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RIBA Stage 3 Fire Strategy

Joint Archive Facility

Mold

North Wales

Quality Assurance

Revision	Description	Date	Produced by
FS4	RIBA 3 Fire Strategy Report – updated compartmentation drawing	27/04/2026	Lee Smart BEng (Hons) MCIOB MIFSM
SPL Contract Number - SPL4356			

This report has been produced from the plans specified in the reference drawing table. Should the design change from the drawings specified within this report, then a follow-up analysis must be undertaken prior to any changes taking place. The report should then be updated to reflect the changes in the design.

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Executive Summary

SPL Fire Safety have been commissioned to develop a fire engineering strategy for the construction of a proposed new structure.

The premises is a two-storey building that will be used to store and hold artifacts and archived documents. In addition, there will be meeting space available in the front reception area that can be used by local groups, members of the public and also for visitors to the site.

The premises is proposed to be located adjacent to the Theatr Clwyd / Civic Centre.

Due to the use of the premises, enhanced passive fire protection will be in place with the strong room being separated from the rest of the premises by 240minutes of fire resistance. In addition, rooms used for the restoration and review of the documents have been protected to a 60minute standard.

In terms of active measures, the premises will have a BS5839 Part 1 fire alarm and detection system to an L2 specification and there will be gas suppression in place to protect the strong room.

There will be 2 protected staircases giving access to and from the upper floor and 2 means of escape off the roof.

Essential fire protection features

The following section summarises the key elements of fire safety provisions that are to be provided within the project. The table is a summary of the key elements and, therefore, should not be read in isolation. The full report should be read before implementation of the strategy.

	Fire Safety Requirements	Clarification
Construction	Evacuation Strategy	Simultaneous evacuation
	Occupancy / Risk Profile	Assembly and recreation (A1, A2, A3 & B2)
	Design Guidance	BS9999 - 2017
	Fire-fighting shaft serving the building	No requirement for a firefighting shaft
	Fire Service access route	Premises will be accessible via Raikes Lane to the West or the A5119 to the East.
	Corridors	All corridors are not required to be fire protected due to travel distance restrictions. See the compartmentation section for protected areas.
	Compartmentation	Archive strong rooms on ground and first floor requires 4-hour fire resistance to separate them from the rest of the premises. Accessed via 2 hour lobbies. Archive Strong room floor will be 4-hour fire protected. Compartment floors within the non-strong room area are designed to provide 60 minutes of fire resistance. The lift and lobby require 60 minutes of fire resistance. Staircases require 60 minutes of fire resistance. 60-minute fire resistance is required around: • Secure search / Secure lobby • Delivery lobby • Gas suppression room / Incoming services • Plant room / server room • Reprographics and isolation room 30minutes of fire resistance will be in place to separate the cleaners stores.
Active and Passive Measures	Fire detection and fire alarm for the building	BS5839 Part 1 L2 specification
	Water suppression system	Sprinklers will not be required in this premises
	Suppression	Gas suppression proposed for the Strong rooms.
	Emergency Lighting	In accordance with BS5266: Part 1 2016 – Code of practice for the emergency lighting of premises.
	Escape Signage	In accordance with BS 5499: Part 4 2013 – Code of practice for escape route signage.
	Ventilation of stair	NA
	Ventilation of lobby	NA
	Structural Protection	60 min to all elements except those supporting the archive strong room which will be 4 hours.
	Openings in compartment walls / floors	It should be in suitably fire stopped in accordance with compartmentation section, protection of openings and fire stopping.

Table 1 - Passive and active measures.

Occupant response in the event of an incident

On activation of the enhanced BS5839-1 L2 fire alarm system, all persons will evacuate the premises. Assembly points will be created at a safe distance away from the premises. The assembly point will be in the open, remote from the premises and will not impact on firefighting operations.

Fire and Rescue Service response

The building is set within its own grounds and is accessed off Raikes Lane. Adequate water supplies for firefighting appear to be provided by existing hydrants that are situated within 100m of the building, with the nearest being shown in the diagram below. In addition, a new hydrant will be located within the grounds.

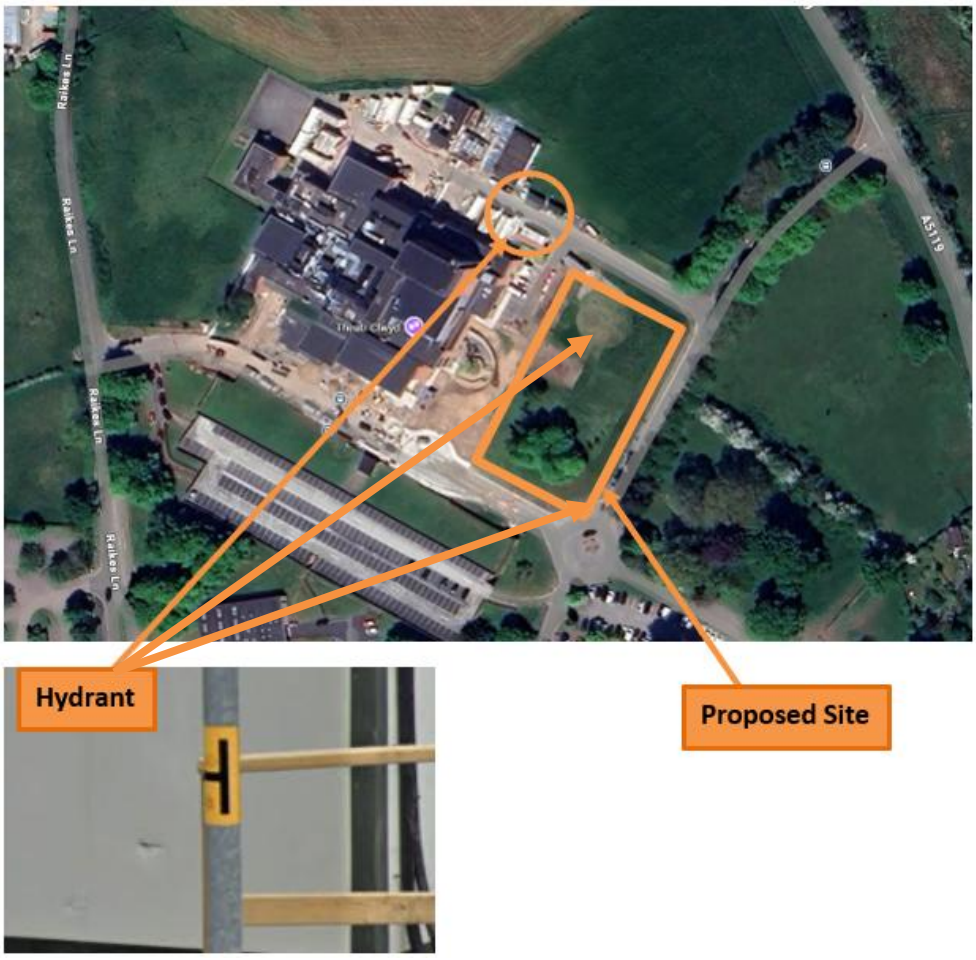


Figure 1 - Site location

Conclusion

With the application of the passive and active fire safety measures in line with BS9999-2017 to be implemented within this project, along with recommendations made within this strategy, it is concluded that the design of the Joint Archives Facility building **DOES** satisfy the functional requirements of Part B of the Building Regulations 2010.

Introduction

General

SPL Fire Safety have been appointed to provide a Fire Engineering Strategy for the project. Initial observations have been made to the client, architect and project team for comment/discussion prior to the completed fire safety strategy being produced. The fire strategy demonstrates a means of compliance with the requirements of BS9999-2017.

Legislation & General Principles

The Welsh version of the Approved Documents are intended to provide **guidance** for some of the more common building designs. However, there may well be alternative ways of achieving compliance with the requirements. Thus, there is no obligation to adopt any particular solution contained in an Approved Document if you prefer to meet the relevant requirement in some other way.

The fire strategy will utilise BS9999-2017 to ensure equivalence.

Building Regulations

The building will be subjected to the requirements of the Building Regulations 2010 (as applies to Wales). It will be necessary, therefore, for it to meet the requirements of Schedule 1 (or an equivalent standard) of the regulations relating to B1 – B5 as shown in the Table.

Building Regulations	Functional Requirements
B1 Means of warning and escape	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.
B2 Internal fire spread (linings)	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 section, “internal linings” means the material or products used in any partition, wall ceiling or other internal structure.
B3 Internal fire spread (structure)	The building shall be designed and constructed so that, in the event of fire, its stability will be maintained for a reasonable period. Where reasonably necessary to inhibit the spread of fire within the building, measures shall be taken, to an extent appropriate to the size and intended use of the building, comprising either or both of the following: (a) sub-division of the building with fire resisting construction, (b) installation of suitable automatic fire detection systems. The building shall be designed and constructed so that unseen spread of fire and smoke within concealed spaces in its structure and fabric is inhibited.
B4 External fire spread	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 regards to the use and position of the building.
B5 Access and facilities for the fire service	The building shall be designed and constructed so as to provide reasonable facilities to assist fire fighters in the protection of life. Reasonable provisions shall be made within the site of the building to enable fire appliances to gain access to the building.

