FIRE STRATEGY

Final

KEARNS PROPERTY MANAGEMENT & DEVELOPMENT
41 Station Road
West Drayton
MIDDLESEX
UB7 7LN

VEMCO CONSULTING
20 William James House
Cowley Road
CAMBRIDGE
CB4 0WX

Copy No:- 1 *of*

PROPOSED DEVELOPMENT

AT

NEWPORT ROAD
HAYES

REGULATION 38 DOCUMENT

FIRE STRATEGY
USING
APPROVED DOCUMENT B v2
(BUILDINGS OTHER THAN DWELLINGS)
2019 EDITION

Final

Report Produced For: Kearns Property Management & Development

Report Produced By: Vemco Consulting

Report Date: September 2020

	Name	Signature	Date
Prepared By	Olivia Jackson		17/09/2020
Checked & Reviewed by	Basil Jackson		17/09/2020
Approved By	Basil Jackson		17/09/2020
Issue Status	**Final**		
Purpose of Issue	**For Issue**		
Authorised for issue by	Basil Jackson		17/09/2020
Document Reference:	ENG-1110911-FS-Newport Road Hayes		

Note: The above form is for Vemco Ltd Client Satisfaction System purposes only.

CONTENTS **Page**

1.1 Overview 5
1.2 Fire Strategy Overview 6
1.3 Building Regulations 7
1.4 Regulatory Reform (Fire Safety) Order 2005 7
1.5 Construction, Design and Management Regulations 2015 7
1.6 Statutory Consultation 8
2.0 EXTERNAL FIRE SPREAD – EXTERNAL WALLS 9
2.1 Construction of External Walls 9
3.0 EXTERNAL FIRE SPREAD – SPACE SEPARATION 11
3.1 Unprotected Areas 11
3.2 Enclosing Rectangles 11
3.3 Space Separation - General 13
3.4 Space Separation Calculations 13
4.0 MEANS OF WARNING AND ESCAPE 15
4.1 Fire Detection 15
4.2 Means of Escape from Common Areas 15
4.3 Means of Escape – Ground Floor Level 16
4.4 Means of Escape – First Floor Level 17
4.5 Means of Escape – Second Floor 19
4.6 Means of Escape – Third Floor 20
4.7 Emergency Lighting 21
4.8 Escape Signage 22
4.9 Other Signage 22
5.0 INTERNAL FIRE SPREAD 24
5.1 Linings 24
5.2 Fire Stopping 24
5.3 Cavity Barriers 24
6.0 FIRE ACCESS 27
6.1 Fire Mains and Hydrants 27
6.2 Fire Tender Vehicular Access 27
6.3 Manual Fire Fighting / Extinguishers 27
7.0 AUTOMATIC FIRE SUPRESSION 29
7.1 Sprinkler System 29

Final

8.0 CONCLUSIONS, RECOMMENDATIONS AND SUMMARY OF FINDINGS.....32
8.1 Conclusions.....32
8.2 Recommendations and Summary of Findings.....32

Final

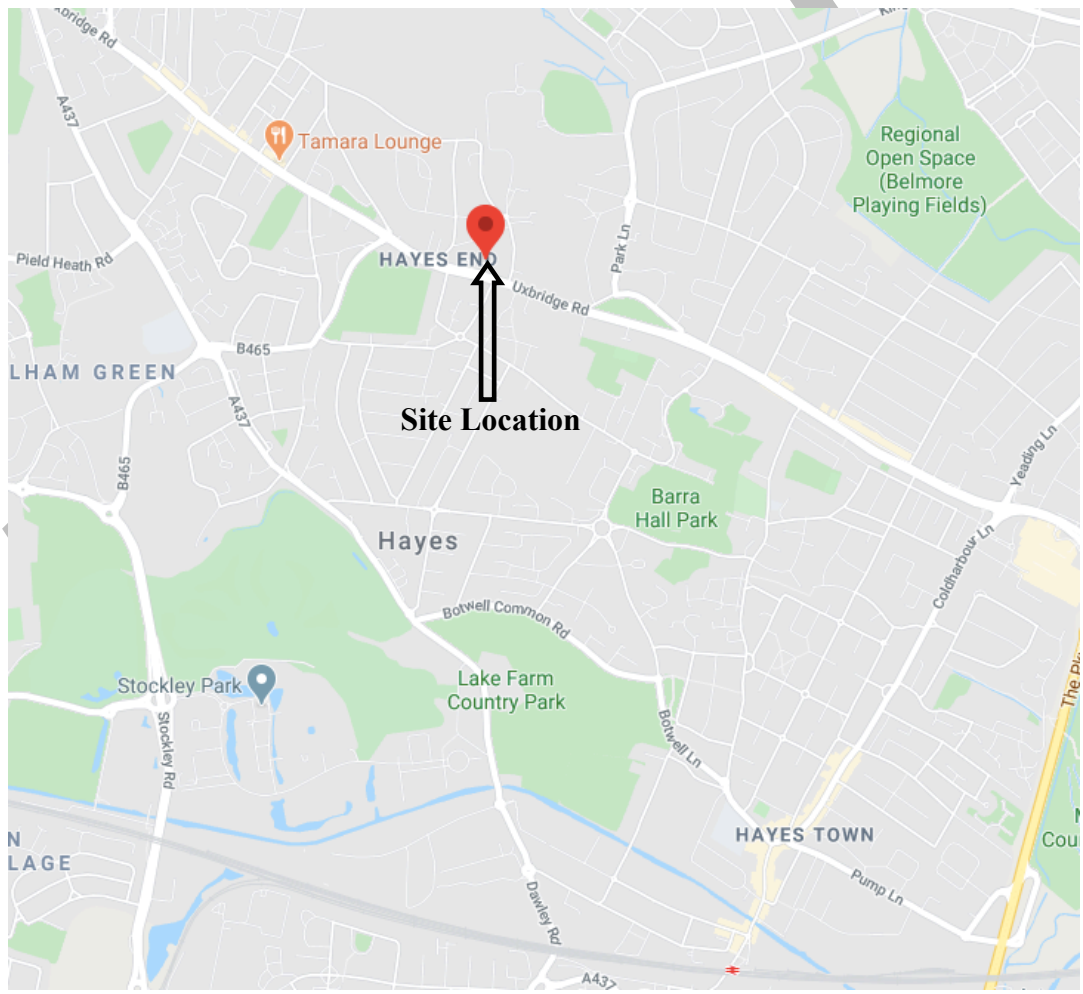
1.0 INTRODUCTION

1.1 Overview

1.1.1 Vemco Consulting has been instructed by Kearns Property Management & Development to undertake a fire safety assessment in accordance with The Building Regulations 2010 - Fire Safety Approved Document B Volume 2 on a proposed development: TCM House, Newport Road, Hayes, UB4 8JX. The site location is shown in Figure 1.1 below.

1.1.2 The development site is located approximately 2.7m north of Hayes and Harlington train station. This building falls under the planning jurisdiction of The London Borough of Hillingdon (planning application reference 61202/APP/2019/3510).

Figure 1.1: Site location



1.1.3 The proposal is for: *Demolition of three existing buildings (Use Classes B1(a) and B1(c)) and erection of a four storey residential hostel building (Sui Generis) containing 28 units, comprising 13 x 1-bedroom, 8 x 2-bedroom and 7 x 3-bedroom dwellings with associated car parking, landscaping and children's play area.*

1.1.4 All references within this assessment report refer to the Building Regulations 2010 Fire Safety Approved Document B Volume 2 2019 edition, unless otherwise stated.

1.1.5 The drawings used in the assessment for this report and are listed as:

- AAL-19-165-P01C - Site Plan
- AAL-20-135-11B - Ground Floor Plan GA
- AAL-20-135-12B - First Floor Plan GA
- AAL-20-135-13B - Second Floor Plan GA
- AAL-20-135-14 Rev C - Third Floor Plan GA

Table 1.1: Summary of building characteristics

Building Name & Address:	TCM House, Newport Road, Hayes, UB4 8JX
Number of Floors:	4 (ground, first, second, third)
Building Height:	9.25m (to uppermost finished floor level)
Building Area:	Approx. 2,040m^2
Purpose Group(s):	2(b) – residential (other)
Sleeping Risk:	Yes
Evacuation method:	Simultaneous Evacuation
Approx. Occupancy Numbers:	Assumptions: 1 person per 1 bedroom unit 2 persons per 2 bedroom unit 3 persons per 3 bedroom unit There are: 3 No 1 bedroom units 8 No 2 bedroom units 7 No 3 bedroom units **Total: 40 persons**

1.2 Fire Strategy Overview

1.2.1 The proposals outlined in this document demonstrate a level of fire safety equal to or greater than the general standard implied by compliance with the recommendations in Approved Document B (ADB). This level of safety therefore satisfies the functional requirements of the Building Regulations relating to fire safety.

