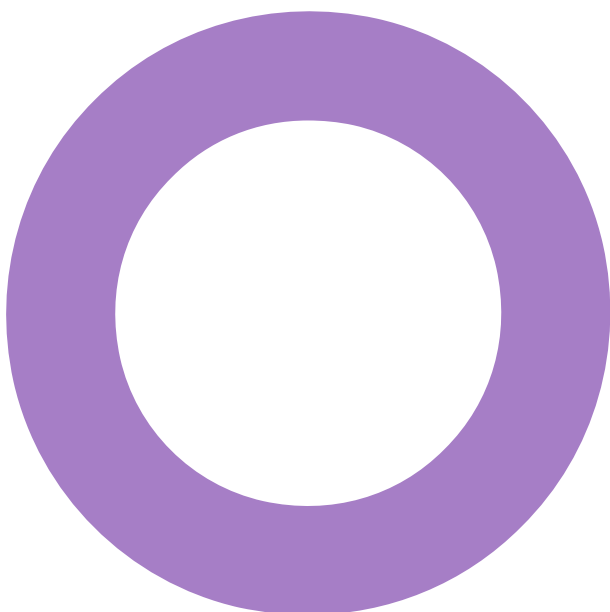


**DIO Headquarters.  
DMS Whittington.  
Kier Construction Limited.**

**FIRE ENGINEERING**  
FIRE STRATEGY REPORT

REVISION 02 – 11 MAY 2021



## Audit sheet.

Rev.	Date	Description of change / purpose of issue	Prepared	Reviewed	Authorised
00	26/06/2020	Fire Strategy Report	SaB	AE	SB
01	23/04/2021	Update to reflect building design changes	ES	AS	SB
02	11/05/2021	Minor updates to reflect design team comments	ES	AS	SB

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Project number: 1921011

Document reference: REP-1921011-5A-ES-20210511-Fire Strategy Report-Rev02

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## Executive Summary.

The purpose of this report is to provide the fire strategy for the DIO Headquarters at DMS Whittington. This report will address issues related to means of warning and escape, internal fire spread (linings and structure), external fire spread, and access and facilities for the Fire Service.

The key fire strategy considerations are as follows:

- The fire strategy and recommendations within this report are based on the guidance of Approved Document B Volume 2: 2019.
- It is understood that the building is to be provided with an automatic fire detection and alarm system throughout, to a Category L1 standard in accordance with BS 5839-1.
- Based on the means of escape assessment conducted, the escape capacity is considered to be sufficient, however, alterations are required to the base of Stair 3 to avoid a pinch point at the base of the stair.
- Although the Second floor is to be served by a single stair, it is not proposed to provide lobby protection to the stair, based on a number of enhancements to the building, as discussed in Section 3.5.2.
- By virtue of the height and nature of the building, loadbearing elements of structure are to be provided with a minimum of 60 minutes structural fire resistance.
- A number of external walls require fire resisting construction for the purposes of external fire spread (60 minutes loadbearing/integrity and 15 minutes or 60 minutes insulation depending on the external wall proximity to the boundary). The external fire spread assessment has been undertaken considering the site boundary and/or midpoints of adjacent roads. However, if it is confirmed that adjacent buildings are under the same ownership, the assessment may need to be revised, depending on the use of the adjacent buildings.
- Required Fire Service vehicle access is achievable to 15% of the perimeter for a pump appliance.

Any recommendations made within this report are subject to agreement with the Statutory Authorities.

## 1. Introduction.

### 1.1 Overview.

The objective of the fire strategy is to set out the fire safety provisions required in order to meet the functional requirements of the Building Regulations 2010. The guidance of Approved Document B Volume 2 (2019 edition) (referred to as AD-B throughout) has been used to inform the fire strategy for this development. This report will address issues related to means of warning and escape, internal fire spread (linings and structure), external fire spread, and access and facilities for the Fire Service.

Any proposed deviations from this guidance will be highlighted and alternative design solutions detailed.

Where not explicitly described within this report, it is assumed that, in all other respects, the building will be designed in accordance with the relevant sections of AD-B, or the supporting British Standards referenced therein.

It is envisaged that this document will be provided as part of the formal Building Regulations submission (in support of Regulation 38 and Part B – Fire Safety).

It is important that the building management have a clear understanding of the fire strategy adopted and of the operation and maintenance of the fire safety systems and equipment within the building that are designed to protect lives and property.

Any recommendations given within this report are subject to agreement with the Statutory Authorities.

### 1.2 Building Description.

The proposed building is a three storey office development (Ground plus two upper floors), with an uppermost occupied storey height of 7.5m above the lowest adjacent external ground level.

Ground and First floor each have an area of approximately 1160m<sup>2</sup>, whilst the top storey is much smaller at approximately 280m<sup>2</sup>, as can be seen in Figure 1.

The primary use of the building is open-plan office space, with a double-height space linking Ground and First floors, which consists of circulation at First floor and a café/seating area at Ground floor.

As there is no statutory requirement to provide sprinklers, the building is not to be provided with sprinkler protection.



Figure 1 - Building floor plans.

### 1.3 Vertical Circulation.

Whilst the First floor will be provided with access to three 1200mm protected escape stairs, only the central protected escape stair (adjacent to the double-height space) will continue up to serve Second floor (i.e. is served by a single stair only).

### 1.4 Occupancy.

The anticipated occupancy has been calculated based upon a floor space factor of 6m<sup>2</sup>/person, as per Table D1 of AD-B for office accommodation. The double-height space occupancy at Ground has been based on the design occupancy (number of seats shown).

Table 1 - Anticipated occupancy.

Reference	Anticipated occupancy
Ground floor office	133
First floor office	133
Second floor office	34
Double-height space	70
<b>Total</b>	<b>370</b>

### 1.5 Drawing References.

The following architectural layouts and fire strategy drawings have been used as a basis for this fire strategy and should be read in conjunction with this report.

Table 2 - Drawing references.

Drawing number	Revision	Drawing title
WHIT10140500-TBC-B304-00-DR-A-0400	P07	Fire Strategy Ground Floor Plan
WHIT10140500-TBC-B304-01-DR-A-0401	P06	Fire Strategy First Floor Plan
WHIT10140500-TBC-B304-02-DR-A-0402	P05	Fire Strategy Second Floor Plan
WHIT10140500-TBC-B304-XX-SK-A-9951	P01	DIO review option 5 Landscape option 1 P01
WHIT10140500-TBC-B304-XX-DR-A-2001	P03	Proposed external elevations Sheet 1
WHIT10140500-TBC-B304-XX-DR-A-2002	P03	Proposed external elevations Sheet 2

## 2. Statutory Guidance.

### 2.1 The Building Regulations.


The development will be subject to the requirements of the Building Regulations 2010. It will be necessary, therefore, for it to meet the requirements of Schedule 1 of the Regulations relating to:

- B1 (Means of warning and escape),
- B2 (Internal fire spread (linings)),
- B3 (Internal fire spread (structure)),
- B4 (External fire spread),
- B5 (Access and facilities for the Fire Service).

In England guidance on how to satisfy these functional requirements can be found in Approved Document B (AD-B) Volume 2 (2019 edition). However, whilst AD-B provides guidance for some of the more common building arrangements, there is no obligation to adopt any particular solution contained in the document, as alternative solutions are acceptable, provided that an equivalent level of fire safety to that provided by the standard solutions can be demonstrated.