Table 2 - The functional requirements required for B1 – B5

Construction, Design and Management Regulations (CDM Regs)

Projects undertaken within Great Britain and Northern Ireland are subject to the requirements of the Construction (Design and Management) Regulations 2015 (CDM Regs). The objective of the CDM Regs is to reduce risk as low as reasonably practicable concerning Health and Safety during construction and maintenance of construction sites and occupied buildings.

This report defines the strategy for meeting the functional and performance requirements for fire safety in the finished building. It is primarily intended to form part of the submission for Building Regulation Part B approval. Where any conclusions or recommendations have been arrived at which specify particular materials, products or forms of construction these will have been assessed, in accordance with CDM Regulations 9 (duties for designers).

In addition, this fire safety strategy plays an important role in providing appropriate fire safety measures for people in and around the building in the event of fire. Where aspects of the strategy involve significant residual risks or health and safety critical assumptions when the building is in use, appropriate information will be made available to the CDM Coordinator (for example, this might include a tailored management regime, or controls on certain aspects of the building).

Report Limitations.

Within this report are illustrations and drawings that are suggestive only and are envisioned only to describe the notions and principles of the building fire strategy. Property protection and business continuity are not covered primarily within this report; the fire strategy addresses the life safety elements of Building Regulations.

Referenced Drawings

This report should be read in conjunction with the drawings produced by the client, which are highlighted in Table 1

Drawing / Document Name	Reference Number	Issue
Site plan	JAF_FRL_XX_XX_DR_L_1500	P04
Ground Floor - GA	JAF_DB3_XX_00_DR_A_2011	P03
First Floor - GA	JAF_DB3_XX_01_DR_A_2012	P03
Roof Plan - GA	JAF_DB3_XX_RF_DR_A_2013	P02
Proposed compartmentation Plan – Ground floor	JAF_DB3_B01_00_DR_A_68001	P02
Proposed compartmentation Plan – Ground floor	JAF_DB3_B01_01_DR_A_68002	P02
Proposed elevations	JAF_DB3_XX_ZZ_DR_A_2071	P02
Proposed side elevations	JAF_DB3_XX_ZZ_DR_A_2072	P01

Table 3 - Reference Drawings

Building Summary

Building Description

The joint archives facility will be a 2 storey purpose built premises that has been developed to store artifacts and archived documents of significant importance. The storage areas on each floor are known as the strong rooms.

In addition, to the strong rooms, there are areas where restoration works are undertaken and others that can be visited by members of the public to learn about the artifacts and view permissible items.

The ground floor will have an open plan reception area, community room, secure search room, lounge, document reception, draught lobby, delivery lobby, secure lobby, gas suppression room, store room, welfare facilities and a large strong room to the rear of the building.

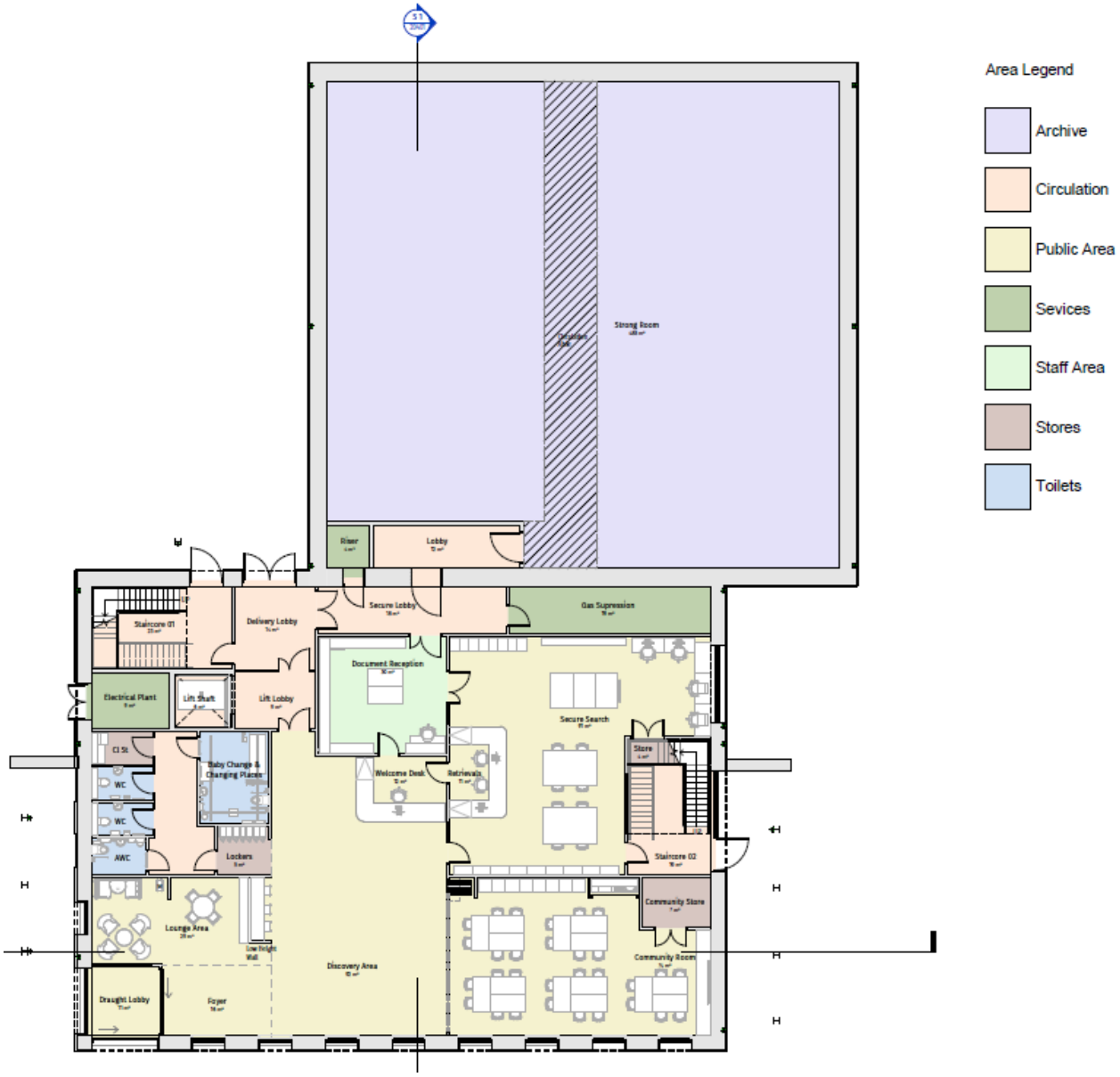
The first floor will have a conservation studio / store, collections care, offices, staffroom, reprographics, isolation room, lobbies, plant rooms and strong room.

There will be two protected staircases and a lift that will allow access from ground to first floor, this floor will only be accessible to permitted persons. Disabled refuge points will be provided within the staircase or the protected lobby leading into it.

The roof will be able to be accessed for maintenance via a fixed ladder in the plant room and a secondary means of escape which will discharge into stair core 1.

Access to the site will be via a new car park, the access point to the rear of the building is located in close proximity to where the fire appliances will make their attendance.

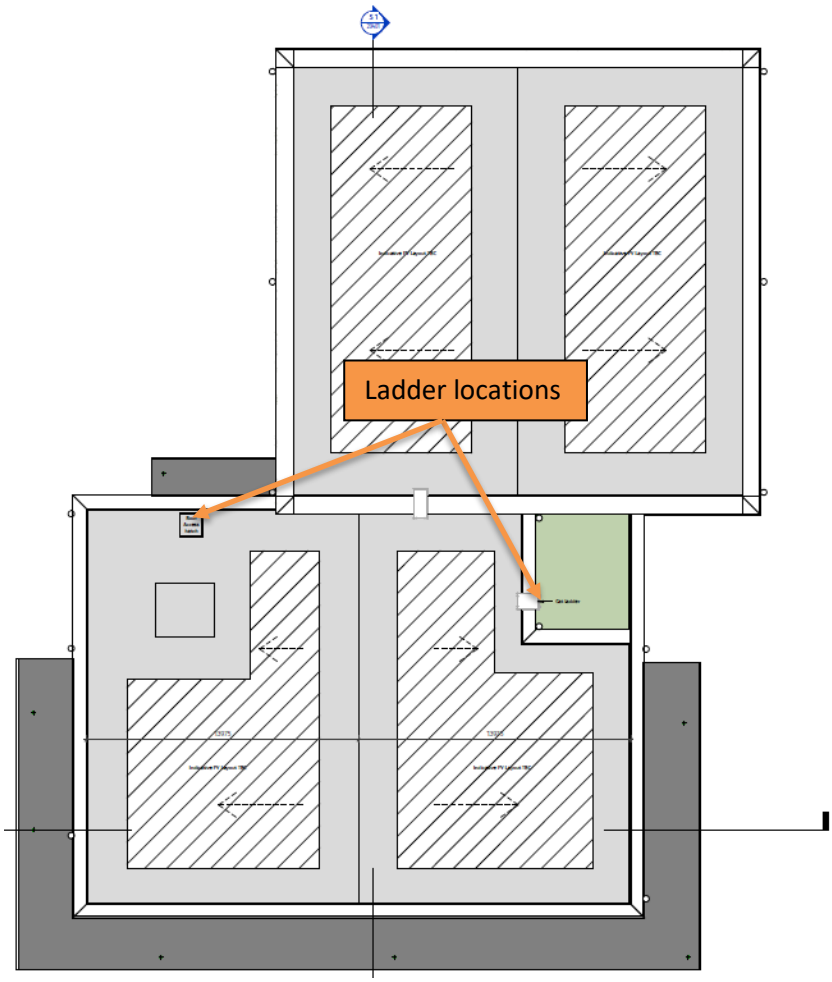
Ground floor



First floor


Area Legend
Archive
Circulation
Sevices
Staff Area
Stores
Toilets
Strongroom
Riser
Lobby
Staircore 01
Refuge Area
Delivery Lobby
Secure Lobby
Plant
Plant Balcony
Store
Holding / Isolation
Services Room
Lift Shaft
Lift Lobby
Staffroom
Staff AWC
Reprographics
Flexible Office Space
Server
Staircore 02
Refuge Area
Staff WC
Main Office
Collections Care
Conservation Studio