1.2.2 The fire strategy described in this report can be summarised as follows:

- Means of escape will be based the entire building being evacuated simultaneously (simultaneous evacuation method);

- Travel distances within bedrooms, bedroom corridors and protected communal corridors are compliant on all floors;
- Structural fire protection will be in accordance with Table B3 of ADB. Compartment floors will be provided throughout;
- The protected lobby between the protected stair and the plant room (place of special fire hazard) should be provided with no less than 0.4m^2 of permanent ventilation or be protected by a mechanical smoke control system;
- Fire detection and fire alarm system within the building will be a Grade D1 Category LD1 system (Table 1 of BS 5839-6:2019); and,
- Fire access - vehicle access is provided to 15% of the perimeter of the building.

1.3 Building Regulations

1.3.1 The construction or modification of any building in England & Wales needs to comply with the statutory requirements of the Building Regulations. These regulations deal with the minimum standards of design and building work for the construction of domestic, commercial and industrial buildings. The Building Regulations contain a list of requirements, referred to as Schedules, which are designed to ensure the health and safety of people in and around buildings. There are 16 Parts, which cover subjects such as structure, fire safety, ventilation, drainage, etc.

1.3.2 In the case of fire, the regulations are dealt with under the functional requirements B1 to B5 of Schedule 1 of the Building Regulations produced under the Building Act 1984. There are a number of prescriptive documents, which can be adopted to show compliance with the Schedules. These include ADB and the British Standards BS9991:2015 and BS9999:2017, which are considered as adequate to provide general guidance for the more common buildings. An alternative approach is to adopt Fire Safety Engineering, which integrates fire engineering calculations, life safety systems, building inherent features and professional judgement, to produce a fire strategy that achieves appropriate levels of safety to a specific building and use.

1.3.3 Responsibility for deciding if the requirements of the Regulations have been met rests with the building control body (a Local Authority Building Control Officer or an Approved Inspector).

1.4 Regulatory Reform (Fire Safety) Order 2005

1.4.1 The Fire Safety Order is the primary piece of legislation relating to fire safety in existing, nondomestic premises, common areas of residential accommodations, and is usually enforced by the local fire authority.

1.4.2 The duty of ensuring that the requirements of the Order are met rests with the Responsible Person, who must undertake a risk assessment for the purpose of identifying the fire precautions he needs to take.

1.5 Construction, Design and Management Regulations 2015

1.5.1 Projects undertaken in the UK are subject to the requirements of the Construction (Design and Management) Regulations 2015 (CDM) or within the European Union, that particular country's interpretation of the European Union Directive.

1.5.2 This report defines the strategy for meeting the functional and performance requirements for fire safety in the finished building. It is intended to form part of the submission for approval under the Building Regulations, Part B (Fire safety). Where any conclusions or

Final

recommendations contained within this report specify particular materials, products or forms of construction these will have been assessed, in accordance with CDM Regulations 11 and 18 (duties for designers).

1.5.3 In the event that these involve significant residual risks or health and safety critical assumptions, this information will be made available to the principal designer. Where the architect or other consultants use all or part of this report to specify works, they are understood to be competent in alerting the Client, principal designer, Designers, Contractors and Building Occupier of issues arising under the CDM Regulations.

1.6 Statutory Consultation

1.6.1 During the Building Regulations application process, the building control body is required to formally consult with the local fire authority. The purpose of this consultation is to give to fire authority the opportunity to make observations with respect to the Building Regulations and to provide an opportunity to make the applicant aware of action that may have to be taken to meet the requirements of the Fire Safety Order.

1.6.2 The consultation should allow both parties to reach mutually compatible views on whether the building meets the requirements of both pieces of legislation. In the exceptional event that the fire authority proposes to require physical changes to the building to meet the requirements of the Fire Safety Order, the building control body should make the applicant aware.

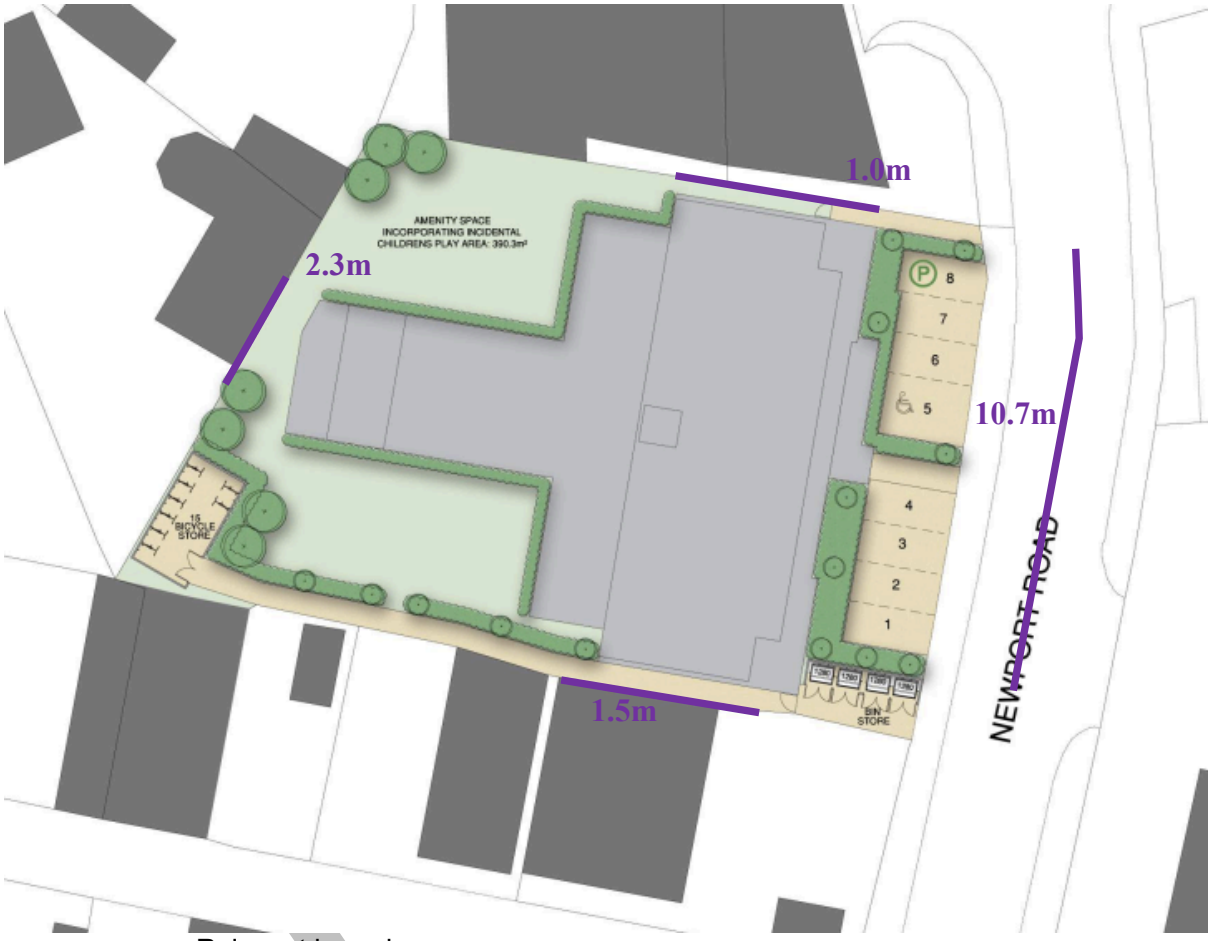
Final

2.0 EXTERNAL FIRE SPREAD – EXTERNAL WALLS

2.1 Construction of External Walls

2.1.1 The requirement is that external walls of a building shall adequately resist the spread of fire and the roof of the building shall adequately resist the spread of fire.

Figure 1.2: Relevant boundaries applicable to the development



Relevant boundary

Xm Separation distance from the development to the relevant boundary

2.1.2 The provisions relate to the spread of fire across relevant boundaries. Limits therefore depend on the distance of the wall/roof from a relevant boundary.

2.1.3 Where a wall is 1000mm or more away from a relevant boundary a reduced standard of fire resistance can be accepted in most cases and the wall only needs fire resistance from the inside[1]. This applies to all façades of this building. Relevant boundaries are illustrated using purple lines in Figure 1.2 above.

2.1.4 For those walls within 1000mm of a relevant boundary, ADB requires 30 minutes fire protection each side separately[2]. The external walls within 1000mm of the relevant boundary should meet Class 0 (National Class) or Class B-s2,d2 or better (European Class). No façades at this development are within 1000mm of a relevant boundary.

2.1.5 The proposed building stands 9.25m to the uppermost finished floor level. A fire resistance of 60 minutes is therefore required to the ground and first floors as the building height is above 5m but below 18m above ground level[3]. This applies to all structural members, beams and columns (exposed faces), load bearing walls (each side separately) and floors (from the underside).

Final

3.0 EXTERNAL FIRE SPREAD – SPACE SEPARATION

3.1 Unprotected Areas

3.1.1 The use of distance to a relevant boundary rather than an adjacent building makes it possible to calculate the allowable proportion of unprotected areas.