### 2.2 The Regulatory Reform (Fire Safety) Order.

The Regulatory Reform (Fire Safety) Order (the RRO) is based on risk-appropriate compliance and requires a fire risk assessment to be carried out. The fire service will conduct inspections of premises to enforce the regulations. Whilst a guidance document has been produced by the government to assist in the preparation of the risk assessment, it should be noted that this document should not be used to design the building – the building design should be focused on satisfying the functional requirements of the Building Regulations.

 The fire strategy detailed in this report does not, therefore, explicitly address the management requirements of the RRO. It will be necessary for effective fire safety management regimes to be developed by the building occupier, and a risk assessment of the premises to be conducted (and updated on an on-going basis).

### 2.3 Construction, Design and Management Regulations.

Design projects undertaken in the UK are subject to the requirements of the Construction (Design and Management) Regulations 2015, the objective of which is to ensure that health and safety issues are properly considered during a project's design and development so that the risk of harm to those who have to construct, use and maintain the building is reduced.

As a designer, in accordance with Regulation 9 of the CDM regulations, Hoare Lea Fire will take into account the general principles of prevention in the preparation of this report and where reasonably practicable, eliminate, minimise and/or control foreseeable hazards associated with the design. Where elimination is not reasonably practicable, Hoare Lea Fire will be required to provide 'pre-construction' information in respect of any significant and/or unusual project-specific hazards that remain.

Following our design process, Hoare Lea Fire confirm that there are no significant and/or unusual residual hazards associated with this particular design.

### 2.4 Materials and workmanship

Regulation 7(1) of the Building Regulations requires that all building work should be carried out in a workmanlike manner, with adequate and proper materials that are appropriate for the circumstances in which they are used, are adequately mixed and prepared, and are applied, used or fixed so as to perform the functions for which they are designed.

Further guidance is provided in the Approved Document supporting Regulation 7.

Independent certification schemes exist to provide additional confidence that products are manufactured and installed to an appropriate and consistent standard. Such schemes can assist in ensuring that the Material and



Workmanship requirements of Regulation 7(1) are satisfied. It is therefore suggested that, where appropriate, manufacturers and installers that are subject to independent certification schemes are specified on this scheme.

### **2.5 Property Protection.**

This report deals only with Statutory Requirements, and property protection is not, therefore, explicitly addressed, unless otherwise stated. As such, it is recommended that the building insurers are consulted to ensure that any additional needs are satisfied.

## 3. Means of Warning and Escape.

### 3.1 Functional Requirements.

*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 case of fire from the building to a place of safety outside the building capable of being safely and effectively used at all material times.*

### 3.2 Fire Evacuation Strategy.

The building will adopt a simultaneous evacuation strategy throughout. On this basis, an immediate and simultaneous evacuation of the office space and double-height space will occur in the event of detection or manual call point activation in any area.

### 3.3 Means of Warning and Detection.

In accordance with AD-B, the building should be provided with a suitable electrically operated fire warning system in accordance with BS 5839-1:2017 to a Category M standard (i.e. manual call points only).

It is recognised that an automatic fire detection and alarm system (AFD) will have significant life-safety benefits, by providing occupants with a significantly earlier warning than a code-compliant system, allowing them more time to escape before conditions become untenable.

On this basis, it is proposed to provide the building with an automatic fire detection and alarm system to a Category L1 standard in accordance with BS 5839-1.

### 3.4 Horizontal Means of Escape.

Please note that further information on the means of escape for the double-height space is set out in Section 3.6 of this report, however, the general principles for all areas of the building are discussed within the following subsections.

#### 3.4.1 Travel Distances.

The travel distances should be limited to those shown in Table 3, as set out in AD-B, when measured to a storey exit, which is an exit to outside at access level or an escape stair access door at an upper floor level. Single direction travel distances should be measured to a storey exit or a place where escape is available within more than one direction.

If the accommodation fit out layout is unknown then 2/3<sup>rd</sup>s of the distance in Table 3 should be applied (i.e. a direct distance).

Table 3 – Maximum recommended travel distances.

Location	One-Way Travel	Two-Way Travel
Office	18m	45m
Places of special fire hazard	9m	18m
Plant rooms (within room)	9m	35m
Plant rooms (overall)	18m	45m
Roof*	60m	100m

\* It is assumed that the roof access is for maintenance only and not for use by the office occupants.

All travel distances, excluding within the Second floor office space, are currently compliant with Table 3. The maximum single direction travel distance proposed at Second floor is approximately 19m to the protected lobby serving the single stair, when accounting for the anticipated furniture layout (see Figure 2).



Please note that further information on means of escape through the double-height space is set out in Section 3.6 of this report.

For the purposes of determining whether the exit widths are sufficient, the anticipated occupancy has been split proportionally based upon floor area.

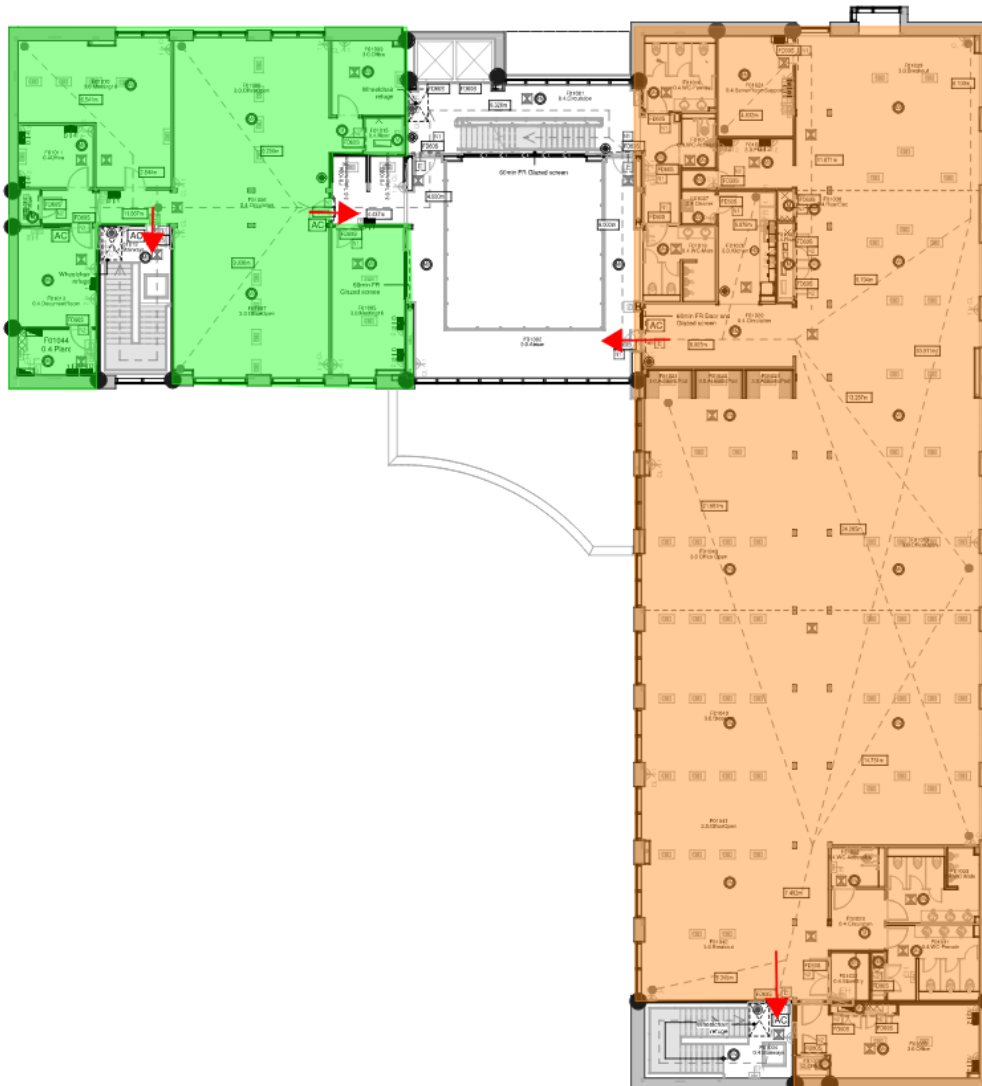


Figure 3 - Office storey exits (First Floor).