Roof Plan



Site layout

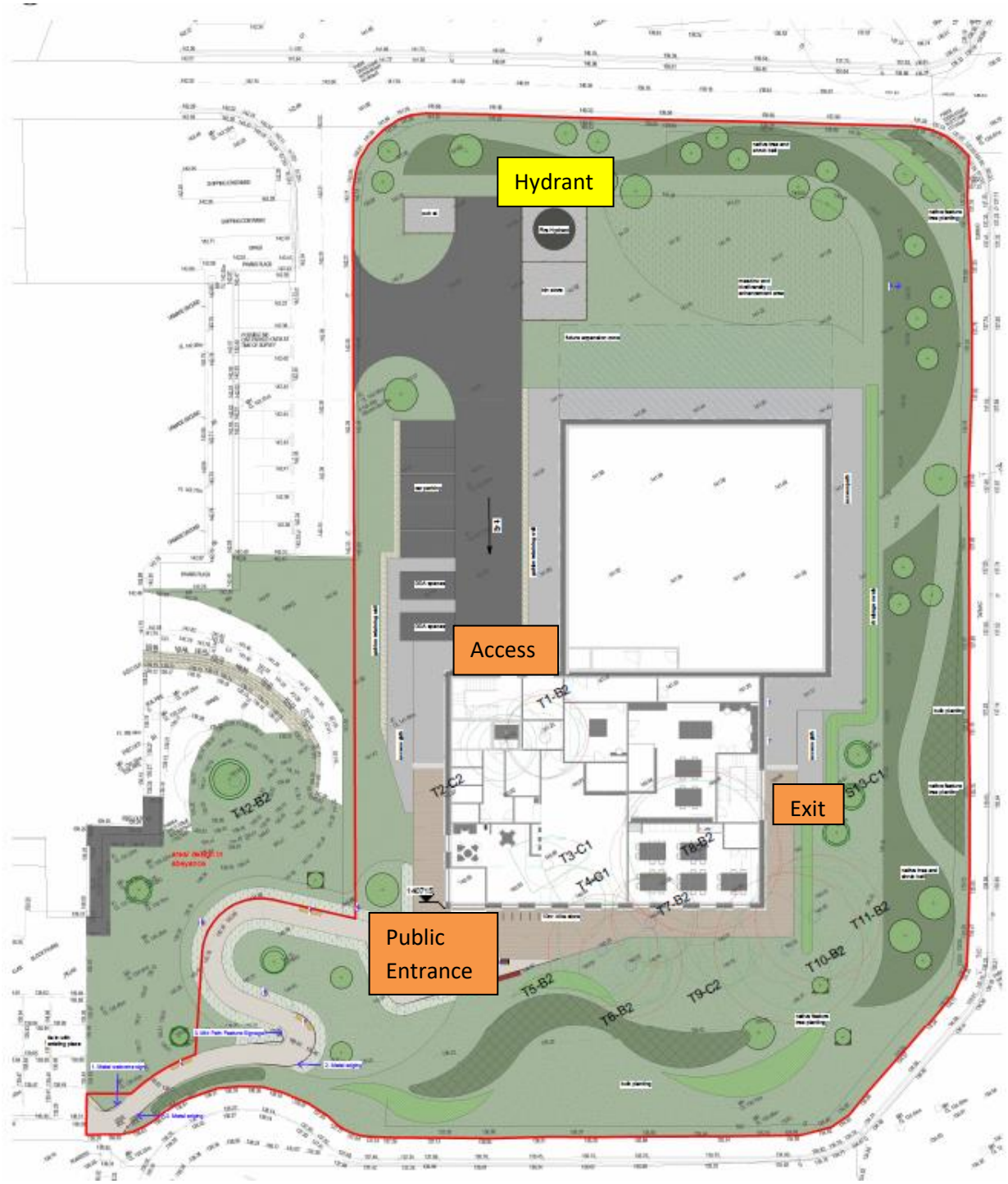


Figure 2 - Floor plans

Purpose Groups

Title	Group / Risk Profile	Purpose for which the building or compartment of a building is intended to be used
Assembly and Recreation	5 / A1, A2, A3 & B2	Storage and education

Table 4 - Purpose groups

Means of Escape

Evacuation Principle

The general building evacuation philosophy for the properties is based on the concept of simultaneous evacuation policy, whereby the occupiers of the premises evacuate on activation of the BS 5839-1 fire detection system. If a fire were to occur or the fire alarm were activated,

1) Persons will make their way to their nearest available exit.

2) The travel distance from any part of the premises to a final exit or protected route is within agreed guidance levels or have been rationalised (see horizontal MOE section for further details).

3) At the ground floor level, persons can reach a final exit door without having to leave a protected route before reaching ultimate safety in fresh air.

As there is a simultaneous evacuation policy in place, staircase calculations have been carried out (see vertical escape). It is derived from the calculations that the upper floor is provided with adequate widths of staircase to facilitate a simultaneous evacuation.

Fire Detection and Alarm

A BS 5839-1 fire alarm and detection system will cover the premises. The design of the fire alarm will be to BS5839 Part1 L2 specification and will be monitored via a link to an alarm receiving centre.

This specification covers:

- Manual break glass call points adjacent to final / storey exit doors.
- Smoke detection on the means of escape.
- Smoke/ heat / multipoint detection within all rooms including the strong room.
- Smoke / heat detection covering high-risk rooms and risers.
- Sounders are located throughout the premises and on the roof.
- Fire alarm panel located by the main entrance.

Interfaces – The fire alarm will be interfaced with the following as a minimum

- Lift – Ground on actuation of the fire alarm
- Door security – Designated Fire Exits to fail open on actuation or loss of power
- Services – To be covered by the M&E design.

Emergency Lighting

Emergency lighting will be provided throughout the building in accordance with BS 5266-1:2016. Emergency lighting – Part 1: Code of practice for the emergency lighting of premises. Emergency lighting will be provided in escape routes, open areas, high-risk areas and strategic points of importance including:

- Within rooms and corridors of the building
- Near each exit door intended to be used in an emergency and outside the premises to a place of safety.
- Within the two staircases so that each flight or change in level receives direct light.
- Mandatory emergency exit and safety signs and near to each piece of fire-fighting equipment / call point.
- Disabled toilets and all facilities exceeding $8m^2$

"Near" is normally considered to be within 2m measured horizontally

Emergency Escape Signage

All exits and exit routes will be clearly marked with appropriate escape signs so that the occupants can easily determine their most direct route to a place of safety in the event of an emergency.

Fire escape signs are to be provided to guide occupants from any point in a building, via a place of relative safety (the escape route) to the place of ultimate safety (outside the building). Exit and directional signage should be provided in accordance with the requirements if BS 5499: Part 4 and conform to BB EN ISO 7010.

Signage is provided to identify the available escape route/routes from each location within the building. To achieve this, the following principles have been adopted.

- Escape routes or doorways leading to a means of escape should be visible from any place within a room.
- If it is not possible to see the direct means of escape, then intermediate/additional signage to be considered.
- All changes of direction in corridors, stairways and open spaces forming part of the means of escape will be marked with intermediate signs.

Signs should be sited at the same height throughout the escape route, so far as is reasonably practicable.

Suppression systems

Sprinklers – Given the use, occupancy and size of the premises, there are no requirements to provide a water suppression system within the premises.

Gas suppression – Gas suppression will be installed within the strong room. The gas will be stored in a dedicated room located at ground floor and the gas will be carried into the strong room within a piped system. The design will be installed to align with BS EN 15004 or equivalent.

Occupancy level

The occupancy has been calculated by reviewing the floor area and using Table 9 of BS9999-2017. It is acknowledged that the occupancy in the majority of areas will not achieve those offered in the table below; however, for the purposes of the evacuation strategy, the figures below will be used to ensure the means of escape are compliant.