3.1.2 Any part of an external wall which has less fire resistance than the appropriate amount given in Table B4 is considered to be an unprotected area. The windows and any external door openings at this building would be categorised as unprotected areas.

3.1.3 Small unprotected areas in an otherwise protected area of wall are considered to pose a negligible risk of fire spread and therefore may be disregarded. ADB gives the constraints that apply to the placing of such areas in relation to each other.

3.1.4 A wall situated within 1000mm from any point on the relevant boundary, including a wall coincident with the boundary will meet the provisions for space separation if:

a) The only unprotected areas are those shown in Diagram 13.5; and
b) The rest of the wall is fire resisting from both sides.

3.1.5 A wall situated at least 1000mm from any point on the relevant boundary will meet the provisions for space separation if:

a) The extent of unprotected areas does not exceed that given by one of the methods referred to in section 13 and
b) The rest of the wall (if any) is fire resisting.

3.1.6 However, as determined in section 2 of this report, there are no walls of the proposed development site situated within 1000mm of a relevant boundary.

3.1.7 The assumptions used to calculate boundary and separation distances in BRE 187 are:

- the extent of a fire in a building should be limited by compartmentation;
- unprotected areas on a burning building are taken to fail immediately;
- unprotected areas on an exposed building fail when the fire in the adjacent building reaches its peak intensity; and
- thermal radiation from a burning building is based on:
  - total unprotected area on the elevation of a compartment; and
  - compartment temperature which is dependent on fire load, ventilation, insulation and presence of a suppression system.

3.2 Enclosing Rectangles

3.2.1 For most elevations with a number of unprotected areas, the calculation can be approximated to a single area that will provide an equivalent intensity of radiation. This equivalent radiator is the rectangle which totally encloses all the openings in the elevation (termed the overall enclosing rectangle) that radiates at a reduced intensity, the reduction factor being the ratio of the total area of all the openings to the area of the enclosing rectangle.

Figure 3.1: North Elevation

Final

Figure 3.2: East Elevation (not used in calculations)

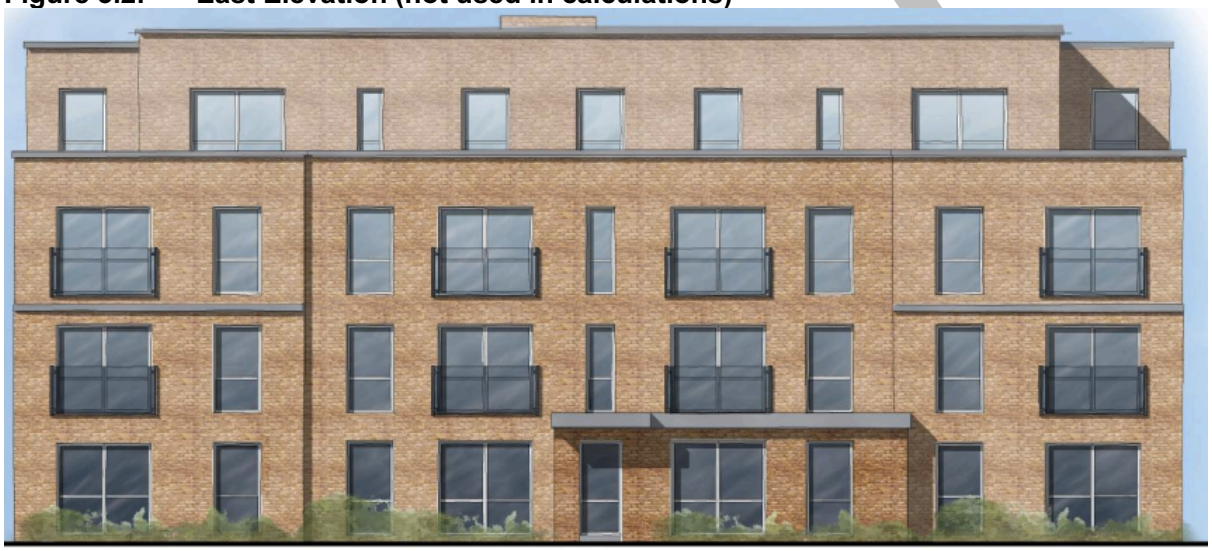


Figure 3.3: South Elevation

Figure 3.4: West Elevation

3.3 Space Separation - General

3.3.1 For most elevations with a number of unprotected areas, the calculation can be approximated to a single area that will provide an equivalent intensity of radiation. This equivalent radiator is the rectangle which totally encloses all the openings in the elevation (termed the overall enclosing rectangle) that radiates at a reduced intensity, the reduction factor being the ratio of the total area of all the openings to the area of the enclosing rectangle. The enclosing rectangles used in this assessment are shown as red boxes in the diagrams above and represent a single compartment within the building.

3.3.2 For the purposes of this assessment, the only façade analysed is the front elevation. The reason for not analysing the remaining boundaries (both side and rear elevations) can be summarised as follows:

- Both side and rear elevations are coincident with the adjacent building, therefore there are no unprotected areas and the walls require 60 minutes fire rating.

3.4 Space Separation Calculations

Ground floor – North Elevation

Compartment A

Unprotected percentage = (Total unprotected area ÷ Area of enclosing rectangle) x 100

= (2.3 x 2) ÷ (9 x 3) x 100

= (4.6 ÷ 27) x 100

= 17.0%

3.4.1 This is rounded to 20% and the façade width to 9m, Table A (for 3m high enclosing rectangles) gives a minimum boundary distance of **1.0m**. This distance is the same as the measured separation distance between the building and the site boundary, therefore the proposed separation distance is compliant.

Final

Ground floor – South Elevation

Compartment B

Unprotected percentage = (Total unprotected area ÷ Area of enclosing rectangle) x 100

= (4.9 + 2.3) ÷ (9 x 3) x 100

= (7.2 ÷ 27) x 100

= 26.7%

3.4.2 This is rounded to 30% and the façade width to 9m, Table A (for 3m high enclosing rectangles) gives a minimum boundary distance of **1.0m**. This distance is less than the measured separation distance between the building and the relevant boundary, therefore the proposed separation distance is compliant.

Ground floor – West Elevation

Compartment C

Unprotected percentage = (Total unprotected area ÷ Area of enclosing rectangle) x 100

= (4.9 x 2) + (2.3 x 2) ÷ (12 x 3) x 100

= (14.4 ÷ 36) x 100

= 40.0%

3.4.3 This is rounded to 40% and the façade width to 12m, Table A (for 3m high enclosing rectangles) gives a minimum boundary distance of **1.5m**. This distance is less than the measured separation distance between the building and the relevant boundary, therefore the proposed separation distance is compliant.

3.4.4 In summary, the BR 187 method for calculating boundary distance reveals that the risk of fire spreading from the proposed development to a relevant boundary is low.

Final

4.0 MEANS OF WARNING AND ESCAPE

4.1 Fire Detection

4.1.1 The requirement is given in Part B of Schedule 1 to the Building Regulations 2010 in that 'The building shall be designed and constructed so that there are appropriate provisions for the early warning of fire and appropriate means of escape in the case of a fire from the building to a place of safety outside of the building capable of being safely and effectively used at all material times'.

4.1.2 In terms of early warning, a minimum of Grade D1 Category LD1 fire detection and fire alarm system should be introduced to this building in accordance with BS 5839-6:2019[4]. Table 1 of BS 5839-6:2019 states that self-catering premises/premises with short-term paying guests should have a Grade D1 Category LD1 fire detection and fire alarm system. This complies with the requirements of Approved Document B v2.

4.1.3 The smoke and heat alarms will be mains operated and conform to BS EN 14604 and BS 5839-1:2017. The detectors will have a standby power supply in the form of a rechargeable battery and are therefore compliant with the requirements of Approved Document B v2. The positioning of the smoke and heat detectors is to accord with the guidance given in BS 5839-1:2017.

4.1.4 The fire alarm cause and effect principles for the building can be summarised in the table below.

Table 4.1: Alarm Cause and Effect

Accommodation	Cause	Effect
Residential Accommodation – Units	• Single smoke or heat detector activated within the unit	• Alarm signal sounds throughout the affected area, invoking immediate evacuation of entire building. • No interlinks are proposed to any other accommodation.
Ancillary Areas	• Single smoke detector / heat detector or manual call point activated	• Alarm signal sounds throughout the affected area, invoking immediate evacuation of entire building.

4.2 Means of Escape from Common Areas

4.2.1 It should be noted that each floor of this building is being treated as a compartment i.e. there is no requirement for compartment walls sub-dividing any of the within this building as it falls under the residential 'other' purpose group[5]. For this type of design, a simultaneous evacuation strategy will be used. Therefore, when an alarm sounds, simultaneous evacuation of all floors of the entire building is required. Travel distances will be in accordance with ADB (see Table 4.2 below).