It is noted that office area A at Ground and First Floor is limited to 60 persons due to the door leading into the double-height space swinging in the direction opposite to escape, however, this is greater than the anticipated number of occupants (33 persons).

The horizontal means of escape capacity for each office area has been calculated in Table 5.

Table 5 - Exit width capacity assessment.

Location	Anticipated occupancy	Available exit width*	Maximum occupancy	Sufficient exit width for anticipated occupancy
Ground floor office A	37	880mm <sup>†</sup> 880mm	60	Yes

Location	Anticipated occupancy	Available exit width*	Maximum occupancy	Sufficient exit width for anticipated occupancy
Ground floor office B	96	880mm 880mm	110	Yes
First floor office A	37	880mm <sup>†</sup> 880mm	60	Yes
First floor office B	96	880mm 880mm	110	Yes
Second floor office	34	880mm <sup>~</sup>	60	Yes
Double-height space	70	1600mm <sup>~</sup> 880mm <sup>#</sup> 880mm <sup>†#</sup> 880mm	110	Yes

\* Exits struck through denote discounted exits for calculation purposes.

<sup>†</sup> Door swing opposes direction of escape – occupancy limited to 60.

<sup>~</sup> Only a single exit is provided to the space – occupancy limited to 60.

<sup>~</sup> Whilst the doors to the double-height space entrance lobby are shown swinging in the direction opposite to escape, it has been confirmed by the design team that they will be configured so that they may be opened in the direction of escape in an emergency.

<sup>#</sup> Only the storey exits into the protected stair and exits directly to outside have been considered for the double-height space, as it is unlikely that occupants would be directed to escape via the offices, which could contain sensitive/secure information given the use of the building.

All exits affording access to a disabled refuge are shown to be provided with a minimum clear width of 850mm for wheelchair access.

### 3.4.3 Inner Rooms.

An inner room is a room from which escape is only possible by passing through another room (the access room), which presents a risk if a fire starts in the access room. Where the design of the cellular offices creates an inner room arrangement, one of the following should be provided to ensure that occupants are made aware if a fire occurs within the access room:

- The door or walls of the inner room should contain a vision panel (minimum 0.1m<sup>2</sup>); or
- The access room should be provided with an automatic fire detection system to warn occupants in the inner room where a fire occurs in the access room; or
- The walls or partitions of the inner room stop 500mm below the ceiling.

Furthermore:

- The occupancy of an inner room is limited to 60 persons.
- The inner room should be entered directly off the access room (but not via a corridor).
- The escape route from the inner room should not pass through more than one access room.
- Travel distances from any point in the inner room to the exits from the access room should not exceed the maximum travel distances detailed in Table 3.
- The access room should not be a place of special fire hazard and should be in control of the same occupier.

It is noted that a number of inner rooms are to be provided within the building, which are considered as meeting the guidance of AD-B due to the provision of a Category L1 fire detection and alarm system.

### 3.4.4 Automatic Doors.

AD-B recommends that any automatic doors provided within the building should not be placed across escape routes, unless:

- They are arranged to fail safely to outward opening from any position of opening, or;
- They are provided with a monitored ‘fail safe’ system for opening the doors if the mains power supply fails, or;
- They fail safely to the open position in the event of power failure, or;
- Non-automatic swing doors of the required width are provided immediately adjacent to the automatic door.

### 3.4.5 Security Controls on Escape Route Doors.

In general, doors on escape routes should either not be fitted with lock, latch or bolt fastenings, or they should only be fitted with simple fastenings that can be readily operated from the side approached by people making an escape. The operation of these fastenings should be readily apparent; without the use of a key and without having to manipulate more than one mechanism. This is not intended to prevent being fitted with hardware to allow them to be locked when the rooms are empty.

### 3.5 Vertical Means of Escape.

There are three primary escape stairs serving the building; all three stairs serve First floor, while only the central stair (Stair 3) continues up to serve the Second floor.

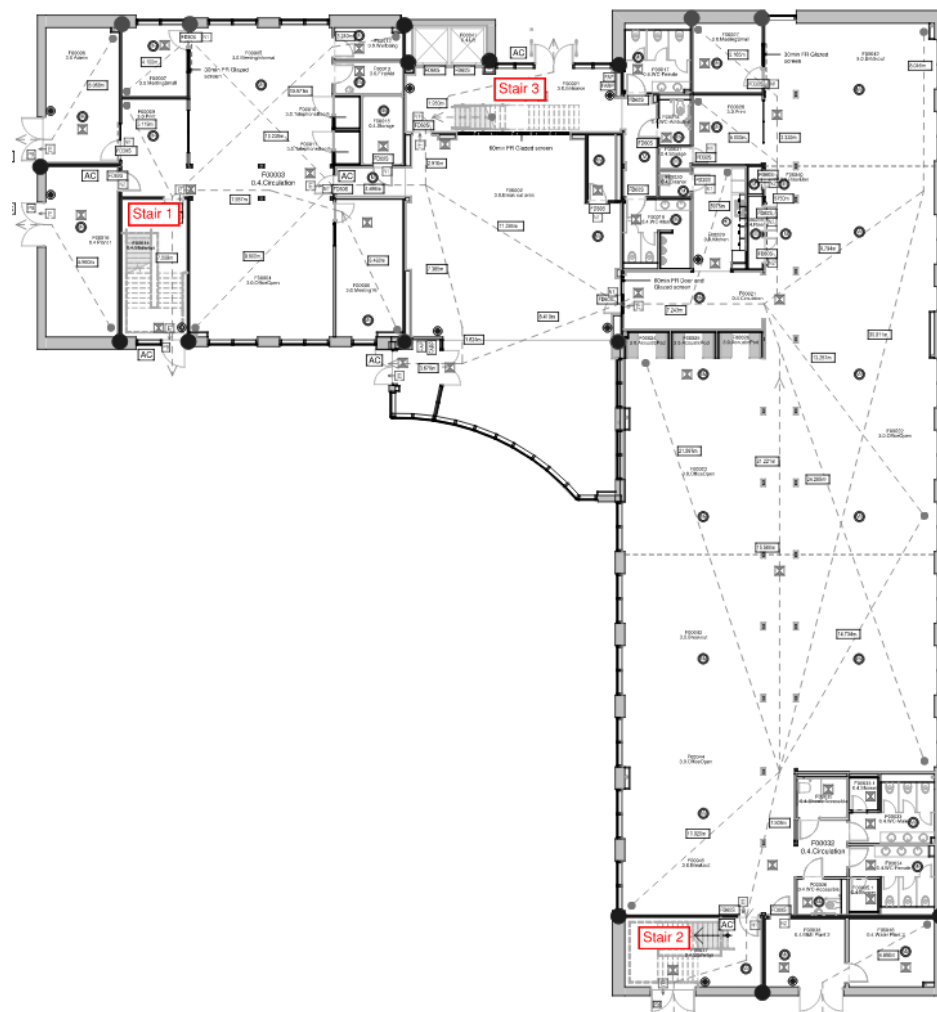


Figure 4 – Stair nomenclature.

