the residential areas will achieve the classifications described in Section 20 of BS 9991. These are shown below.

Location	National Class	European Class
Rooms no larger than 4m^2	3	D-s3,d2
Circulation spaces within dwellings	1	C-s3,d2
Common escape routes and circulation areas	0	B-s3, d2

Table 2 - Wall and Ceiling Linings in Residential Areas

5.5.2 Office Areas

The surface linings of walls and ceilings in the office and other non-residential areas will meet the classifications given in Table 3 below.

Location	National Class	European Class
Rooms no larger than 30m^2	3	D-s3,d2
Other rooms	1	C-s3,d2
Other circulation spaces	0	B-s3, d2

Table 3 - Wall and Ceiling Linings in Non-Residential Areas

6.0 EXTERNAL FIRE SPREAD

6.1 Fire Spread to Adjacent Buildings

Calculations into the permitted glazing on the building's elevations have been carried out using the enclosing rectangle method in line with the recommendations of BRE 187: External Fire Spread- Building Separation and Boundary Distances: 2014.

Guidance allows for the boundary distance to be taken to either the site boundary or to a notional boundary such as to the midpoint of a road on the basis that future development is unlikely. Fire separation between buildings has also been considered.

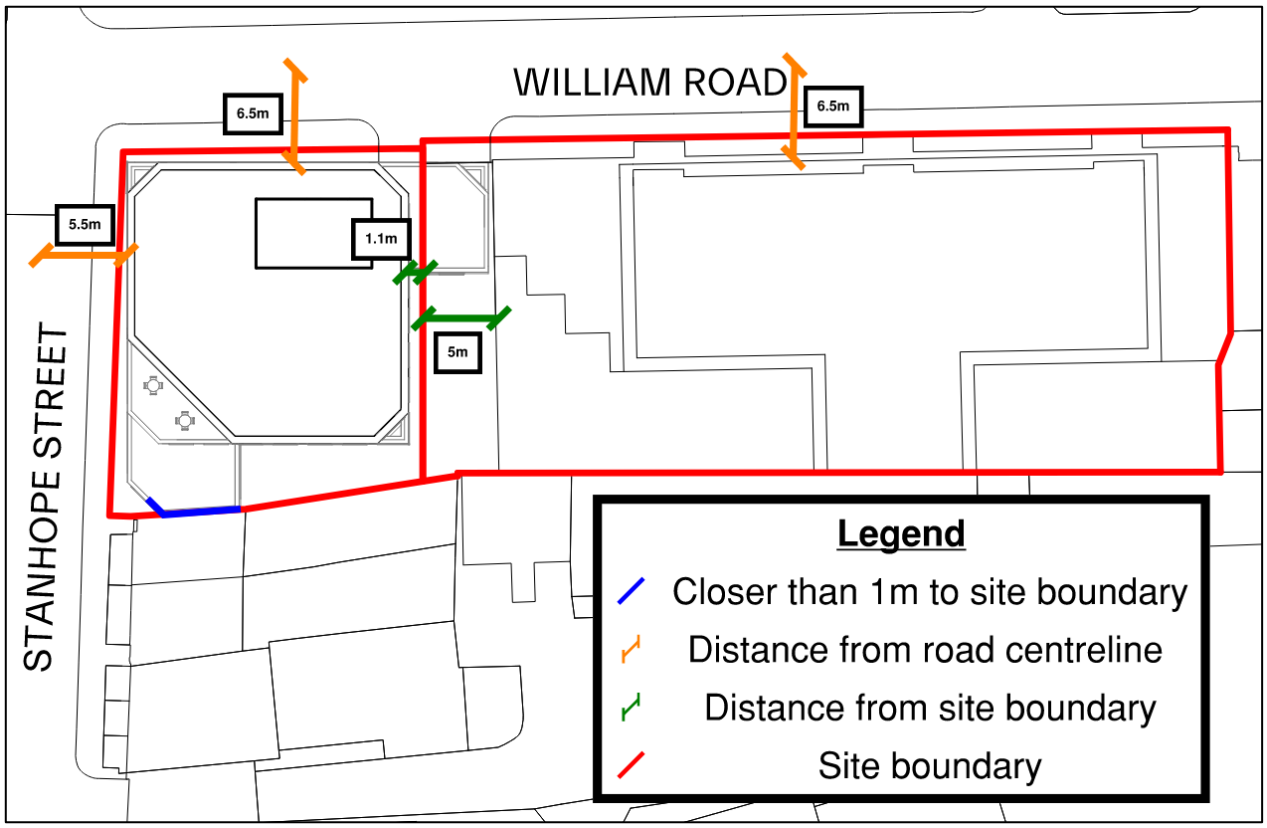

Figure 13 - Site Boundaries and Notional Boundaries

Elevation		Distance to Relevant Boundary (m)	Appropriate Enclosing Rectangle h x w (m x m)	Permitted Unprotected Area (%)
North Elevation	Office	6.5	3.3 x 50	100
	Residential	6.5	3.4 x 8	100
South Elevation	Office	N/A		
	Residential	2.3	3.4 x 8	100
East Elevation	Office	N/A		
	Residential	1.1	3.4 x 5	93.2
West Elevation	Office	5	3.3 x 23	100
	Residential	5.5	3.4 x 5	100

Table 4 – External Fire Spread Assessment

The South and East office external elevations and parts of the residential south elevation (Highlighted in Blue) run in coincidence with the site boundary. Where the building is within 1m of the boundary then the elevation would need to be fire resisting from both sides, with only small unprotected areas i.e. no more than $1m^2$ with at least 4m separation or $0.1m^2$ with 1.5m separation.

The elevations on the residential accommodation have been established to be able to contain 100% unprotected area on the majority of elevations. However, on the east elevation the amount of unprotected area i.e. glazing is limited to 93.2%. By the amount of glazing that is currently proposed on the scheme this is not considered an issue.

6.2 External Wall Construction

6.2.1 Residential Block

The top floor height of the building exceeds 18m. As mentioned previously, the PBSA will be designed following the design principle for a residential building. On this basis, all materials used in the construction of the external wall will achieve European Class A2-s1, d0 or Class A1, with the exception of sealants, gaskets, doors and windows (including frames); (see regulation 7(3) for the full list of exemptions).

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

6.2.2 Office Block