Table 4.2: Travel distance by purpose group[6]

Purpose Group	Accommodation	Travel within	Maximum travel distance (m)	
			In one direction	More than one direction
2(b) – residential	Residential	In bedrooms	9	18

Final

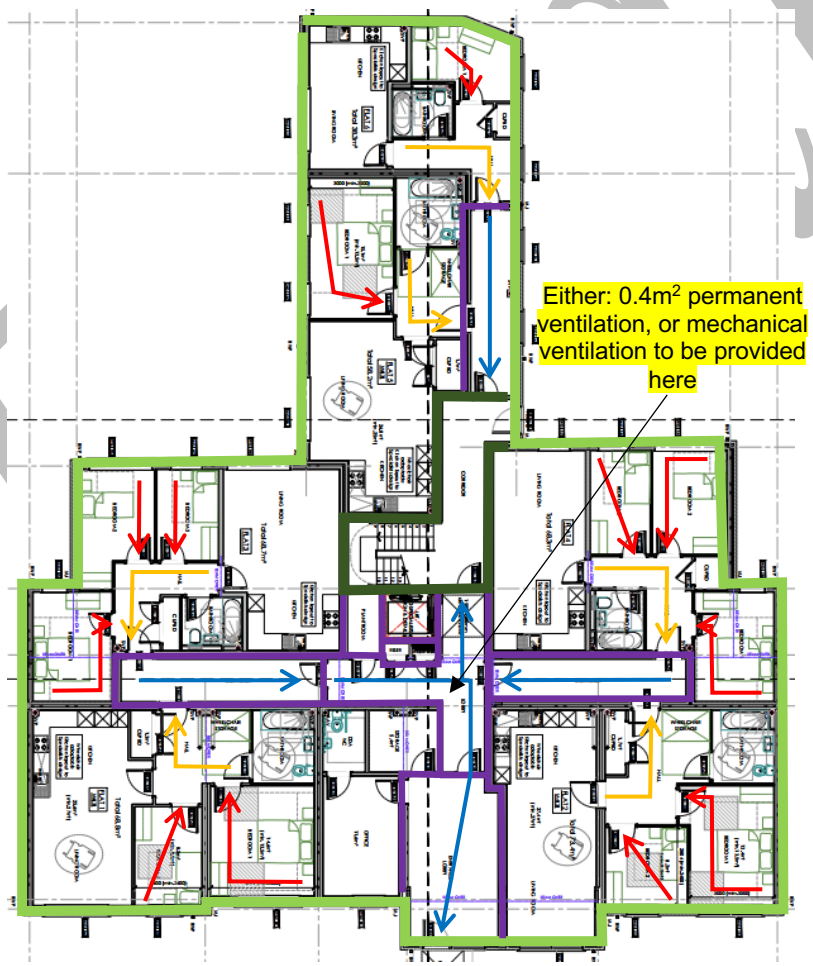
(other)				
		In bedroom corridors	9	35
		Elsewhere	18	35

4.3 Means of Escape – Ground Floor Level

4.3.1 The plan view in Figure 4.1 shows the proposed layout of the ground floor level.

4.3.2 The maximum travel distance within bedrooms and bedroom corridors for one direction of travel is 9m. The measured travel distances within the bedrooms and bedroom corridors of all units are compliant. The maximum permitted travel distance within the communal corridors is 18m for one direction of travel and 35m for more than one direction of travel. There are two directions of escape within the ground floor communal corridors therefore the travel distances are compliant.

Figure 4.1: Means of Escape on Ground Floor



Travel distance within bedrooms (9m rule 1 direction/18m rule 2 directions)
Travel distance within bedroom corridors (9m rule 1 direction/35m rule 2 directions)
Travel distance elsewhere (18m rule 1 direction/35m rule 2 directions)
Fire resistant to 60 mins from the inside

- Fire resistant to 60 mins each side separately
- Fire resistant to 30 minutes each side separately
- All doors forming the enclosure of the protected stair to be FD30S[7].
- All doors forming the enclosure of the lift shaft to be FD30[8].
- All doors forming the enclosure of the lift shaft to be FD20S[9].

4.3.3 The plant room is an area of special fire hazard and should be provided with 30 minutes fire resisting construction each side separately[10]. Additionally, the extraction system for the plant room should be a separate and independent system from the remaining building. Extracted air from the plant room should not be recirculated[11].

4.3.4 The communal stairway in this building has a width of 1180mm, Table 3.2 of ADB states that a stairway that serves 3 floors and has a width of 1200mm has the capacity to serve 330 persons. This building has an occupancy capacity of 40 persons, the measured stair width is just less than 1200mm and is therefore deemed to be compliant.

4.3.5 Refuges should be provided on every storey, typically within the protected stair. The refuge should have minimum dimensions of 900mm x 1400mm. Refuges should be provided with an emergency voice communication (EVC) system in accordance with BS 5839-9. It should contain Type B outstations communicating with a master station in the building control room (if one exists) or next to the fire detection and alarm panel. Wireless technology may be more appropriate[12].

4.3.6 lift wells should comply with either of the following:

a. Be sited within the enclosure of a protected stairway;
b. Be enclosed with fire resisting construction (minimum REI 30) when in a position that might prejudice the means of escape.[13]

4.3.7 The lift shaft is located in a position that may prejudice means of escape therefore should be enclosed within 30 minutes fire resisting construction.

4.3.8 ADB states that a protected lobby should be provided between an escape stair and a place of special fire hazard to prevent the stair from becoming smoke logged. The lobby should have no less than 0.4m^2 of permanent ventilation or be protected by a mechanical smoke control system[14]. The lobby area between the stairwell and the plant room should therefore be provided with either 0.4m^2 permanent ventilation, or mechanical ventilation as shown in Figure 4.1.

4.4 Means of Escape – First Floor Level

4.4.1 The plan view in Figure 4.2 shows the proposed layout of the first floor.

4.4.2 The maximum travel distance within bedrooms and bedroom corridors for one direction of travel is 9m. The measured travel distances within the bedrooms and bedroom corridors of all units are compliant. The maximum permitted travel distance within the communal corridors is 18m for one direction of travel. There is one direction of escape in the first floor communal corridor. The measured travel distances are compliant.

4.4.3 The plant room is an area of special fire hazard and should be provided with 30 minutes fire resisting construction each side separately[15]. Additionally, the extraction system for the plant room should be a separate and independent system from the remaining building. Extracted air from the plant room should not be recirculated[16].

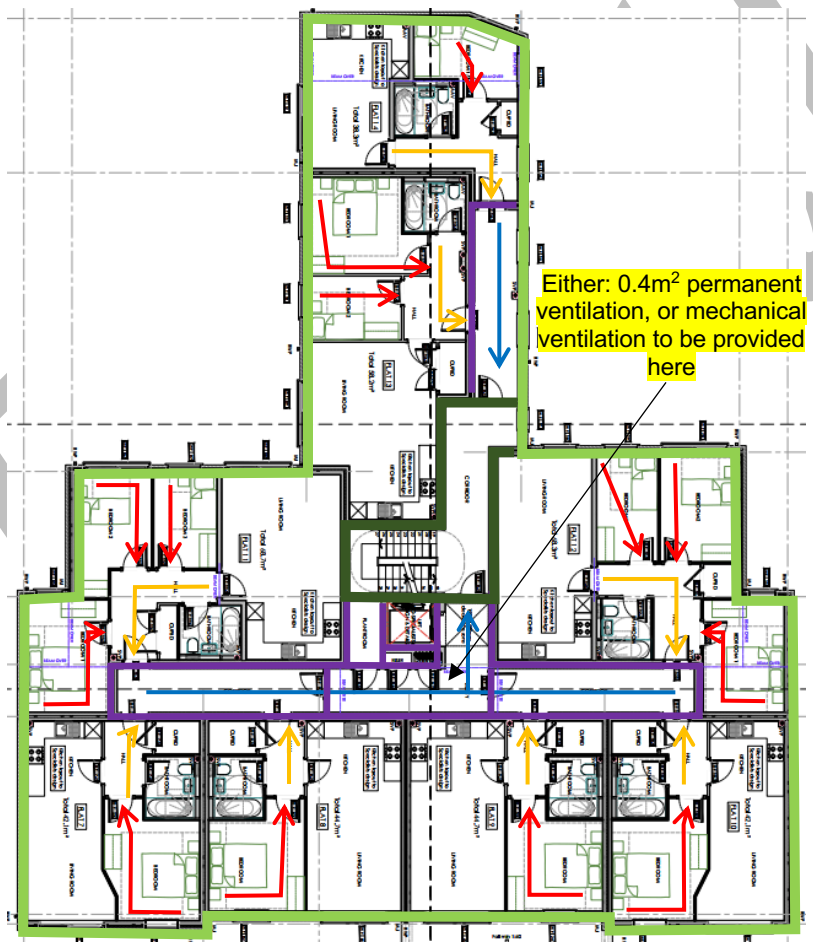
Draft

4.4.4 Refuges should be provided on every storey, typically within the protected stair. The refuge should have minimum dimensions of 900mm x 1400mm. Refuges should be provided with an emergency voice communication (EVC) system in accordance with BS 5839-9. It should contain Type B outstations communicating with a master station in the building control room (if one exists) or next to the fire detection and alarm panel. Wireless technology may be more appropriate

4.4.5 Stair widths are compliant on this floor.

4.4.6 ADB states that a protected lobby should be provided between an escape stair and a place of special fire hazard to prevent the stair from becoming smoke logged. The lobby should have no less than 0.4m^2 of permanent ventilation or be protected by a mechanical smoke control system[17]. The lobby area between the stairwell and the plant room should therefore be provided with either 0.4m^2 permanent ventilation, or mechanical ventilation as shown in Figure 4.2.