### 3.5.1 Stair Capacity.

The maximum capacity for each stair is calculated based upon the stair width and number of storeys which it serves, in line with AD-B. The maximum stair capacities are set out in Table 6.

Table 6 - Stair capacity.

	Stair 1	Stair 2	Stair 3
Stair Width	1,200mm	1,200mm	1,200mm
Levels Served	1	1	2
Stair Capacity	240 persons	240 persons	285 persons

If a fire occurs in either one of the office areas at First floor, and a stair is considered to be discounted, there is sufficient capacity within the remaining two stairs to accommodate the escaping occupants.

If a fire occurs within the double-height space preventing the Ground and First floor office occupants from reaching Stair 3, there is sufficient capacity provided by Stairs 1 and 2 to accommodate the escaping office occupants from the respective office, without having to pass through the double-height space.

The provision of a single escape stair (Stair 3) serving Second floor is considered reasonable on the basis that it is considered unlikely that smoke will enter this protected stair in the early stages of fire development when occupants will be escaping, due to limited fire loading within the double-height space, the provision of comprehensive automatic fire detection and warning, and clear lines of sight to the protected stair store exits. Stair 3 is also to be separated from the Second floor office accommodation, by a protected lobby, providing a level of smoke protection to the stair if a fire occurs at this floor and is only accessed from the double-height space and toilet accommodation at Ground and First floors.

As combustible content of the double-height space is to be controlled (see Section 3.6) and toilet accommodation is permitted to be located within protected stairs, it is unlikely that a fire elsewhere in the building will discount the Stair 3 prior to occupants making their escape.

It is noted that a small café area is proposed within the double-height space at Ground floor, however, this will be used for serving hot/cold drinks and reheating sandwiches/paninis only (i.e. full cooking facilities will not be provided) and, therefore, this is not considered as a place of special fire hazard, nor is it considered as a significant risk to Second floor occupants escaping via a single stair.

Section 3.6 details the worst-case fire scenarios occurring within the double-height space.

### 3.5.2 Single Stair Design.

As noted above, the Second floor office space is to be served by a single stair only (Stair 3). Whilst Clause 3.34(a) of AD-B would generally recommend that this stair be provided with protected lobbies at Ground and First floors, it is considered that the proposed arrangement (i.e. no lobbies) is reasonable based on the following:

- An automatic fire detection and alarm system to a Category L1 standard is to be provided throughout the building, meaning that if a fire occurs within the double-height space, occupants located at Second floor will be immediately alerted to evacuate.
- Stair 3 is to be provided within an increased period of fire resistance (60 minutes) to separate it from all adjacent accommodation at each floor.
- FD 60S fire doors are to be provided to Stair 3, rather than the minimum recommended standard of FD 30S fire doors.
- Occupants of the Second floor will be limited to 34 persons (significantly less than the 60 persons permitted by AD-B) and will be familiar with the building. As such, they will be familiar with the escape routes/strategy, and queuing and flow times will be reduced.
- By virtue that the balcony walkways through the double-height space at First floor are being used primarily for circulation, there will be an absence of fire loading, with the double-height space separated from all

other areas at First floor via a minimum of 60 minutes fire resisting construction (FD 60S doors). As such, the First floor of the double-height space could be considered akin to a protected lobby, although not strictly following the guidance of AD-B and open to the Ground floor areas of the double-height space.

- The fire loading within the double-height space immediately adjacent to the stair at Ground floor is to be restricted by virtue of a clear demarcated route and a limit on combustibles, as discussed in Section 3.6.
- A small café area is proposed within the double-height space at Ground floor, however, this will be used for serving hot/cold drinks and reheating sandwiches/paninis only (i.e. full cooking facilities will not be provided) and, therefore, this is not considered to be a place of special fire hazard, nor is it considered as a risk to Second floor occupants escaping via a single stair.

The above proposals will be subject to formal Statutory Authority approval, with further information provided within Section 3.6 of this report regarding means of escape from the double-height space.

### 3.5.3 Merging Flow & Final Exits.

In general, the width of the final exit from a stair should not be less than the width of the stair it serves and should swing in the direction of escape. However, where stair final exits are shared with occupants escaping from discharge level, merging flow needs to be considered.

The required width of the final exit from the base of a protected stair is dependent on the width of the stair and the number of occupants escaping via the base of the stair at discharge level (i.e. Ground floor).

In accordance with Clause 2.23 and Diagram 2.6 of AD-B, the required final exit width when considering merging flow can be calculated from the following equation:

$$W = \left( \frac{\left( \frac{N}{2.5} \right) + (60S)}{80} \right)$$

Where:

- W = Width of final exit (m),
- N = Number of occupants escaping at Ground floor,
- S = Stair width (m).

The final exit doors serving Stairs 2 and 3 will each provide a clear width of at least 1800mm and have sufficient width to accommodate the maximum anticipated merging flow of occupants as indicated in Table 7, however, the final exit from the base of Stair 1 will provide a clear width (1000mm) that is less than the stair width, which is discussed below.

Table 7 - Final exit widths.

	Stair 1	Stair 2	Stair 3
Stair Width	1,200mm	1,200mm	1,200mm
Number of merging occupants	37	96	110*
Required Final Exit Width	1,200mm	1,3800mm	1,450mm
Actual Final Exit Width	1,000mm	1,800mm	1,800mm

*\*The largest number of occupants, when considering merging flow, which may be required to escape via the base of Stair 3 (110 persons), is in the event that the Ground floor entrance lobby doors in the double-height space are discounted.*

It is noted that there is a pinch point at the base of Stair 3, which is less than the 1.2m stair width, due to the location of the Ground floor door entering the stair from the double-height space.

It is recommended that one of the following options be implemented to ensure that the clear width of this stair discharge route (1.2m) is maintained at Ground floor:



- The Ground floor storey exit should be relocated slightly to the left (circa 0.4m); or
- The stair should be relocated slightly to the right (circa 0.4m).

Whilst the final exit from the base of Stair 1 provides a clear width that is less than the width of the stair served (1000mm final exit), the arrangement is considered reasonable, as the maximum number of occupants required to escape via Stair 1 is 37 persons at First floor and 37 persons at Ground floor and, therefore, 'bottlenecking' is unlikely to occur. As such, Table 3.2 of AD-B would recommend a minimum stair width of 1000mm, which could accommodate up to 150 First floor occupants. Furthermore, a final exit of 1000mm would be sufficient when considering merging flow. As such, it is not considered necessary to increase the final exit width as a result of an oversized stair which will not be utilised to full capacity.

The above proposals will be subject to formal Statutory Authority approval.

### 3.6 Double-Height Space - Escape Past a Void.

It is noted that as the double-height space does not pass through a compartment floor, the guidance within Appendixes B and C of BS 9999 does not apply.