Occupied room	Size	Maximum occupancy
Ground Floor		
Draught Lobby /Foyer	24m^2	19
Lounge Interpretation	27m^2	27
Self service area	88m^2	44
Community room	72m^2	36
Reception	11m^2	3
Document reception	30m^2	5
Secure search	90m^2	12
Retrievals	10m^2	2
Gas Suppression	19m^2	2 – Authorised persons only
Secure lobby	18m^2	9
Delivery lobby	14m^2	7
Incoming services	7m^2	2 – Authorised persons only
Strong room / airlock	501m^2	18 - Authorised persons only
Total– 183 persons		
First floor – Authorised persons only		
Main office	43m^2	12
Staffroom	42m^2	20
Delivery lobby	14m^2	7
Lift lobby	11m^2	5
Collections care	37m^2	9
Conservation store	16m^2	2
Conservation studio	88m^2	44
Server	11m^2	2
Flexible office space	18m^2	4
Reprographics	26m^2	4
Holding/isolation	16m^2	8
Secure lobby	13m^2	6
Plant	37m^2	2
Plant balcony	34m^2	2
Strong room / airlock	501m^2	18 - Authorised persons only
Total– 136persons		

Table 5 – Occupancy levels

BS9999-2017

To utilise BS9999-2017, the first item which must be reviewed is the risk profile of the persons within the premises. This is undertaken by reviewing the occupancy characteristic and the potential fire growth rate.

First floor and staff areas of the ground floor (Excluding the strong room).

Occupancy characteristic - Based on Table 2 of BS9999:2017, the occupancy would be considered as being characteristic A. These are people who are awake and aware of their surroundings.

Table 2 Occupancy characteristics

Occupancy characteristic	Description	Examples
A	Occupants who are awake and familiar with the building	Office and industrial premises
B	Occupants who are awake and unfamiliar with the building	Shops, exhibitions, museums, leisure centres, other assembly buildings, etc.

Table 6 - BS9999 Table 2

Fire growth rate - Based on Table 3 of BS9999:2017, a medium fire growth rate will be utilised within this fire strategy. This is due to the mix of offices and restoration rooms.

There are areas that are considered as being of a high fire risk (plant rooms, stores, etc.); however, these are enclosed in fire-resistant construction.

Table 3 Fire growth rates

Category	Fire growth rate [A]	Fire growth parameter [B] kJ/s³	Description	Typical examples [C]
1	Slow	0.003	Evenly distributed low level fire load, small discrete packets of fuel or material of limited combustibility [D]	Reception areas, concourses (without concession outlets) and halls with limited fire load such as sports stadia and foyers
2	Medium	0.012	Evenly distributed low to mid-level fire load comprising a mix of combustible materials	Offices, lounges, classrooms, auditoria, seating areas, galleries and car parks [E]

Table 7 - BS9999 Table 3

The Strong room.

Occupancy characteristic - Based on Table 2 of BS9999:2017, the occupancy would be considered as being characteristic A. These are people who are awake and aware of their surroundings.

Fire growth rate - Based on Table 3 of BS9999:2017, a slow fire growth rate will be applied to this area. This is due to the client specifying that whilst there are large volumes of paper, there will be no ignition sources other than specialist low voltage LED lighting. As such, the potential for fire has been significantly reduced. In addition, gas suppression is to be provided.

Plant spaces.

Occupancy characteristic - Based on Table 2 of BS9999:2017, the occupancy would be considered as being characteristic A. These are people who are awake and aware of their surroundings.

Fire growth rate - Based on Table 3 of BS9999:2017, a high fire growth rate will be applied to this area.

Ground floor (public area).

Occupancy characteristic - Based on Table 2 of BS9999:2017, the occupancy would be considered as being characteristic B. These are people who are awake but potentially unaware of their surroundings.

Fire growth rate - Based on Table 3 of BS9999:2017, a slow fire growth rate would normally be applied; however, given that there is a meeting room in this area, the fire growth rate will be set at medium.

Risk profiles

Strong room – All persons will be awake, familiar with their surroundings and whilst there will be a large fuel load, restrictions on ignition sources has been undertaken. In addition, gas suppression is proposed for the strong room - A1 risk profile

First floor – This will only be occupied by the staff working in the building – A2 risk profile

Plant spaces - These will only be occupied by authorised staff / contractors– A3 risk profile

Roof – Accessed infrequently by authorised persons only.

Ground floor public area – Open to the public and there will also be staff. – B2 risk profile

Horizontal Escape

Limitations on travel distances			
Risk Profile	**Use of premises or part of premises**	**Travel in one direction**	**Travel in more than one direction**
A1	Storage / Strong room	26m	65m
A1 – With 15% variation due to the fire alarm being L2 specification	Storage Strong room – **See rational for acceptance on the next page.**	29.9m Guidance 33.5m Proposed	N/A
A2 – Minimum package	Offices / meeting rooms / circulation spaces	22m	55m
B2 – Minimum package	Offices / meeting rooms / circulation spaces	20m	50m
A3 – Minimum package	Plant rooms / stores / electrical distribution rooms	18	45

Table 8 - ADB Limitations on travel distances

The areas shaded in green are the travel distances used within this project. The area highlighted in yellow has had a rationale applied.

First floor – The travel distances from all areas (other than the strong room) are compliant with 20m for a single direction or 50m where 2 directional travel is permitted.

Ground floor occupied areas– The travel distances from all areas are compliant with 20m for a single direction or 50m where 2 directional travel is permitted.

Plant rooms – Travel distances are compliant with the requirements of BS9999 Table F1.

Strong room - The travel distances from the furthest point to the airlock door is over guidance as travel from the furthest corner of the room to the door is circa 33.5m; whereas guidance states that the travel distance should be 29.9m for a single direction.

Rationale for acceptance – A single means of escape (with no external final exits) has been provided due to security restrictions and also to maintain the correct atmospheric conditions required for the artifacts. The following have been considered to ensure the means of escape are sufficient.

- Whilst there are combustibles within the strong rooms, there will be no sources of ignition.
- All lighting will be low voltage and selected to be appropriate for the strong rooms use.
- Persons in the strong room are authorised to be in the area, inducted and aware of their surroundings. When reviewed from a time perspective, the additional 3.6m will take a further 3seconds.
- The exit route will be free from any obstructions, on level ground and there are dedicated pedestrian routes.

Given the above, it is considered that the means of escape are considered satisfactory in this instance.

Exit widths

The widths of escape routes and exits have been calculated using the guidance from Section 16.6 and Tables 12 and 16 of BS9999 - 2017.

Table 12 Widths of escape routes and exits	
A1	3.3mm per person
A2	3.6mm per person
A3	4.6mm per person
B2	4.1mm per person

Table 9 - Widths of escape routes and exits

The review of the final exits has been covered, those being exits that are larger than 1050mm in width and those that are between 850mm-1050mm.

Ground Floor

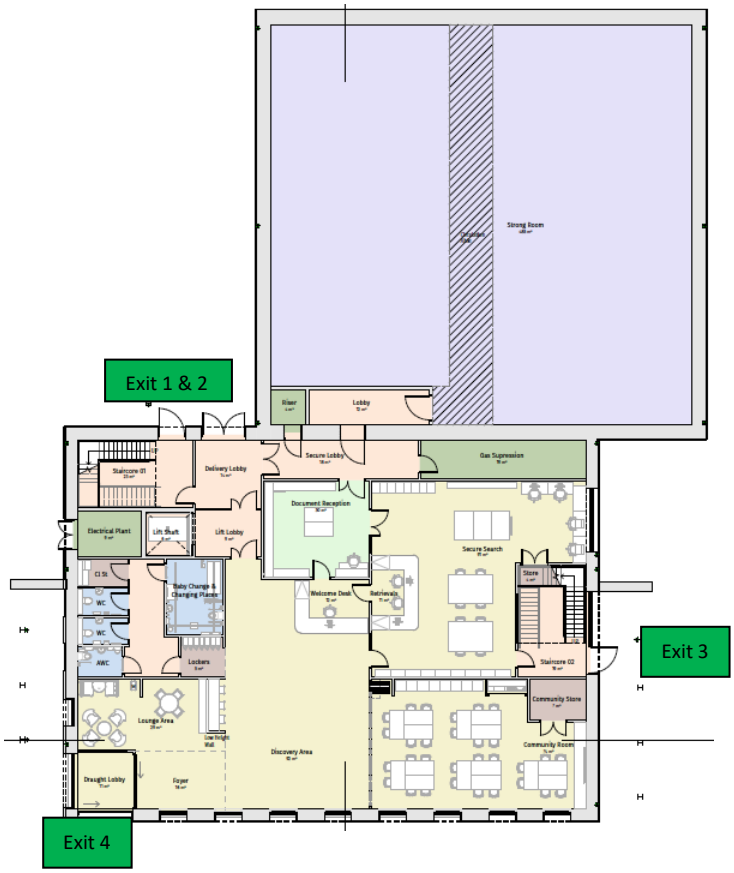


Figure 3 - Exit locations

Exits between 850mm-1050mm - 16.6.1 – The following requirements are considered as being the minimum width.

- Not less than 850mm if unassisted wheelchair access is required.
- Not less than 800mm for any risk profile.

To review the exits that are less than 850mm, the following calculation has been used

$$n=500/m$$

- n = Exit number
- m = Minimum exit capacity per person.

Capacity of 850mm door widths		
A1	3.3mm per person	151
A2	3.6mm per person	138
A3	4.6mm per person	108
B2	4.1mm per person	121persons

Table 10 - Exits less than 1050mm

Exits larger than 1050mm - Exits larger than 1050mm are calculated differently to the previous section; these exit dimensions are divided by the exit capacity per person. The tables provide a full review.