Figure 4.2: Means of escape on first floor



- Travel distance within bedrooms (9m rule 1 direction/18m rule 2 directions)
- Travel distance within bedroom corridors (9m rule 1 direction/35m rule 2 directions)
- Travel distance elsewhere (18m rule 1 direction/35m rule 2 directions)
- Fire resistant to 60 mins from the inside
- Fire resistant to 60 mins each side separately
- Fire resistant to 30 minutes each side separately

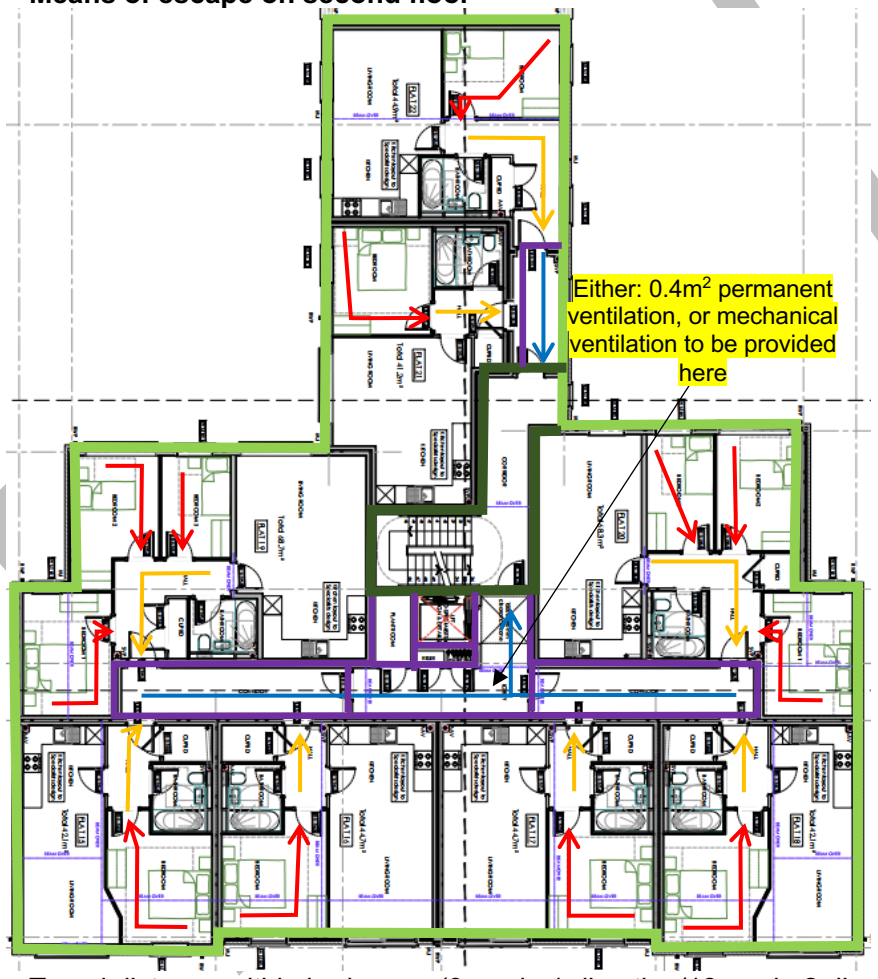
- All doors forming the enclosure of the protected stair to be FD30S[18].
- All doors forming the enclosure of the lift shaft to be FD30[19].
- All doors forming the enclosure of the lift shaft to be FD20S[20].

4.5 Means of Escape – Second Floor

4.5.1 The plan view in Figure 4.3 shows the proposed layout of the second floor.

4.5.2 The maximum travel distance within bedrooms and bedroom corridors for one direction of travel is 9m. The measured travel distances within the bedrooms and bedroom corridors of all units are compliant. The maximum permitted travel distance within the communal corridors is 18m for one direction of travel. There is one direction of escape in the second floor communal corridor. The measured travel distances are compliant.

Figure 4.3: Means of escape on second floor



Travel distance within bedrooms (9m rule 1 direction/18m rule 2 directions)
Travel distance within bedroom corridors (9m rule 1 direction/35m rule 2 directions)
Travel distance elsewhere (18m rule 1 direction/35m rule 2 directions)
Fire resistant to 60 mins from the inside
Fire resistant to 60 mins each side separately
Fire resistant to 30 minutes each side separately

- All doors forming the enclosure of the protected stair to be FD30S[21].
- All doors forming the enclosure of the lift shaft to be FD30[22].

- All doors forming the enclosure of the lift shaft to be FD20S[23].

4.5.3 The plant room is an area of special fire hazard and should be provided with 30 minutes fire resisting construction each side separately[24]. Additionally, the extraction system for the plant room should be a separate and independent system from the remaining building. Extracted air from the plant room should not be recirculated[25].

4.5.4 Refuges should be provided on every storey, typically within the protected stair. The refuge should have minimum dimensions of 900mm x 1400mm. Refuges should be provided with an emergency voice communication (EVC) system in accordance with BS 5839-9. It should contain Type B outstations communicating with a master station in the building control room (if one exists) or next to the fire detection and alarm panel. Wireless technology may be more appropriate

4.5.5 Stair widths are compliant on this floor.

4.5.6 ADB states that a protected lobby should be provided between an escape stair and a place of special fire hazard to prevent the stair from becoming smoke logged. The lobby should have no less than 0.4m^2 of permanent ventilation or be protected by a mechanical smoke control system[26]. The lobby area between the stairwell and the plant room should therefore be provided with either 0.4m^2 permanent ventilation, or mechanical ventilation as shown in Figure 4.3.

4.6 Means of Escape – Third Floor

4.6.1 The plan view in Figure 4.4 shows the proposed layout of the third floor.

4.6.2 The maximum travel distance within bedrooms and bedroom corridors for one direction of travel is 9m. The measured travel distances within the bedrooms and bedroom corridors of all units are compliant. The maximum permitted travel distance within the communal corridors is 18m for one direction of travel. There is one direction of escape in the third floor communal corridor. The measured travel distances are compliant.

4.6.3 The plant room is an area of special fire hazard and should be provided with 30 minutes fire resisting construction each side separately[27]. Additionally, the extraction system for the plant room should be a separate and independent system from the remaining building. Extracted air from the plant room should not be recirculated[28].

4.6.4 Refuges should be provided on every storey, typically within the protected stair. The refuge should have minimum dimensions of 900mm x 1400mm. Refuges should be provided with an emergency voice communication (EVC) system in accordance with BS 5839-9. It should contain Type B outstations communicating with a master station in the building control room (if one exists) or next to the fire detection and alarm panel. Wireless technology may be more appropriate.

4.6.5 Stair widths are compliant on this floor.

4.6.6 A 1.0m^2 AOV should be provided at the head of the stair to clear smoke in the event of a fire within any of the units.