There are currently no regulations regarding the external wall construction of buildings under 18m in height. However, it is best practice for the external walls of the building to not provide a medium for fire spread. This implies that products or materials which form part of the external wall construction of the building (including balconies) should achieve European Class A2-s1, d0 or Class A1, with the exception of sealants, gaskets, doors and windows (including frames); (see regulation 7(3) for the full list of exemptions).

7.0 FIRE SAFETY MANAGEMENT

7.1 General

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

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

7.2 Staff

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

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

7.3 Fire Safety Manual

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

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

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

7.4 Maintenance and Housekeeping

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

7.5 The Regulatory Reform (Fire Safety) Order 2005

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

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

A Fire Risk Assessment should be carried out:-

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

Other legal duties include: -

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

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

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

8.0 INFORMATION, LIMITATIONS AND ASSUMPTIONS

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

Drawings

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

Information

The following information was used for the preparation of this report: -

Drawing	Drawing Number
GROUND FLOOR PLAN - PLOT B	A295 MCO BB G0 DR A 01099
GROUND FLOOR PLAN - PLOT A	A295 MCO BA G0 DR A 01100
LEVEL 01-03 FLOOR PLAN	A295 MCO BA 01 DR A 01101
LEVEL 04-05 FLOOR PLAN	A295 MCO BA 04 DR A 01104
LEVEL 06-07 FLOOR PLAN	A295 MCO BA 06 DR A 01106
LEVEL 08-13 FLOOR PLAN	A295 MCO BA 08 DR A 01108
LEVEL 14 FLOOR PLAN	A295 MCO BA 14 DR A 01114
BASEMENT PLAN	A295 MCO BA B0 DR A 01098

Survey (Existing Building)

This building has not been surveyed by Jeremy Gardner Associates.

Building Regulations

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

Other Limitations

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

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

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

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

APPENDIX A – ASSESSMENT OF COOKING HOBS RADIANT HEAT FLUX

BS 7974 “Applications of Fire Safety Engineering Principles to the Design of Buildings” states that at a point where the radiant heat flux is 10 kW/m² tenable conditions are maintained for 4 seconds and where the radiant heat flux is 2.5 kW/m² they are maintained for 30s. This is a reasonable time to escape from the living room / kitchen area. The radiant heat flux is a function of the heat release rate of a fire and the distance from the fire (see Figure A1).