A1 Areas - Strong rooms	Occupancy	Number of exits provided	Available exit capacity
Ground floor	10 Persons	1 x 1800mm	60 – Single means of escape
First floor	10 Persons	1 x 900mm door leading to staircase 1	60 – Single means of escape

A2 Areas	Occupancy	Number of exits provided	Available exit capacity
Ground floor	Circa 36 Persons	1 x 1800mm 1 x 900mm	Discounted 138
First floor	136 Persons	1 x 900mm 1 x 900mm	Discounted 138

Note – The expected occupancy of floor 1 is significantly lower than those list in the table above. The occupancy figure of 136 includes those that are in the strong room and plant areas.

A3 areas	Occupancy	Number of exits provided	Available exit capacity
Plant rooms	4max	1 x 850mm	60 – Single MOE

B2 Areas	Occupancy	Number of exits provided	Available exit capacity
Ground floor	134 Persons	1x 1200mm 1 x 1200mm 1 x 900mm	Discounted 292 121 persons Total exit capacity - 413

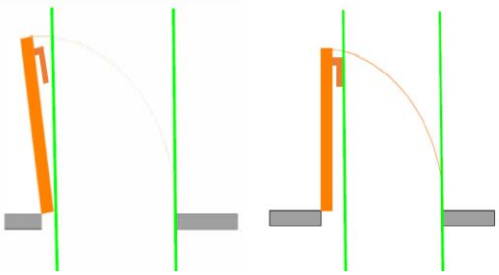
Table 11 - Exit Capacities by Risk Profile

Note – The main entrance is also considered as a final exit for persons in the foyer and in the meeting room. As this is a sliding door, this will be designed to default to the open position on actuation of the fire alarm (when premises are occupied). The door will either fail safe open or will have an integral secondary power supply to maintain the operation of the door.

Following review of the exits, it can be seen that there is sufficient exit capacity to support the proposed occupancy.

Doors on escape routes

The cross-corridor door can be hung in either direction.



All doors on escape routes should be hung to open not less than 90 degrees (see figure 5).

Any door that opens towards a corridor or a stairway should be sufficiently recessed to prevent its swing from encroaching on the effective width of the stairway or corridor.

Figure 4 - Effective door width

Vision Panels

Vision panels are to be installed in cross-corridor doors and lobby doors to alert people approaching a door to the presence of another person on the other side.

If a door has a single viewing panel, the minimum zone of visibility should be between 500 mm and 1 500 mm from the floor. If a door has multiple viewing panels, the minimum zone of visibility should not be interrupted by opaque areas that obstruct more than 350 mm of the vertical height of the zone. Where the minimum zone of visibility is interrupted, there should be a vision panel at both the top and bottom of the zone. Vision panels should be positioned centrally on the door or offset towards its leading edge (see Figure 13). Each individual viewing panel should be not less than 100 mm in width.

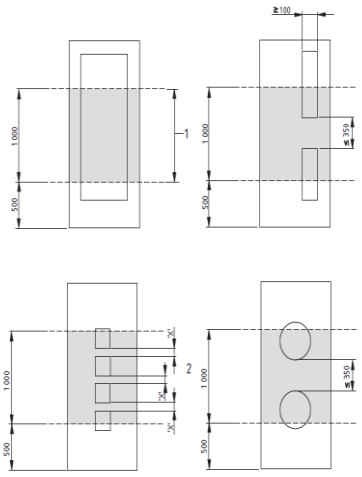


Figure 5 - Vision panels BS 9999

Vertical Escape

The procedures adopted within the premises in the unlikely event of an incident is that of a simultaneous evacuation strategy. The principle of a simultaneous strategy is that if a fire occurs anywhere within the property, all occupiers leave and await a response from the local Fire and Rescue Service.

The premises will have 2 x fire-protected internal staircase, these will be reviewed.

Roof - There will be a fixed ladder giving access to the roof (authorised persons only) and an additional ladder that can be used as a secondary means of escape, this is located in staircase 1.

Stair number	Occupancy	Size	Stair capacity
Staircase 1	136	1200 / 4.5mm per person	266
Staircase 2	136	1200 / 4.5mm per person	266

Table 12 - Staircase capacities

Note – One stair must be discounted leaving a single stair with a capacity of 266 persons.

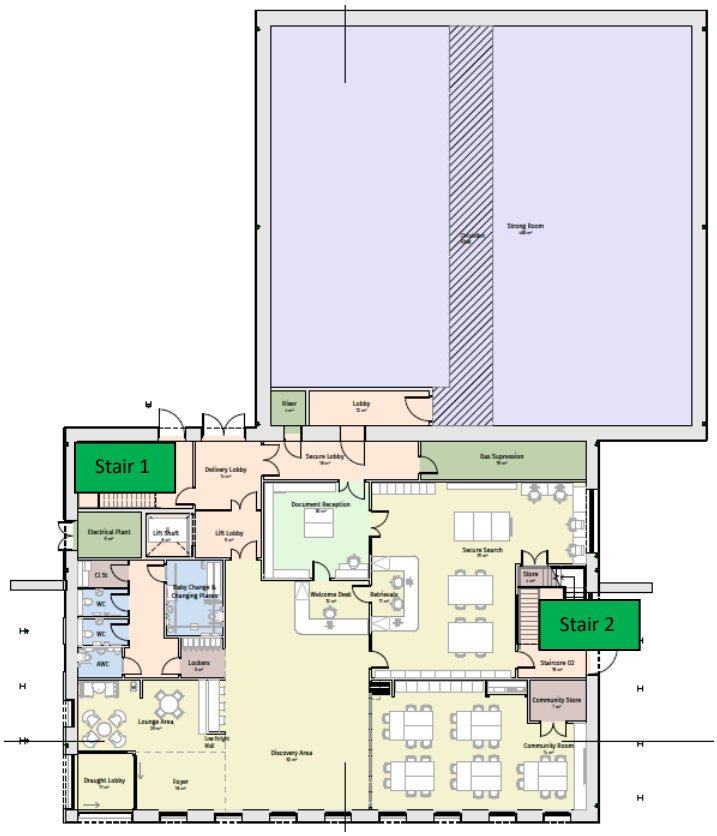


Figure 6 - Staircase locations

Secondary power supply

The fire alarm and detection system shall be a BS5839-1 L2 system, which requires each device to be mains powered, with a tamper-proof, integral battery backup as a secondary supply.

The emergency lighting system will be installed to BS5266 and will include integral tamperproof batteries.

The proposed gas suppression system will have its own tamper proof battery as a secondary supply.

The sliding front door will have a secondary integral power supply.

Internal Fire Spread (linings)

The choice of materials for walls and ceilings can significantly affect the spread of a fire and its rate of growth, even though they are not likely to be the materials first ignited; it is particularly important in circulation spaces where the rapid spread of fire is most likely to prevent occupants from escaping. All surface finishes and internal linings are to be designed in accordance with BS9999 Table 33. A summary of the main features and classification requirements are provided in the Table below.

Location	European Class
Circulation Spaces	B-s3, d2
Other rooms	C-s3, d2
Small rooms max 30m^2 non-residential accommodation	D-s3, d2

Table 13 - Table 33 of BS9999

Structural Requirements

Premature failure of the structure can be prevented by provisions for load-bearing elements of structure to have a minimum standard of fire resistance, in terms of resistance to collapse or failure of load bearing capacity. The purpose of providing the structure with fire resistance is:

- To minimise the risk to occupants.
- To reduce the risk to firefighters who may be engaged in search and rescue operations.
- To reduce the danger to people in the vicinity of the building.

All areas except the strong room - As the premises is 9.6m in height, all exposed elements of structure are to be protected by encapsulation or intumescent coverings affording 60 minutes fire protection.

Strong room – The strong room has been designed to be fire protected for 240mins; as such, the elements of structure will also be protected for this period as a minimum.

All internal structures will be designed and constructed with materials that conform to BS9999 Table 23.

Table 23 Fire resistance periods for elements of structure (independent of ventilation conditions)

Risk profile	Minimum periods of fire resistance, in minutes					
	Depth below access level of lowest basement		Height [A] of top occupied storey above access level			
	More than 10 m	Not more than 10 m	Not more than 5 m	Not more than 18 m	Not more than 30 m	More than 30 m
A1	60	60	30	60 [B]	90 [C]	120
A2	90 [C]	60	30	60	90	120
A3	Not allowed	120 [D]	60	90	90	120
B1	60	60 [B]	30	60	90 [C]	120
B2	90 [C]	60	30	60	90	120
B3	Not allowed	120 [D]	60	90	90	120

Table 14 - Table 23 of BS9999

Compartmentation

The compartmentation of certain parts of the building will reduce the risk of fire spread and the impact of a fire within the building. Passive compartmentation would not normally be provided if guidance contained within BS9999 Table 28 was followed; however, due to the nature of the premises and the historical importance of the items contained within, the compartmentation will be enhanced.