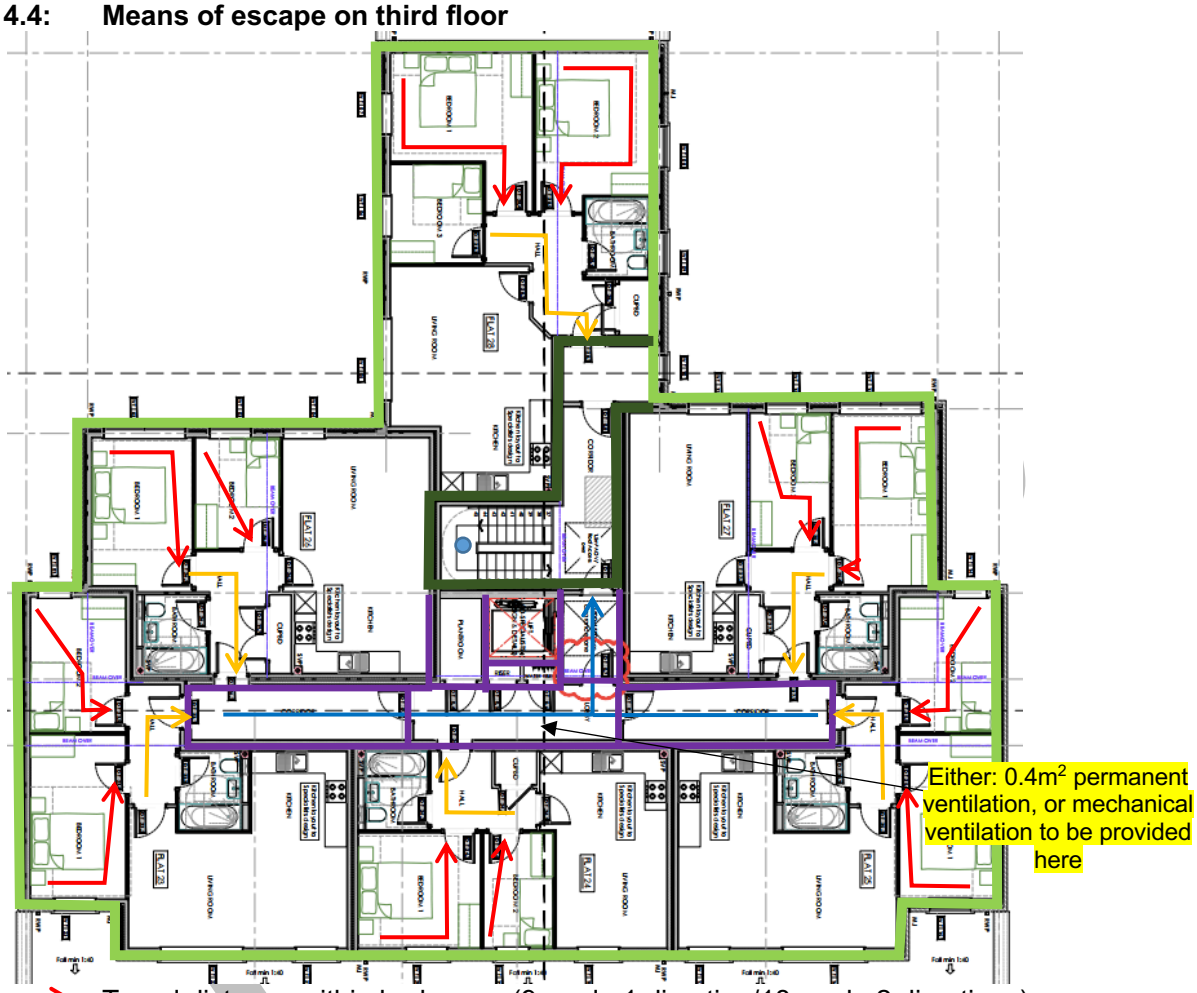
4.6.7 Unit 28 opens directly onto the stair area. This is compliant with ADB as the stair will be protected by a smoke control system in accordance with BS EN 12101-6[29].

4.6.8 A 1.0m^2 AOV will be provided at the head of the stair.

Draft

4.6.9 ADB states that a protected lobby should be provided between an escape stair and a place of special fire hazard to prevent the stair from becoming smoke logged. The lobby should have a minimum 0.4m^2 of permanent ventilation or be protected by a mechanical smoke control system[30]. The lobby area between the stairwell and the plant room should therefore be provided with either 0.4m^2 permanent ventilation, or mechanical ventilation as shown in Figure 4.4.

Figure 4.4: Means of escape on third floor



- Travel distance within bedrooms (9m rule 1 direction/18m rule 2 directions)
- Travel distance within bedroom corridors (9m rule 1 direction/35m rule 2 directions)
- Travel distance elsewhere (18m rule 1 direction/35m rule 2 directions)
- Fire resistant to 60 mins from the inside
- Fire resistant to 60 mins each side separately
- Fire resistant to 30 minutes each side separately
  - All doors forming the enclosure of the protected stair to be FD30S[31].
  - All doors forming the enclosure of the lift shaft to be FD30[32].
  - All doors forming the enclosure of the lift shaft to be FD20S[33].
- 1.0m^2 AOV

4.7 Emergency Lighting

4.7.1 Emergency lighting as backup lighting meeting the recommendations of BS5266 Parts 1 and 7 will be provided in the following areas:

Purpose group or use	Areas requiring escape lighting
Office	All common escape routes

4.7.2 Luminaries will be provided appropriately spaced to provide the light levels suggested within British Standard BS5266 as follows:

Defined escape routes	0.5lux
Undefined routes	1lux

4.7.3 Emergency lighting shall be provided on all escape routes. The installation shall also comply with the Codes of Practice for Emergency Lighting BS5266 Part 1: 2016.

4.7.4 Final locations and routes shall be agreed during the design development.

4.8 Escape Signage

4.8.1 Every doorway or other exit providing access to a means of escape, other than exits in ordinary use (e.g. main entrances), should be distinctively and conspicuously marked by an exit sign in accordance with BS ISO 3864-1 and BS 5499-4. Such signage will meet the recommendations of BS5499 Part 4 and will be located as follows, except for escape routes which are in ordinary use:

- All designated escape routes or escape routes across open areas will be provided with signage, especially stairs and other changes in level and direction.
- The position of all doors and other exits sited on escape routes, including storey exits and final exits will be identified by signs.
- Where an escape route from a room is not conspicuous or confusion could occur, the route will be indicated by a sign, including intermediate signs where necessary.
- All changes of direction in corridors, stairways and open spaces forming part of an escape route will be marked with intermediate signs. Each intermediate door or junction will be similarly signed.

4.8.2 It is suggested that the final signage provision is agreed with the Regulatory Authorities prior to occupation of the complete building.

4.9 Other Signage

4.9.1 Fire resisting doors and fire exit doors and escape routes in and around the building should be provided with signage meeting the recommendations of BS5499 Part 5.

Method of Closure	Signage	Sign Diameter	Letter Height	Location
Self-closing device		60mm	5mm	Fire doors in corridors, off staircases and refuse lobbies
				Within the inside door of the riser cupboards and maintenance access cupboards

Draft

Keep locked shut			

Final

5.0 INTERNAL FIRE SPREAD

5.1 Linings

5.1.1 The requirement is given in Part B of Schedule 1 to the Building Regulations 2010 in that '*to inhibit the spread of fire within the building, the internal linings shall:*

a) adequately resist the spread of flame over their surfaces; and

b) have, if ignited, a rate of heat release or rate of fire growth, which is reasonable in the circumstances.

Internal linings means the materials or products used in lining any partition, wall, ceiling or other internal structure.'

5.1.2 The ceiling covering to all floors shall provide 30 minutes fire resistance from the underside as required in Table B3 of ADB v2. Where exposed reinforced concrete is provided, this meets the requirement.

Table 5.1: Classification of linings

Location	European Class
Small rooms of maximum internal floor area: • 30m^2 in non-residential accommodation	D-s3, d2
Other rooms	C-s3, d2

5.2 Fire Stopping

5.2.1 Any openings for services (exceeding a dimension set out in ADB[34] (shown below) breaching compartment walls will be fire stopped (unless protected throughout their entire length with fire resisting material) in accordance with Section 10 of ADB. This is to prevent the passage of fire and assist in retarding the movement of smoke. Joints between elements of structures that serve as barriers to fire will be fire-stopped to prevent the passage of fire and smoke.

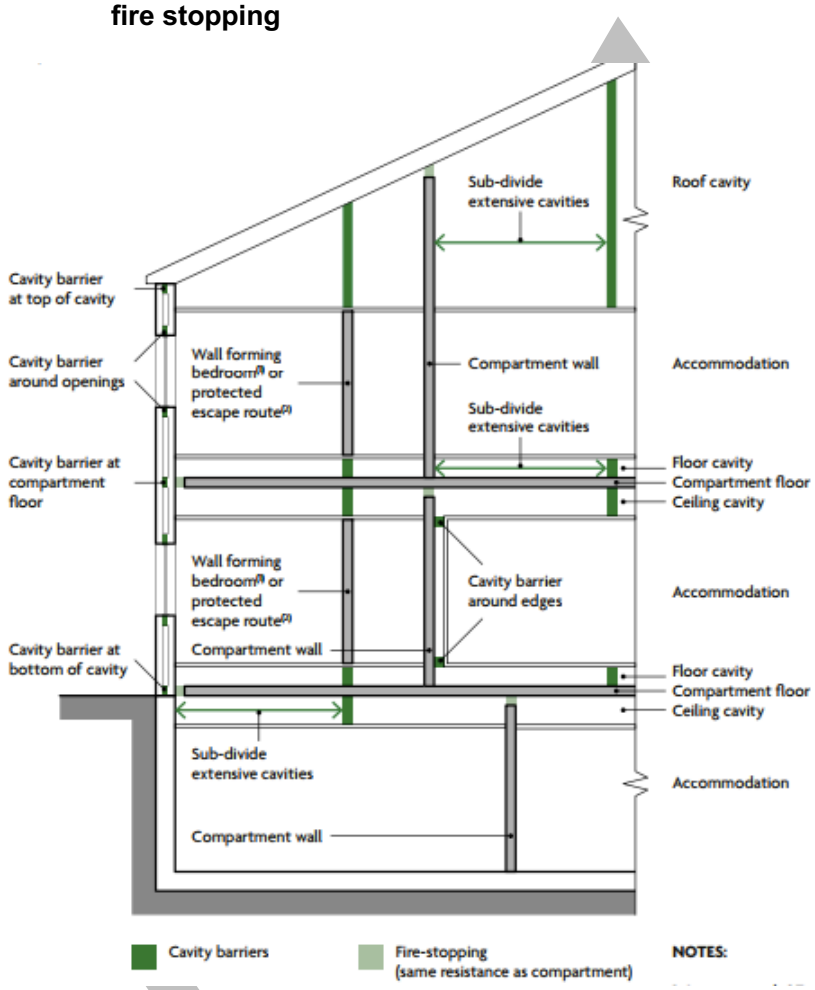
Situation	Pipe material and maximum nominal internal diameter (mm)		
	(a) Non-combustible material	(b) Lead, Aluminium, aluminium alloy, uPVC, fibre cement	(c) Any other material
Structure (but not a wall separating buildings) enclosing a protected shaft which is not a staircase or a lift shaft	160	110	40
Compartment Wall or Compartment floor	160	160 (stake pipe) 110 (branch pipe)	40
Any other situation	160	40	40

5.3 Cavity Barriers

Final

5.3.1 During construction of a building, cavities offer a route for fire and smoke to spread which may present danger to occupants of the building. Cavities are found in concealed spaces, i.e. voids in the floors, walls, ceilings etc. Cavity barriers are designed to prevent the spread of fire and smoke throughout the building. Please note that provisions for cavity barriers are not the same as those for fire-stopping. See Figure 5.1 for the provisions for cavity barriers and a differentiation between cavity barriers and fire stopping.