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

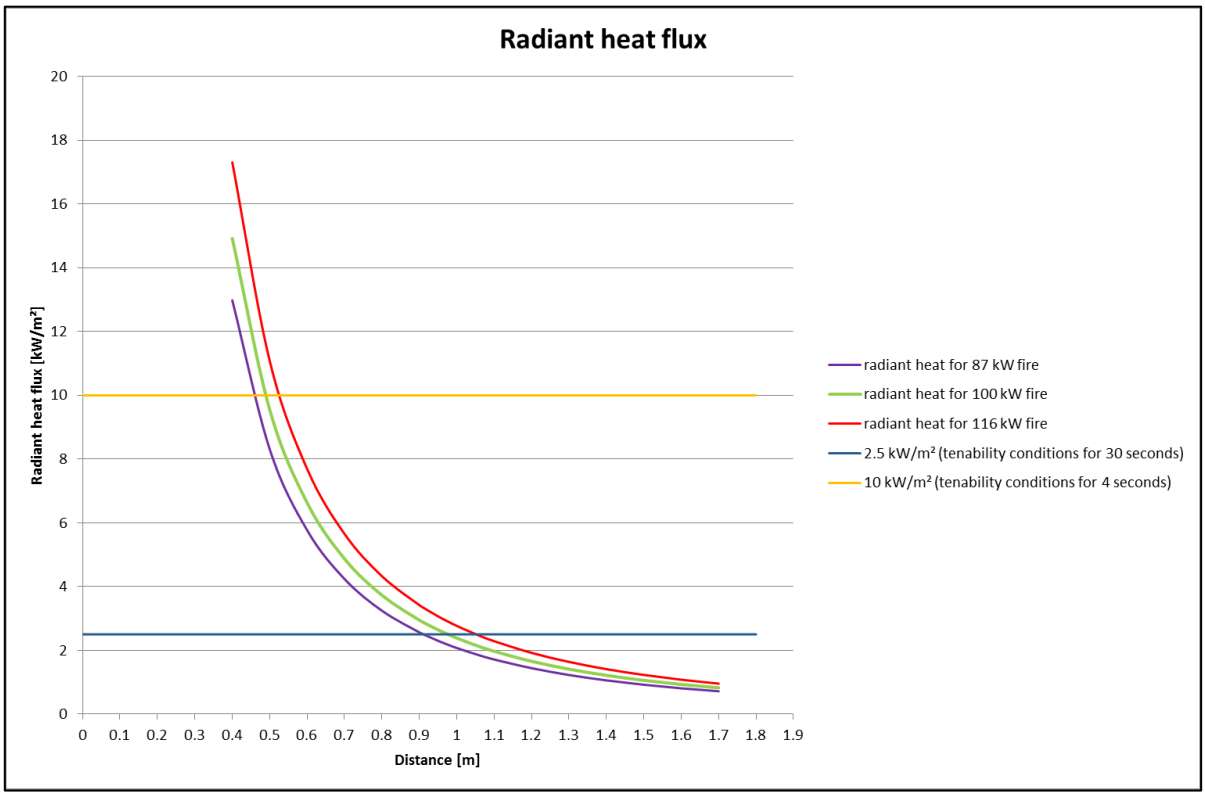

Figure A1 *– Radiant Heat Flux*

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

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

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

The equation is:

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

Where 0.3 is the fraction of heat emitted as radiation.

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

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

Therefore, the distance for 2.5kw/m^2 RHF at 116kW HRR would be:

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

$$r = 1.1m$$

The distance for 10kw/m^2 RHF at 116kW HRR would be:

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

$$r = 0.53m$$

Based on the worst case apartment layouts, the distance between the centre of the cooking hob and the opposite wall of the escape path is 1.64m. This means that there will be sufficient clearance for the occupants to avoid the zone containing RHF of 10kW/m^2 and 2kw/m^2 whilst making their way out of the apartment. This is based on adult males with a typical shoulder width of 510mm (SFPE Handbook 2017). Once they reach the apartment entrance/exit door, they will be separated by more than the 1.1m needed to keep exposure to within 2.5kw/m^2. This is tenable for more than 30 seconds, which is sufficient to allow occupants to enter the protected common escape route, at which point they will be protected from the fire by fire resistant construction.

Based on the fire engineering analysis, it is considered that the location of the cooking hobs will not prejudice escape from the studios and open plan apartments and the proposed layouts meet the functional requirements of Building Regulations.

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