Table 28 Maximum dimensions of compartments

Risk profile	Single storey	Multi storey	
	Maximum floor area m²	Height of top floor m	Maximum area of any floor m²
A1	No limit	No limit	No limit
A2	No limit	<30	No limit
		≥30	4 000
A3	No limit	<18	14 000
		18 to 30	4 000
		≥30	Not acceptable
A4 [a)]	Not applicable [a)]	Not applicable [a)]	Not applicable [a)]
B1	No limit	No limit	No limit
B2	No limit	<18	8 000
		No limit	4 000

Table 15 - Table 28 of BS9999

A summary of the compartmentation can be found below:

Strong room

- 4 hours fire resistance to separate strong room from rest of the premises
- 4 hours fire resistance around the airlock, made up of 2 x 120min walls
- 4 hour fire resisting floors

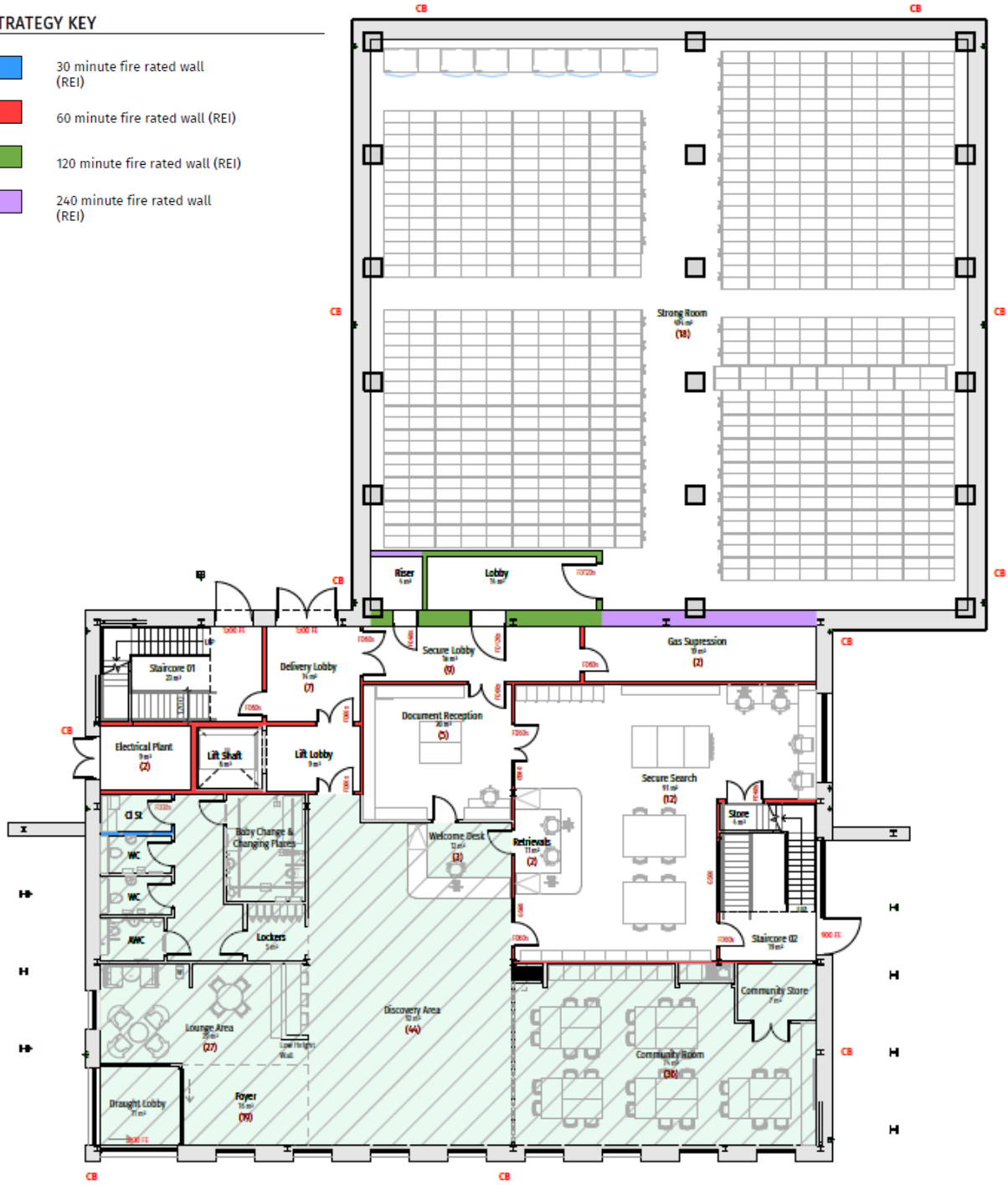
Other areas

- 60 minute fire resistant floor between ground and first floor
- 60 minutes fire resistance around the lift and lobby
- 60 minutes fire resistance around the staircases
- 60 minutes fire resistance around the following rooms
    - Secure search
    - Secure lobby
    - Delivery lobby
    - Gas suppression
    - Incoming services
    - Plant room
    - Server
    - Reprographics and isolation room
- 30 minutes fire resistance around the cleaners store

Ground floor

FIRE STRATEGY KEY

- 30 minute fire rated wall (REI)
- 60 minute fire rated wall (REI)
- 120 minute fire rated wall (REI)
- 240 minute fire rated wall (REI)



First floor

FIRE STRATEGY KEY

- 30 minute fire rated wall (REI)
- 60 minute fire rated wall (REI)
- 120 minute fire rated wall (REI)
- 240 minute fire rated wall (REI)

Fire Door Summary

All fire doors indicated with suffix (s) should be fitted with intumescent strips and cold smoke seals. The following sizes of strips and seals should be fitted to the frame or fire door and be an approved tested system.

Fire door rating	Intumescent strip and Cold Smoke seal sizes
FD30s	15mm x 4mm
FD60s	20mm x 4mm or two 10mm x 4mm strips
FD120s	Specialised design to cover the fire safety and security elements.

Table 16 - Intumescent strip and Cold Smoke seal sizes

Note - s indicates intumescent strips and cold smoke seals

Doors	Fire Rating of the doors	Self-closing devices required
Staircase doors	FD60s	Yes
Corridor doors	FD60s	Yes
Lobby doors	FD60s	Yes
High-risk rooms on escape routes	FD60s	No – Keep locked shut
Cleaners store	FD30s	No – Keep locked shut
Strong room doors	FD120s	Yes

Table 17 - Fire door summary

Self-closing devices – all self-closing devices installed must conform to BS EN 1154

Ironmongery – Doors providing egress from the premises will be provided with ironmongery/furniture to ensure persons can evacuate in a safe manner.

Doors which will be used solely for evacuation purposes will have a push bar installed, along with the appropriate signage.

Protection of Openings and Fire Stopping

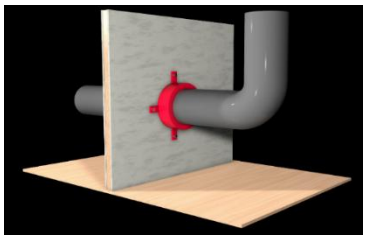
If a fire-separating element is to be effective, every joint or imperfection of fit, or opening to allow services to pass through the element, should be adequately protected by fire collars, fire-resistant sealant or intumescent fire stopping so that the fire resistance of the element is not impaired.

All pipe work that penetrates a compartment wall or floor will be fire-stopped in line with clause 32.5.14 and the table overleaf.

Pipes that pass through a fire-separating element (unless the pipe is in a protected shaft), should meet the appropriate provisions in alternatives A, B or C.

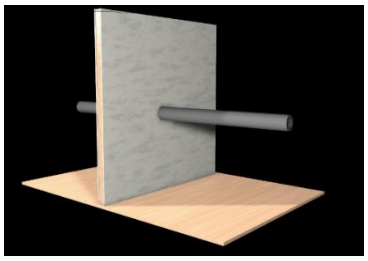
Alternative A: Proprietary seals (any pipe diameter)

Provide a proprietary sealing system, which has been shown by test to maintain the fire resistance of the wall, floor or cavity barrier.



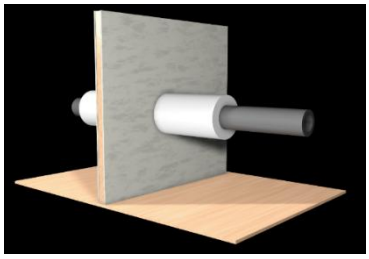
Alternative B: Pipes with a restricted diameter

Where a proprietary sealing system is not used, fire-stopping may be used around the pipe, keeping the opening as small as possible. The nominal internal diameter of the pipe should not be more than the relevant dimension given in the table below.



Alternative C: Sleeving

A pipe of lead, aluminium, aluminium alloy, fibre-cement or uPVC, with a maximum nominal internal diameter of 160mm, may be used with a sleeving of non-combustible pipe as shown below.



Maximum nominal internal diameter of pipes passing through a compartment wall / floor			
Situation	Pipe materials and maximum nominal internal diameter (mm)		
	(a) Non-combustible materials	(b) Lead, aluminium, aluminium alloy, uPVC[2], fibre cement	(c) Any other material
1. Structure (but not a wall separating buildings) enclosing a protected shaft which is not a stairway or a lift shaft	160	110	40
2. Compartment wall or compartment floor	160	160 (Stack Pipe) 110 (Branch Pipe)	40
3. Any other situation	160	40	40

Note:

1. Any non-combustible material (such as cast iron, copper or steel) which, if exposed to a temperature of 800°C, will not soften or fracture to the extent that flame or hot gas will pass through the wall of the pipe.
2. uPVC pipes complying with BS 4514:2001 and uPVC pipes complying with BS 5255:1989.
3. These diameters are only in relation to pipes forming part of an above-ground drainage system and enclosed as shown in Diagram 38. In other cases, the maximum diameters against situation 3 apply.

Table 18 – BS9999 Table 31 - Maximum nominal internal diameter of pipe passing through a compartment wall/floor

Ventilation and air conditioning.