Figure 5.1 Extract from ADB v2[35]: differentiation between cavity barriers and fire stopping



5.3.2 Cavity barriers will be included in any large cavity with the potential for extensive unseen fire spread. The key areas that require cavity barriers are as follows:

- At the junction between an external cavity wall and a compartment wall that separates buildings and at the top of such an external cavity wall
- At the junction between an external cavity wall and every compartment floor and compartment wall
- At the junction between a cavity wall and every compartment floor, compartment wall, or other wall or door assembly that forms a fire-resisting barrier
- In a protected escape route, above and below any fire-resisting construction that is not carried full storey height
- Where the corridor will be sub-divided to prevent fire or smoke affecting two alternative escape routes simultaneously

- Within the void behind the external face of rain screen cladding at every floor level and on the line of compartment walls abutting the external wall
- At the edges of cavities (including around openings, i.e. windows)

5.3.3 In addition to the above locations, cavity barriers are also normally required in cavities (including ceiling voids and under floor service voids) where the cavity exceeds 20m. However, ADB makes the recommendation those cavity barriers (including dampers in air conditioning ductwork) can be omitted, resulting in unlimited cavity sizes providing the criteria outlined in[36] ADB are adopted.

5.3.4 In the event that larger cavities are required a summary of the necessary provisions are detailed below:

ADB Recommendations from Paragraph 9.12
A) The room and the cavity together are compartmented from the rest of the building.
B) An automatic fire detection and alarm system meeting the relevant recommendations of BS5839 Part 1: 2002 is fitted in the building (however detectors are not required in the cavity)
C) The cavity is used as a plenum and the recommendations about re-circulating air distribution systems in BS9999:2008 are followed.
D) The surface of the ceiling exposed in the cavity is Class 0 and the supports and fixings in the cavity are non-combustible construction
E) The flame spread rating of any pipe insulation system is Class 1
F) Any electrical wiring in the void is laid in metal trays, or in metal conduit
G) Any other materials in the cavity are of limited combustibility

5.3.5 The cavity barriers will provide a minimum of 30 minute fire rating (i.e. 30 minutes integrity and 15 minutes insulation). Any penetrations through the cavity barriers will be either:

- Fitted with a proprietary sealing system; or
- Pipes of limited diameters that are sealed with fire-stopping, or sealed with sleeving of non-combustible pipe material

Final

6.0 FIRE ACCESS

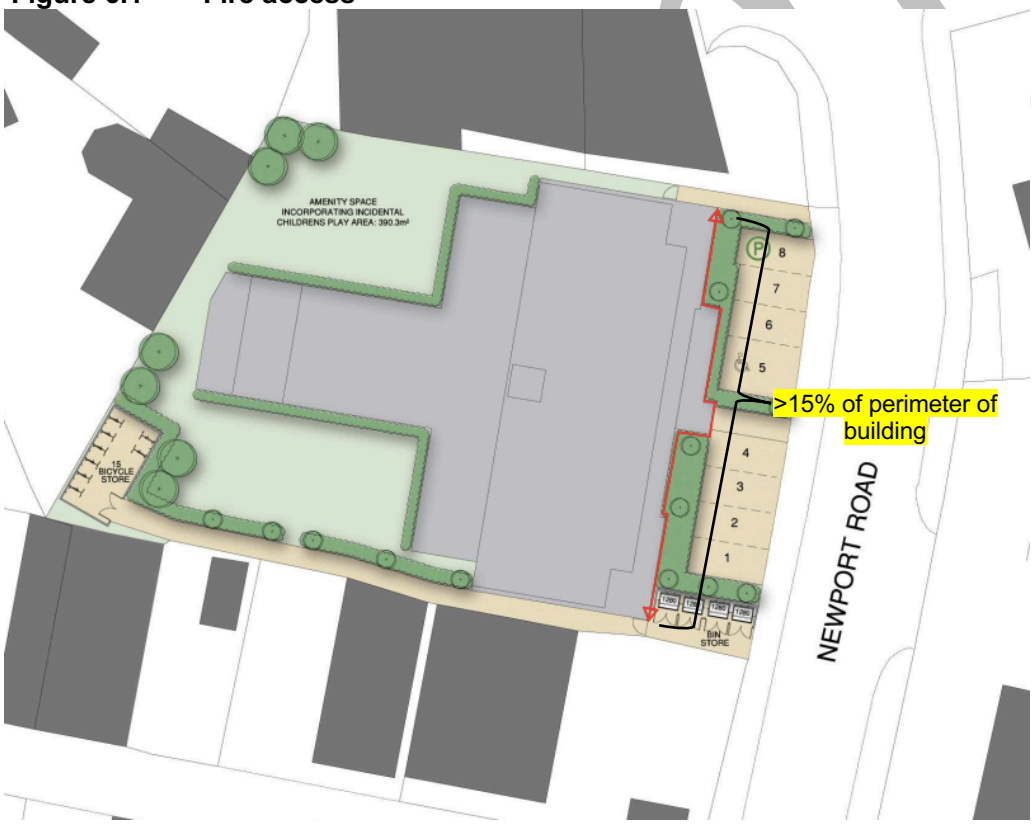
6.1 Fire Mains and Hydrants

6.1.1 The nearest fire hydrant is located approximately 15-20m from the building. There is therefore no requirement to provide additional fire hydrants.

6.2 Fire Tender Vehicular Access

6.2.1 ADB v2 deals with the requirements of vehicular access to the building for firefighting purposes[37]. Small buildings (i.e. total floor area no greater than 2000m^2 and top floor no greater than 11m above ground level) not fitted with fire mains should be provided with vehicle access to either 15% of the perimeter, or within 45m of every point of the footprint of the building. This building has a floor area of approximately 2,040m^2 and has a height of 9.25m above ground floor level. The total floor area of this building is just greater than 2000m^2 therefore should be considered as a small building. The fire tender can park close to the front entrance of the building on Newport Road, from here, there is access to >15% of the perimeter (see Figure 6.1). The building is therefore compliant in this regard.

Figure 6.1 Fire access



6.3 Manual Fire Fighting / Extinguishers

6.3.1 Selection and positioning of fire extinguishing equipment shall comply with BS5306-8:2012. Each of the storeys within this building have a floor area of greater than 400m^2, therefore, the minimum quantity of extinguishers with an A rating should be as follows:

- at least two extinguishers with a Class A rating; having a combined minimum total fire rating of 0.065 × floor area of the storey. In light of this, extinguishers should have a combined minimum total fire rating of:

  - 35A for the ground floor
  - 35A for the first floor
  - 33A for the second floor
  - 28A for the third floor

- Extinguishers should be sited in such a way that it is not necessary to travel from the site of any fire to reach an extinguisher further than the maximum distance stipulated for a Class A fire. Extinguishers should be located no more than every 30m along an escape route[38]. (Note that a 9 litre (2 gallon) water extinguisher can achieve a 13A rating).

6.3.2 Extinguishers should be available for immediate use at all times and should be located:

- in conspicuous positions on brackets, on floor stands or within cabinets;
- where they will be readily seen by persons following an escape route;
- most suitably, near to room exits, corridors, stairways, lobbies and landings;
- in similar positions on each floor, where floors are of similar appearance; and
- where they are visible and mounted so as to position the handle approximately 1.5m from the floor.

Final

7.0 AUTOMATIC FIRE SUPRESSION

7.1 Sprinkler System

7.1.1 The client wishes to introduce a sprinkler system to this building as a means of reducing the risk to life safety of occupants of the building. The sprinkler system should be in accordance with BS 9251:2014. BS 9251 defines bed and breakfast accommodation/short stay residential buildings as requiring a Category 1 sprinkler system. The minimum design discharge densities, number of design sprinklers that should be capable of operating simultaneously in a compartment, and duration of supply should be in accordance with Table 2 of BS 9251 (see Table 7.2).