In accordance with Clause 2.13 of AD-B, escape routes should not pass within 4.5m of openings between floors, unless the direction of travel is away from the opening or there is an alternative escape route which does not pass within 4.5m of the void. The circulation width can be seen in Figure 5.

It is noted that any occupants on the balcony walkways around the void would be required to escape within 4.5m of the void, when assuming escape through the office demise is not possible.

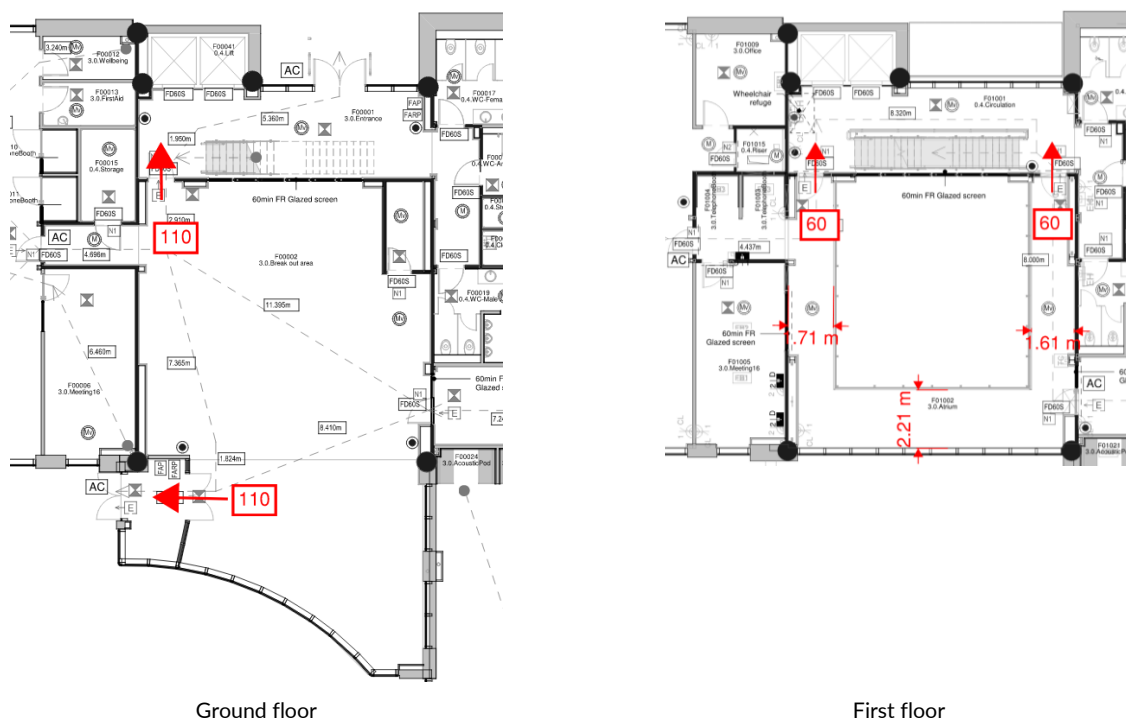


Figure 5 - Double-height space means of escape.

However, the proposed arrangement is considered reasonable on the following basis:

- Occupants within the First floor offices are provided with alternative means of escape, without having to enter the double-height space. As such, the only occupants requiring further consideration are those occupants potentially located on the balcony walkways.


- The First floor balcony walkways are intended to be circulation only, thus only a small and transient occupancy is expected within this space, with the maximum capacity permitted being 60 persons based on the escape widths.
- The Ground floor coffee bar will house limited equipment (i.e. coffee machine and a worktop oven 'Merry Chef ikon es2') for food reheat, so there is no high risk cooking equipment.
- In the event of a fire occurring within the café area at Ground, the comprehensive automatic fire detection will allow occupants to be notified in the early stages of fire development prior to significant smoke development will prevent access to Stair 3.

The above proposals will be subject to formal Statutory Authority approval.

### 3.7 Disabled Refuges.

A disabled refuge will be required for each exit route where level access is not provided (i.e. one per stair per level). Where the disabled refuges are located within the stair enclosure, they should not reduce the width or obstruct the flow of people escaping.

Each refuge point should be a minimum of 900mm x 1400mm in floor area, be provided with an emergency voice communication system and be located in a place of relative safety (i.e. within a protected stair or protected stair lobby).

 EVC system to each refuge should comply with BS 5839 Part 9 (2011) and consist of Type B outstations which communicate with a master station.

### 3.8 Emergency Lighting.

Suitable lighting should be provided to all premises to enable the safe movement of persons along escape routes to a place of relative or ultimate safety, with lighting to the escape stairs being on a separate circuit from that supplying any other part of the escape route. Emergency escape lighting should be in accordance with BS 5266-1 and AD-B Table 5.1.

### 3.9 Emergency Signage.

Every doorway, other exit or escape route providing access to a means of escape should be distinctively and conspicuously marked by an exit sign in accordance with BS ISO 3864-1, BS 5499-4 and the recommendations of ISO 3864 Part 1 and the Health and Safety (Safety sign and signals) Regulations 1996.

## 4. Internal Fire Spread (Linings).

### 4.1 Functional Requirements.

*To inhibit the spread of fire within the building the internal linings shall adequately resist the spread of flame over their surfaces; and have, if ignited, either a rate of heat release or a rate of fire growth, which is reasonable in the circumstances. In this paragraph “internal linings” mean the materials or products used in any partition, wall, ceiling, or other internal structure.*

### 4.2 Wall and Ceiling Linings.

In order to prevent rapid flame spread, all wall and ceiling linings should satisfy the classifications outlined in Table 8. Further information is provided in Section 6 of AD-B.

Table 8 – Classification of linings.

Location	Classification
Small rooms of maximum internal floor area of 30m <sup>2</sup>	D-s3, d2
Other rooms	C-s3, d2
Other circulation spaces	B-s3, d2*

*\* Wallcoverings which conform to BS EN 15102, achieving at least C-s3,d2 and bonded to a class A2-s3,d2 substrate will also be acceptable*

For the purposes of classification:

A wall is deemed to include:

- The surface of glazing (except glazing in doors); and
- Any part of a ceiling which slopes at an angle of more than 70° to the horizontal.

A wall is not deemed to include:

- Doors and door frames;
- Window frames and frames in which glazing is fitted;
- Architraves, cover moulds, picture rails, skirtings and similar narrow members; or
- Fireplace surrounds, mantle shelves and fitted furniture.

A ceiling is deemed to include:

- The surface of glazing;
- Any part of a wall which slopes at an angle of 70° or less to the horizontal; or
- The underside of a roof exposed to a room below.

A ceiling is not deemed to include:

- Trap doors and their frames;
- The frames of windows or roof lights and frames in which glazing is fitted; or
- Architraves, cover moulds, picture rails, exposed beams and similar narrow members.

## 5. Internal Fire Spread (Structures).

### 5.1 Functional Requirements.

*The building shall be designed and constructed so that, in the event of fire, its stability will be maintained for a reasonable period. A wall common to two or more buildings shall be designed and constructed so that it adequately resists the spread of fire between those buildings. To inhibit the spread of fire within the building, it shall be sub-divided with fire-resisting construction and/or installed with suitable automatic fire suppression systems to an extent appropriate to the size and intended use of the building. The building shall be designed and constructed so that the unseen spread of fire and smoke within concealed spaces in its structure and fabric is inhibited.*

### 5.2 Fire Suppression.

On the basis of the height and floor area of the building, there is no Building Regulations requirement for sprinkler protection within this building and, as such, it is not proposed to provide sprinkler protection.