Ventilation ductwork is proposed in the premises and this has the potential to breach fire-stopping lines. To meet compliance, the client has the option of utilising the following methods in all areas except the strong room.

- Method 1 – Thermally activated fire dampers.
- Method 2 – Fire resisting enclosures.
- Method 3 – Protection using fire-resistant ductwork.
- Method 4 – Automatically activated fire and smoke dampers triggered by smoke detection.

Note – If a section of ductwork passes through either staircase or protected means of escape but does not open into it, methods 2 or 3 will be used.

If the section of ductwork opens into the staircase or a fire-protected corridor as it passes through, method 4 (Fire and smoke dampers linked to smoke detection) will be utilised.

Strong room– Given the importance of the strong room, this will have its own ventilation system to ensure all items are within a controlled climate.

Note – Special consideration will be required on the M&E ventilation design of the airlocks giving access to the strong room.

Cavity Barriers

The provision of cavity barriers in concealed spaces such as walls, floors and ceiling cavities will be in accordance with Clause 33.1 and figure 35. Cavity barriers shall offer a minimum of 30 minutes fire resistance in terms or integrity and 15 minutes fire resistance in terms of insulation.

Should any wall, floor or ceiling be of a greater fire resistance than that of 30 minutes the fire stopping detail should be the same fire resistance as the wall, floor or ceiling forming the compartment line.

It is important to continue the compartment walls up through a ceiling or roof cavity to maintain the standard of fire resistance, therefore compartment / fire resisting walls should be carried up full storey height to the compartment floor or to the roof as appropriate.

Sub-division of any void should be in line with Table 32 and Clause 33.2 and therefore, any void greater than 20m should be sub-divided.

Table 32 **Maximum dimensions of cavities in non-domestic buildings**

Location of cavity	Class of surface/product exposed in cavity (excluding the surface of any pipe, cable or conduit, or any insulation to any pipe)		Maximum dimensions in any direction
	National class	European class	m
Between a roof and a ceiling	Any	Any	20
Any other cavity	Class 0 or Class 1	Class A1; or Class A2-s3, d2; or Class B-s3, d2; or Class C-s3, d2	20
	Not Class 0 or Class 1	Not any of the above classes	10

NOTE 1 The national classifications do not automatically equate to the equivalent classifications in the European column, therefore products cannot typically assume a European class unless they have been tested accordingly.

NOTE 2 When a classification includes "s3, d2", this means that there is no limit set for smoke production and/or flaming droplets/particles.

Table 19 - BS9999 Table 32

Figure 35 **Provisions for cavity barriers**

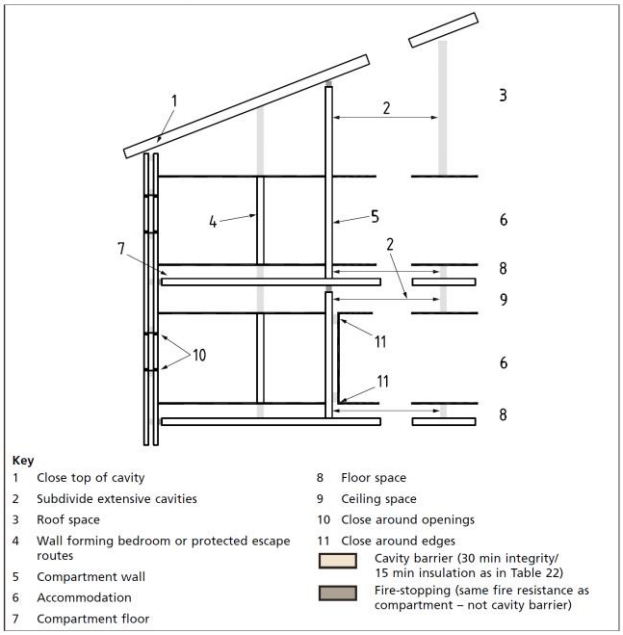
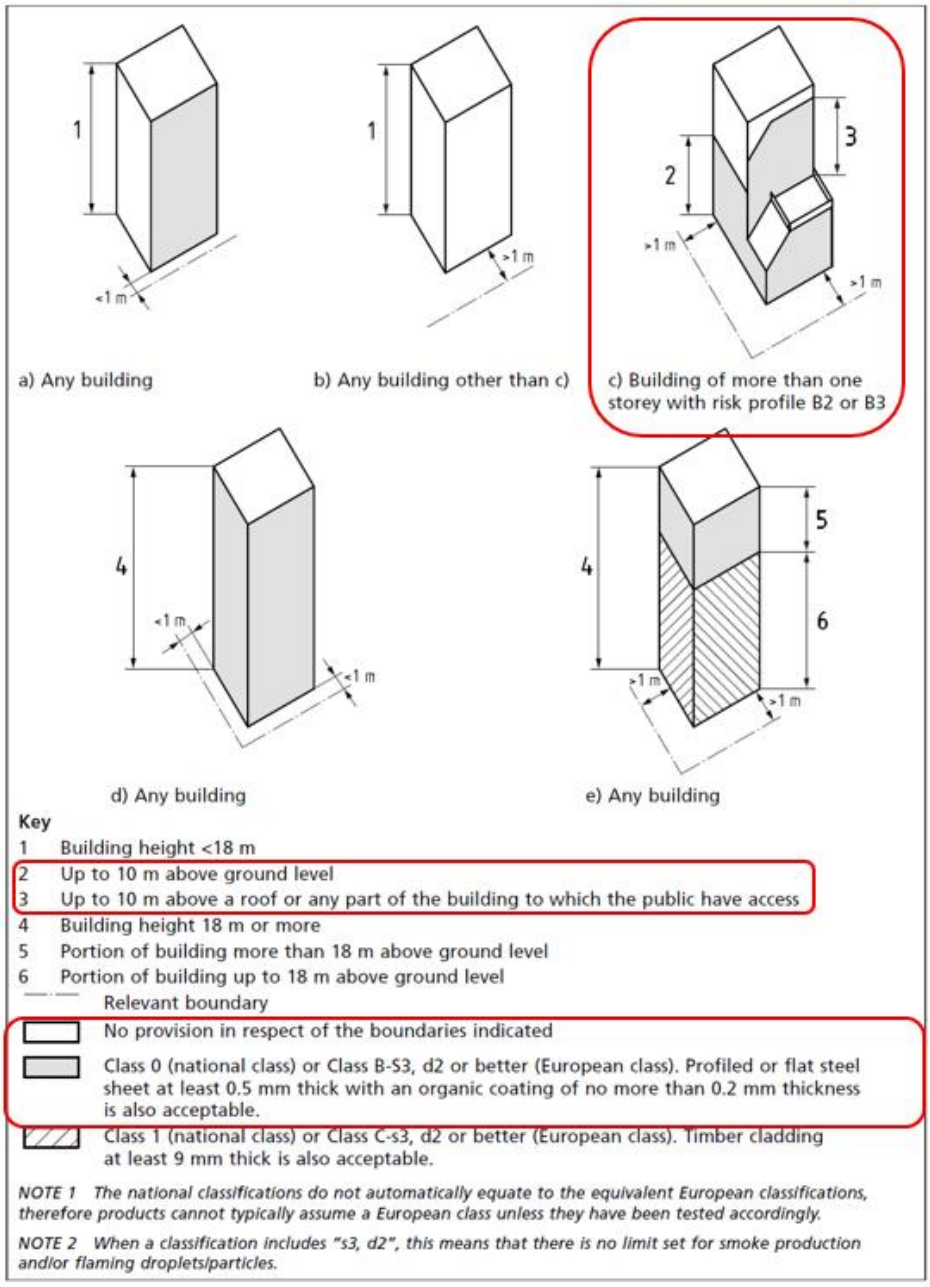


Figure 3 - Typical examples of where cavity barriers and fire stopping are required

External Fire Spread – External wall requirements

External wall surfaces will align with Clause 35.5 and Figure 47b of BS9999.

Figure 47 **Provisions for external surfaces of walls**



Key

1 Building height <18 m
2 Up to 10 m above ground level
3 Up to 10 m above a roof or any part of the building to which the public have access
4 Building height 18 m or more
5 Portion of building more than 18 m above ground level
6 Portion of building up to 18 m above ground level
Relevant boundary
No provision in respect of the boundaries indicated
Class 0 (national class) or Class B-S3, d2 or better (European class). Profiled or flat steel sheet at least 0.5 mm thick with an organic coating of no more than 0.2 mm thickness is also acceptable.
Class 1 (national class) or Class C-s3, d2 or better (European class). Timber cladding at least 9 mm thick is also acceptable.

NOTE 1 The national classifications do not automatically equate to the equivalent European classifications, therefore products cannot typically assume a European class unless they have been tested accordingly.

NOTE 2 When a classification includes "s3, d2", this means that there is no limit set for smoke production and/or flaming droplets/particles.

External Fire Spread – Boundary Distances

SPL Fire Safety have undertaken a review for the boundary distances utilising BR187 as a reference.

Location – The building will be adjacent to Theatr Clwyd, and access will be gained off Raikes Lane.