Table 7.1 Extract from BS 9251:2014, Table 1 – Category of Sprinkler System

Category of system	Description of building/occupancy
1	Single family dwellings such as: [A)]
	• Individual dwelling house
	• Individual flat
	• Individual maisonette
	• Transportable home
	Houses of multiple occupation (HMOs) [A), B)]
	Bed and breakfast accommodation [A), B)]
	Boarding houses [A), B)]
	Blocks of flats 18 m or less in height and with a maximum total floor area of 2 400 m² [A), C)]
2	Blocks of flats greater than 18 m in height [D)]
	Small residential care premises with ten residents or fewer
	Sheltered and extra care housing [D)]
3	Residential care premises with more than ten residents
	Dormitories (e.g. attached to educational establishments)
	Hostels

Table 7.2 Extract from BS 9251:2014, Table 2 – Minimum Sprinkler Design Parameters

Category of system (see Table 1)	Minimum design discharge density mm/min	Number of design sprinklers (see 5.5)	Minimum duration of supply min
1	2.04 [A)]	1 or 2	10
2	2.80 [B)]	1 or 2	30
3	2.80 [C)]	2 to 4 [D)]	30

7.1.2 To comply with the number of design sprinklers, see paragraph 7.1.4 below. Note that, where a sprinkler system is installed as a compensatory feature, the minimum design discharge density should be increased to either:

a. 2.80 mm/min for a single head operation, or 2.04 mm/min through each sprinkler operating simultaneously up to a maximum of two sprinklers in a single area of operation; or

b. 4 mm/min for single head operation, or 2.80 mm/min through each sprinkler operating simultaneously up to a maximum of two sprinklers in a single area of operation.

7.1.3 The increased level of discharge density needed [a) or b) above] should be agreed with the approving authorities prior to installation, based on the risk identified. The system flow rate should be not less than the greater of:

- flow determined by multiplying the discharge density by the maximum area of operation; or
- flow from the sprinkler operation at 0.5 bar (i.e. $10^5 N/m^2$ or 100kPa); or
- approved flow rate specified by the manufacturer for that area of operation.

7.1.4 Residential sprinkler spacing and positioning should meet the following recommendations as set out in section 5.5 of BS 9251:2014:

a. The maximum area protected by each sprinkler should be in accordance with its approved listing performance or 25 m^2, whichever is the lesser.
b. Sprinklers should be not more than 5.5 m apart nor more than half the design spacing from any wall or partition.
c. The distance between sprinklers within a compartment should be not less than 2.4 m, except where there is an intervening constructional feature preventing adjacent sprinklers wetting each other.
d. Pendent and upright sprinklers should have heat-sensitive elements, not more than 100 mm below the ceiling and under no circumstances exceeding the manufacturer's approval listing.
e. Sidewall pattern sprinklers should have the top of the deflector within 100 mm to 300 mm below the ceiling and under no circumstances exceeding the manufacturer's approval listing.
f. The whole of the floor area and the walls from the floor up to 0.7 m below the ceiling should be wetted when the sprinklers are operated.
g. For sloping ceilings, sprinklers should be positioned in accordance with the manufacturer's instructions.
h. Sprinklers should be positioned such that the sensitivity and discharge pattern are not adversely affected by obstructions such as constructional beams, smoke alarms, light fittings or other sprinkler heads (refer to manufacturers' instructions for guidance).
i. Sprinklers should be positioned a sufficient distance from any heat sources (e.g. fireplaces, stoves, ovens, kitchen ranges, hot air flues, hot water pipes, hot air diffusers, water heaters, heat generating light fixtures) in accordance with the sprinkler head manufacturer's instructions.
j. The potential for a shielded fire to develop should be taken into account.
k. Sprinklers should be not less than 50 mm or the manufacturer's recommended distance, whichever is greater, from any wall or partition.

7.1.5 Sprinkler heads should have a thermal sensitivity rating in accordance with BS 9252. The temperature rating of the sprinklers should be:

Final

- the closest to but at least 20 °C greater than the highest anticipated ambient temperature of the location;
- within the range of 79 °C to 107 °C when installed under glazed roofs.

7.1.6 For normal climatic conditions in each apartment, the sprinkler temperature ratings should be set to 68 °C.

Final

8.0 CONCLUSIONS, RECOMMENDATIONS AND SUMMARY OF FINDINGS

8.1 Conclusions

8.2.1 The following recommendations should be considered for implementation. Where advice is given, and the requirement is not mandatory for the building, the client is free to accept or reject our advice. Where a requirement is mandatory this will be specified.

8.2 Recommendations and Summary of Findings

- Means of escape will be based the entire building being evacuated simultaneously (simultaneous evacuation method);
- Travel distances within bedrooms, bedroom corridors and protected communal corridors are compliant on all floors;
- Structural fire protection will be in accordance with Table B3 of ADB. Compartment floors will be provided throughout;
- The protected lobby between the protected stair and the plant room (place of special fire hazard) should be provided with no less than 0.4m^2 of permanent ventilation or be protected by a mechanical smoke control system;
- Fire detection and fire alarm system within the building will be a Grade D1 Category LD1 system (Table 1 of BS 5839-6:2019); and,
- Fire access - vehicle access is provided to 15% of the perimeter of the building.

Final

References:

[1] HMGovernment. approved document B. Fire safety. HM Government; 2019 Table B3
[2] HMGovernment. approved document B. Fire safety. HM Government; 2019 Table B3 / B4
[3] HMGovernment. approved document B. Fire safety. HM Government; 2019 Table B4
[4] Fire detection and fire alarm systems for buildings – code of practice. London: British Standards Institution; 2019 BS5839-6 Table 1
[5] HMGovernment. approved document B. Fire safety. HM Government; 2019 Para 8.10
[6] HMGovernment. approved document B. Fire safety. HM Government; 2019 Table 2.1
[7] HMGovernment. approved document B. Fire safety. HM Government; 2019 Table C1 point 4a
[8] HMGovernment. approved document B. Fire safety. HM Government; 2019 Table C1 point 4b
[9] HMGovernment. approved document B. Fire safety. HM Government; 2019 Table C1 point 5b
[10] HMGovernment. approved document B. Fire safety. HM Government; 2019 Table B3 point 15a
[11] HMGovernment. approved document B. Fire safety. HM Government; 2019 Para 10.10
[12] HMGovernment. approved document B. Fire safety. HM Government; 2019 Para 3.7
[13] HMGovernment. approved document B. Fire safety. HM Government; 2019 Para 5.34
[14] HMGovernment. approved document B. Fire safety. HM Government; 2019 Paragraph 3.35
[15] HMGovernment. approved document B. Fire safety. HM Government; 2019 Table B3 point 15a
[16] HMGovernment. approved document B. Fire safety. HM Government; 2019 Para 10.10
[17] HMGovernment. approved document B. Fire safety. HM Government; 2019 Paragraph 3.35
[18] HMGovernment. approved document B. Fire safety. HM Government; 2019 Table C1 point 4a
[19] HMGovernment. approved document B. Fire safety. HM Government; 2019 Table C1 point 4b
[20] HMGovernment. approved document B. Fire safety. HM Government; 2019 Table C1 point 5b
[21] HMGovernment. approved document B. Fire safety. HM Government; 2019 Table C1 point 4a
[22] HMGovernment. approved document B. Fire safety. HM Government; 2019 Table C1 point 4b
[23] HMGovernment. approved document B. Fire safety. HM Government; 2019 Table C1 point 5b
[24] HMGovernment. approved document B. Fire safety. HM Government; 2019 Table B3 point 15a
[25] HMGovernment. approved document B. Fire safety. HM Government; 2019 Para 10.10
[26] HMGovernment. approved document B. Fire safety. HM Government; 2019 Paragraph 3.35
[27] HMGovernment. approved document B. Fire safety. HM Government; 2019 Table B3 point 15a
[28] HMGovernment. approved document B. Fire safety. HM Government; 2019 Para 10.10
[29] HMGovernment. approved document B. Fire safety. HM Government; 2019 Paragraph 3.34
[30] HMGovernment. approved document B. Fire safety. HM Government; 2019 Paragraph 3.35
[31] HMGovernment. approved document B. Fire safety. HM Government; 2019 Table C1 point 4a
[32] HMGovernment. approved document B. Fire safety. HM Government; 2019 Table C1 point 4b
[33] HMGovernment. approved document B. Fire safety. HM Government; 2019 Table C1 point 5b
[34] HMGovernment. approved document B. Fire safety. HM Government; 2019 Table 14
[35] HMGovernment. approved document B. Fire safety. HM Government; 2019 Diagram 9.1
[36] HMGovernment. approved document B. Fire safety. HM Government; 2019 Para 9.12
[37] HMGovernment. approved document B. Fire safety. HM Government; 2019 Section 15
[38] Fire extinguishing installations and equipment on premises. London: British Standards Institution; 2012

Draft