### 5.3 Loadbearing Elements of Structure.

The height of the building, measured to the uppermost occupied finished floor level, will be greater than 5m, but less than 18m, and, therefore, each member forming part of the structural frame of the building or any other loadbearing beam or column should be provided with a minimum fire resistance period of 60 minutes.

Structures supporting only the roof of the building do not require any fire resistance unless the stability of the building or fire rated external walls depend upon the roof structure, or the roof performs the function of a floor (i.e. supporting roof-top plant or a means of escape route).

### 5.4 Compartmentation.

#### 5.4.1 Compartment Walls.

In accordance with Table 8.1 of AD-B, there is no maximum compartment size limit for an unsprinklered multi-storey office building and, therefore, there is no requirement for the building to be divided into compartments.

However, it is proposed to office area A and office area B from the double-height space by means of 60 minute compartment walls.

#### 5.4.2 Compartment Floors.

The building is less than 30m and, therefore, there is no requirement for compartment floors to be provided.

As such, the double-height void will not penetrate a compartment floor, so is not considered to be an 'atrium' and does not require the additional fire safety provisions recommended in BS 9999 for an atrium.

Furthermore, there is no need for risers to be enclosed in protected shafts.

### 5.5 Fire Resisting Construction.

All walls and floors within the building should follow the compartmentation guidance set out within AD-B table B3. The minimum requirements are summarised below in Table 9.

Table 9 - Fire resistance.

Location	Minimum fire resistance	Fire door requirement*
Stair 1 and 2	30 minutes	FD 30S
Stair 3 <sup>†</sup>	60 minutes	FD 60S
Walls separating offices from double-height space	60 minutes	FD 60S
Fire-resisting external walls <sup>~</sup>	60 minutes	N/A

Location	Minimum fire resistance	Fire door requirement*
Places of special fire hazard <sup>#</sup>	30 minutes	FD 30

\* Where the door is located along a protected escape route, smoke seals are generally required.

<sup>†</sup> Enhanced level of protection to this stair – Refer to Section 3.5.2.

<sup>~</sup> Refer to Section 6.2.

<sup>#</sup> As defined in AD-B, places of special fire hazard include oil filled transformer and switch gear rooms, boiler rooms and storage spaces for fuels or highly flammable substances.

#### 5.5.1 Coffee Bar.

The coffee bar at Ground floor of the double-height space will consist of equipment for making coffee and reheating food (e.g. a worktop oven 'Merry Chef eikon es2'). As there will be no open heat sources and the equipment is limited in size, the coffee bar may reasonably be open to double-height space and is not required to be enclosed in 30 minutes fire resisting construction.

It is noted that, in order that the coffee bar may remain open to the double-height space, any future works should ensure that significant cooking appliances (i.e. standard/large oven) or any open heat sources (e.g. hob, fryer, etc) are not introduced. This restriction should be reflected in the building fire safety management policy.

#### 5.6 Concealed Spaces (Cavities).

Where appropriate, suitable provisions should be made to prevent the unseen spread of fire and smoke through cavities or concealed spaces using cavity barriers in accordance with the guidance of Section 9 of AD-B.

#### 5.7 Fire Stopping.

Openings in any fire-separating element (e.g. compartment walls, cavity barriers, protected corridors etc.) should be protected with appropriate fire stopping or sealing to ensure that the fire resistance of the element is not compromised. Fire stopping should be provided in accordance with Section 10 of AD-B.

## 6. External Fire Spread.

### 6.1 Functional Requirements.

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

### 6.2 Space Separation Analysis.

Under the requirements/guidance of the Building Regulations and AD-B, it is necessary to construct buildings such that the potential for fire spread to neighbouring buildings via radiant heat transfer is limited. To ensure that the building is sufficiently remote from adjacent buildings (or the site boundary) a space separation analysis is carried out. This takes into account the maximum fire size (assumed to be confined to a single compartment), the nature of the external walls (dimensions, the provision of external fire resisting construction and surface spread of flame classification) and the distance to either the site boundary or adjacent buildings.

AD-B recommends using the enclosing rectangle calculation methodology outlined in BR 187. The calculation assesses thermal radiation against the separation distance to a relevant boundary. The relevant boundary is considered to be the site boundary or a notional boundary at the mid-point of a space that is unlikely to undergo future development, such as a road or river.

In accordance with BRE 187, residential, assembly, and office buildings/compartments are considered to have a reduced fire loading and, therefore, the lower value of radiation has been used for this office building.

The external walls are of modular construction, which have been confirmed by the supplier to inherently achieve 60 minutes loadbearing/integrity and 15 minutes insulation from the inside to out, and have an external wall surface that achieves European Classification B-s3, d2. The following assessment has been undertaken on this basis, such that they are not considered to facilitate flame spread and to be further radiation emitting areas.

The space separation analysis carried out for each elevation of the building identified three locations where a restriction on unprotected area is required; this is on a proportion of the East, South and West external walls, as indicated below in Figure 6.



Figure 6 - Permitted unprotected areas in external walls.

However, all elevations have been assessed in the following subsections for completeness, based on the separation distances in Figure 11.

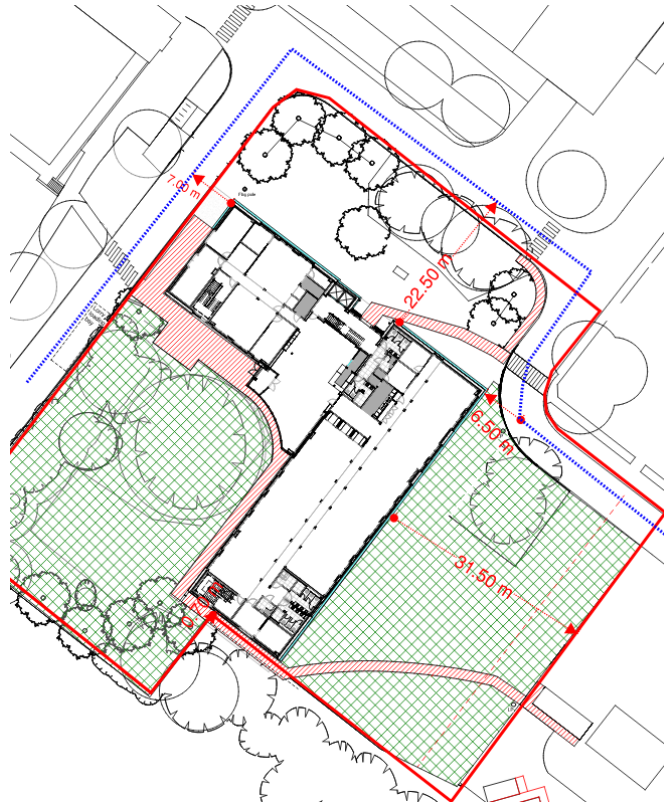


Figure 7 – Separation distances (Blue dotted line indicates mid-point of the road)

It is noted that all separation distances have been measured to the site boundary or midpoint of the adjacent roads, as noted in Figure 11. However, where adjacent buildings are under different ownership (or under the same ownership, but one of the buildings is within the 'residential' or 'assembly' purpose group), a notional boundary should be calculated between the two buildings. Whilst it is yet to be confirmed whether existing buildings on the site are under the same ownership or not, given the nature of the site (i.e. military site), this is considered likely.

As such, if it is confirmed that the red line boundary indicated in Figure 11 is not the site boundary, and adjacent buildings are under the same ownership, the below assessment may need to be revised, depending on the use of the adjacent buildings.

#### 6.2.1 North Elevation.

The distance to the site boundary from the North elevation is approximately 19.5m, however, the distance to the middle of the road (i.e. the notional boundary), is approximately 22.5m. The entire elevation is approximately 12.5m high by 46.0m in length. Therefore, based on an enclosing rectangle of 15m high by 50m length, 100% of the external walls may remain unprotected, in accordance with the calculation methodology of BR 187.

It is noted that the above is considered as a worst-case assessment, as the internal compartmentation between Office A and the double-height space has not been taken into consideration.

#### 6.2.2 East Elevation.

The distance to the site boundary from the East elevation is approximately 31.5m, however, it is noted that the most Northern corner of the East elevation is only 6.5m from the boundary (blue dashed line in Figure 11). As such, the boundary distance has conservatively been considered as 6.5m.

The entire elevation is approximately 12.5m high by 46.0m in length. Therefore, based on an enclosing rectangle of 15m high by 49.5m length, 32% (240m<sup>2</sup>) of the external walls may remain unprotected, in accordance with the calculation methodology of BR 187.

It is noted that the glazed elements of the external wall account for approximately 202m<sup>2</sup> of the external wall, with the remainder of the external wall of construction that achieves the required period of fire resistance. Therefore, on the basis that all non-glazed areas of the external wall are of fire resisting construction (60 minutes loadbearing/integrity and 15 minutes insulation, from the inside to out) and the external wall surface achieves European Classification B-s3, d2 or better, there is no requirement for fire resisting glazing.

### 6.2.3 South Elevation.

Where an external wall is within 1.0m of the site boundary, the following requirements and restrictions are applicable:

1. External walls must achieve the appropriate level of fire resistance in terms of loadbearing, integrity and insulation from both sides (See Section 5.2 Table 9– 60 minutes fire resistance).
2. Unprotected areas must be limited to those set out in Diagram 13.5 of AD-B (maximum 0.1m<sup>2</sup> or 1.0m<sup>2</sup> depending on various criteria).
3. Where windows (protected) make up part of the elevation, these are not permitted to be openable.
4. All external wall surfaces are required to achieve European Classification B-s3, d2 or better.

It is noted that the Southern external wall of Office B is within 1.0m of the boundary and, therefore, should satisfy the criteria above.

As such, the Ground floor plant room doors should also be 60 minutes fire resisting (i.e. FD 60). Whilst the requirement for external walls within 1.0m of a site boundary includes the provision of insulation, fire doors are not generally tested/certified for insulation performance. Notwithstanding, a wall within 1.0m of a boundary is considered akin to a compartment wall between buildings, whereby a FD 60 fire door would be permitted. As such, the provision of an FD 60 door to the plant room is considered reasonable (NB: louvers should not be included within the door unless they are provided with fire dampers).

Whilst protected stairs are not normally considered for space separation analysis, as the stair external wall is within 1.0m of the boundary, it is recommended that it also satisfies the above criteria. However, given the door at the base of the stair is greater than 1.0m from the boundary, it is not considered necessary for the door to be fire resisting.

The Southern elevation to Office A and the double-height space has not been considered, as it is set back approximately 30m from the boundary.

The above will be subject to formal Statutory Authority approval.

### 6.2.4 West Elevation.

The boundary distance for the proportion of the West elevation shown in pink in Figure 6 is 7.0m, taken to the midpoint of the road. Based on an enclosing rectangle of 3m high by 9m length, 100% (27m<sup>2</sup>) of the enclosing rectangle remain unprotected, in accordance with the calculation methodology of BR 187.

Therefore, on the basis that all non-glazed areas of the external wall are of fire resisting construction (60 minutes loadbearing/integrity and 15 minutes insulation, from the inside to out) and the external wall surface achieves European Classification B-s3, d2 or better, there is no requirement for fire resisting glazing..

Figure 8 indicates that the unprotected area currently shown is acceptable.



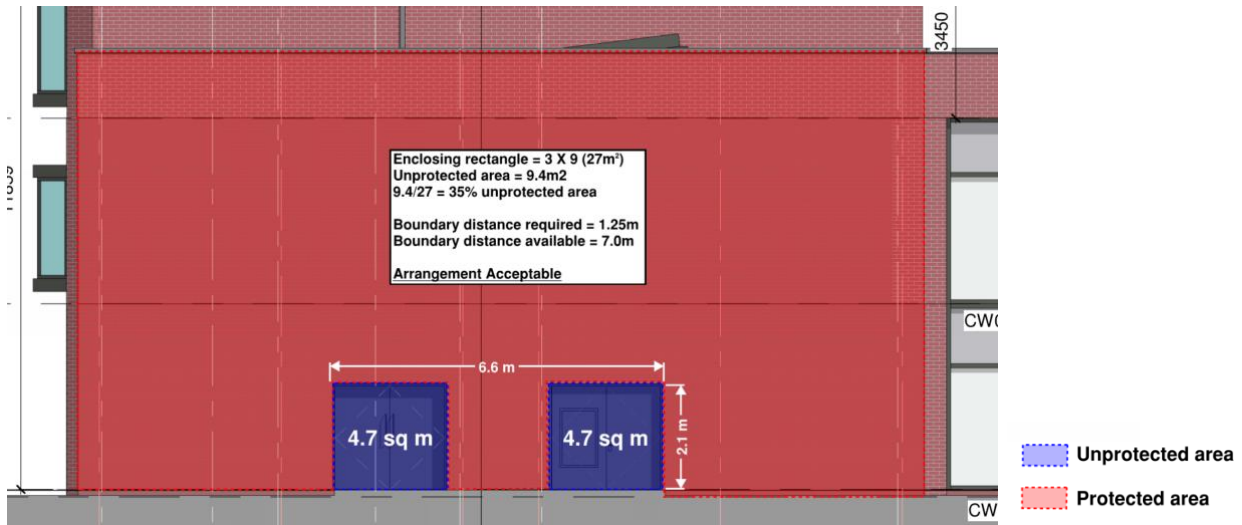


Figure 8 - West facade elevation

### 6.3 External Wall Construction.

The building does not have a storey that exceeds 18m in height and, therefore, either the external walls should satisfy the performance criteria described in BRE report BR 135 or the external wall surface should be in accordance with Table 12.1 of AD-B for surface spread of flame classification, and cavity barriers in any external wall cavity are required in accordance with Section 9 of the Approved Document.

Full reference should be made to the guidance provided in Approved Document B regarding recommendations for external walls.

Notwithstanding the minimum requirements, as demonstrated within the space separation analysis above, the external wall surfaces should achieve European Classification B-s3, d2 or better, to ensure they do not contribute to external fire spread.

## 7. Access and Facilities for the Fire Service.

### 7.1 Functional Requirement.

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

### 7.2 Fire Service Access.

As the uppermost occupied storey of the building does not exceed 11m, firefighting shafts, and consequently dry rising mains, are not required.

For a building less than 11m in height with a floor area between 2000-8000m<sup>2</sup>, the minimum perimeter access required is 15%. The building perimeter is 190m, thus the minimum perimeter access required is 28.5m. The surround roads enable the building to be provided with access 28.5m of perimeter access, which is compliant.

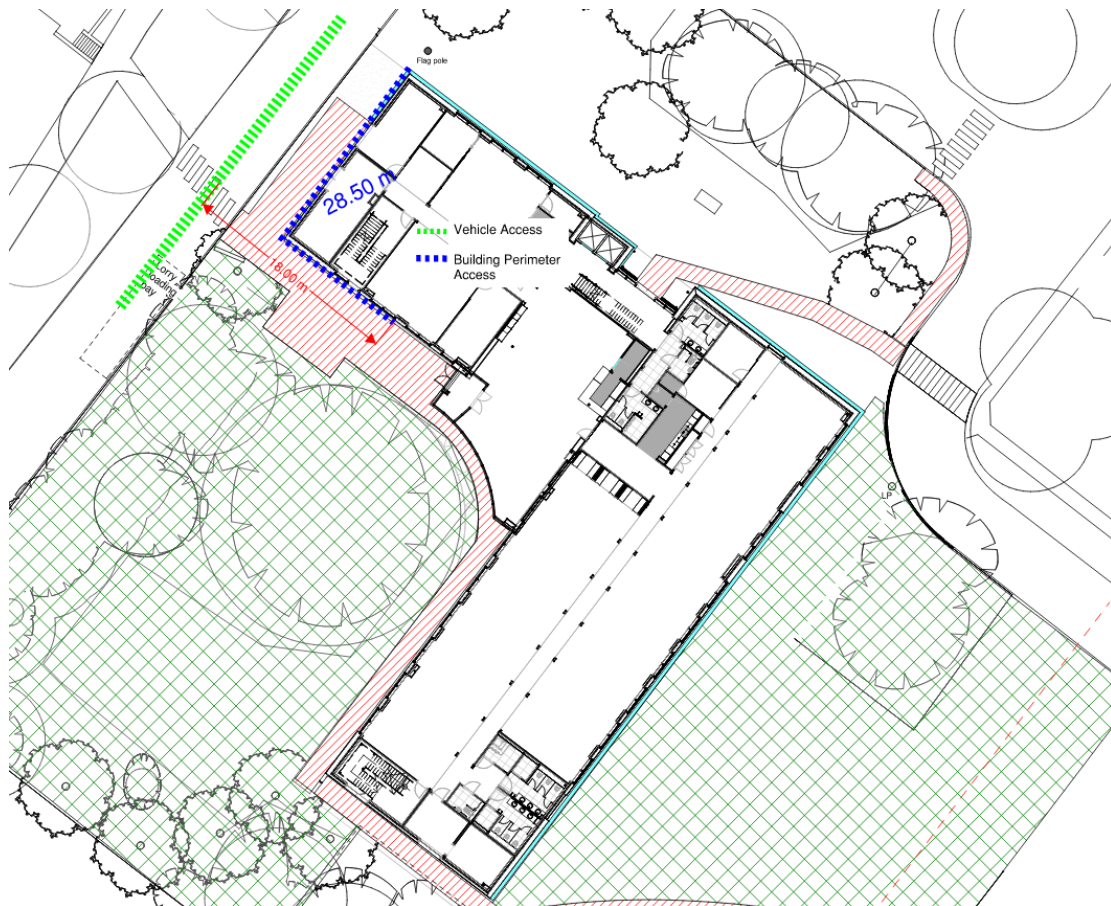


Figure 9 - Fire Service access

### 7.3 Vehicle Access.

Areas of the building shown to have perimeter access in Figure 9 should be within 18m of a suitable fire appliance parking position. Access routes should be provided in line with AD-B table 15.2 (summarised below), and where dead-end access routes exceed 20m, turning facilities will be required.

Table 10: Fire Service Vehicle Access Requirements.

Minimum Width of road between kerbs (m)	Minimum width of gateways (m)	Minimum turning circle between kerbs (m)	Minimum turning circle between walls (m)	Minimum clearance height (m)	Minimum carrying capacity (tonnes)
3.7	3.1	16.8	19.2	3.7	12.5

## 7.4 Fire Hydrants.

The site currently has four hydrants located close the proposed building. These hydrants are located within 100m of an entry point to the building, thus no additional hydrants are required.

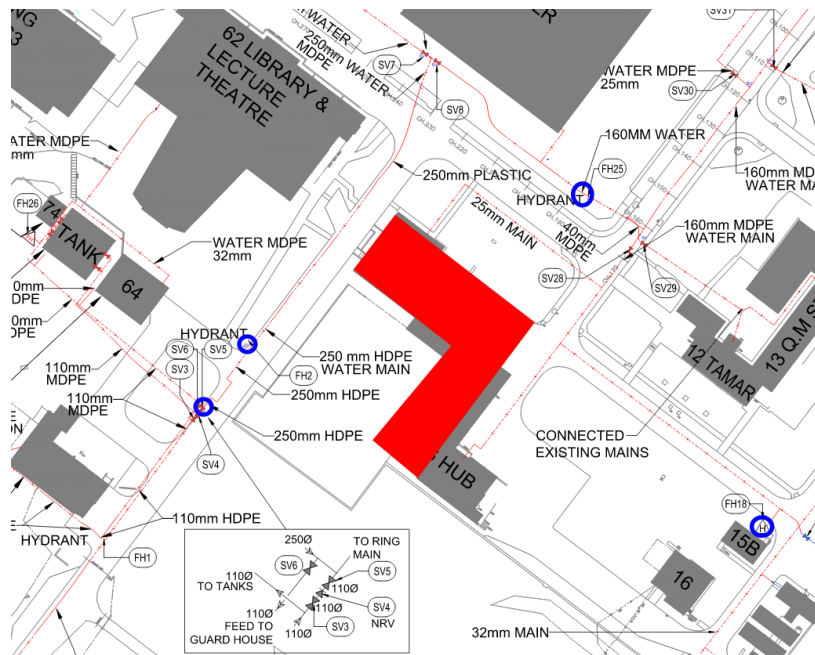


Figure 10- Hydrant locations (Blue) around Proposed Building (red)

## 8. Summary.

Subject to the incorporation of the recommendations made within this report, it is considered that the proposed works meet the functional requirements of the Building Regulations.

The key fire strategy considerations are as follows:

- The comments/recommendations within this report are based on the guidance of Approved Document B Volume 2: 2019.
- The building is to be provided with an automatic fire detection and alarm system throughout, to a Category L1 standard in accordance with BS 5839-1.
- Based on the means of escape assessment conducted, the escape capacity is considered to be sufficient, however, alterations are required to the base of Stair 3 to avoid a pinch point at the base of the stair.
- Although the Second floor is to be served by a single stair, it is not proposed to provide lobby protection to the lower floors, based on a number of enhancements to the building as discussed in Section 3.5.2.
- By virtue of the height and nature of the building considered, loadbearing elements of structure are to be provided with a minimum of 60 minutes structural fire resistance.
- A number of external walls require fire resisting construction for the purposes of external fire spread (60 minutes loadbearing/integrity and 15 minutes or 60 minutes insulation depending on the external wall proximity to the boundary). The external fire spread assessment has been undertaken considering the site boundary and/or midpoints of adjacent roads. However, if it is confirmed that adjacent buildings are under the same ownership, the assessment may need to be revised, depending on the use of the adjacent buildings.
- Required Fire Service vehicle access is achievable to 15% of the perimeter for a pump appliance.

Any recommendations made within this report are subject to agreement with the Statutory Authorities.



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