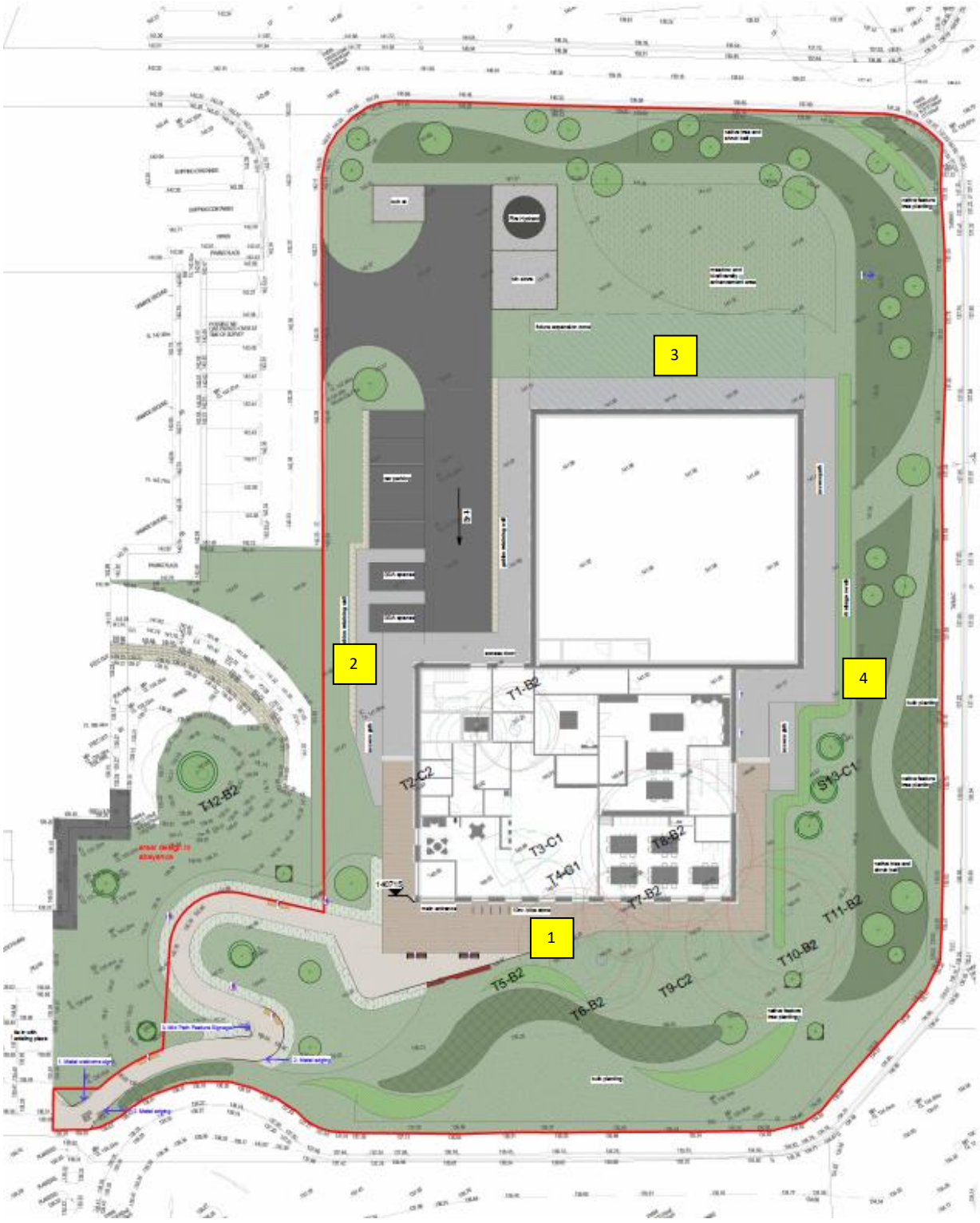
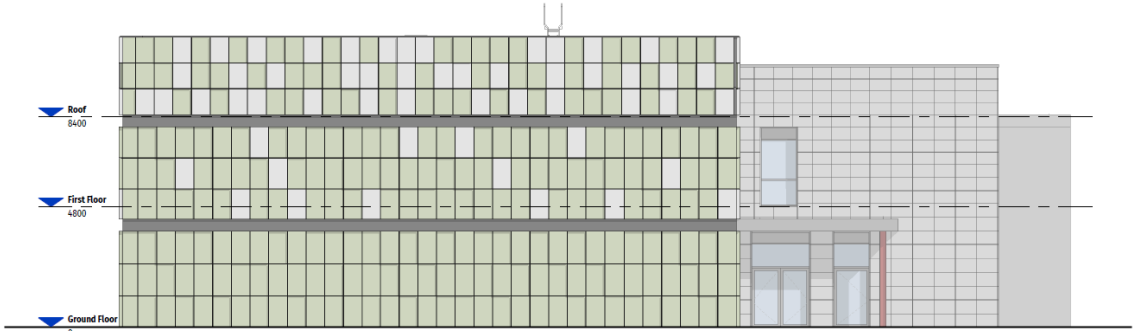


Figure 7 - Site location

Elevation 1 – South West

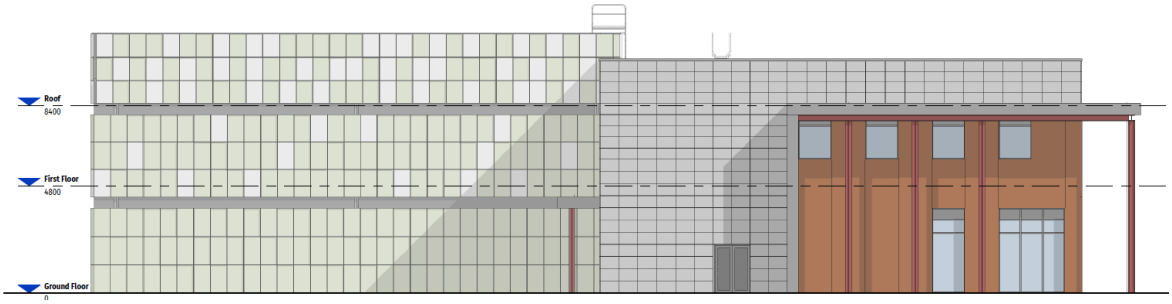
The front of the property faces the centres own grounds and there is a road beyond. The relative boundary is circa 25m from the project. The elevation facing the relative boundary is 29m in length and just under 9m to the roof.

Elevation 2 – North East



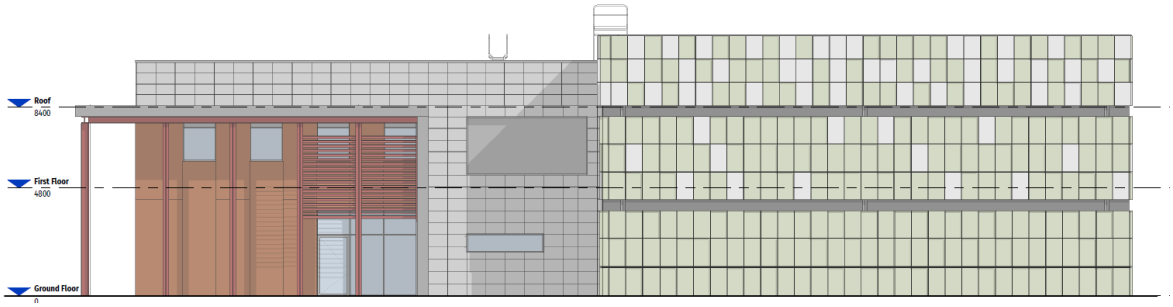
The side of the property faces Theatr Clwyd. The site boundary is circa 8.5m from the project. The elevation facing the relative boundary is 21m in length and just under 9m to the roof.

Elevation 3 – North West



The rear of the property faces the centres own grounds and there is a road beyond. The relative boundary is circa 30m from the project. The elevation facing the relative boundary is 29m in length and 9.6m to the roof.

Elevation 4 – South East



The side of the property faces the centres own grounds and there is a road beyond. The relative boundary is circa 20m from the project. The elevation facing the relative boundary is 24m in length and 9.6m to the roof.

Measurements

Elevation	Area (m^2)	Boundary distance (m)	Unprotected Area (m^2)	Unprotected area as %	Permitted unprotected area %
1	261	25m	36	13	100
2	189	8.5	15	7	100
3	225	30	0	0	100
4	216	20	0	0	100

Table 20 - Boundary distances

Conclusions - Following review of the external site boundaries, it is concluded that the boundary separation is acceptable.

External Fire Spread – Roof Requirements

Table 36 of BS9999 provides guidance on the required resistance to external fire spread- specifically, how roofing materials perform when exposed to fire from outside of the property (e.g. - flying embers, radiated heat from nearby buildings, etc.)

Given the use of the premises, the roof coverings will be $B_{Roof}(t4)$.

Table 36 Separation distances for roof coverings

Designation of covering of roof or part of roof [A]		Distance of roof from any point on relevant boundary			
National class	European class	Less than 6 m	At least 6 m	At least 12 m	At least 20 m
AA, AB or AC	$B_{ROOF}(t4)$	Acceptable	Acceptable	Acceptable	Acceptable
BA, BB or BC	$C_{ROOF}(t4)$	Not acceptable	Acceptable	Acceptable	Acceptable
CA, CB or CC	$D_{ROOF}(t4)$	Not acceptable	Acceptable [B], [C]	Acceptable [B]	Acceptable

Figure 8 Limitations on roof coverings

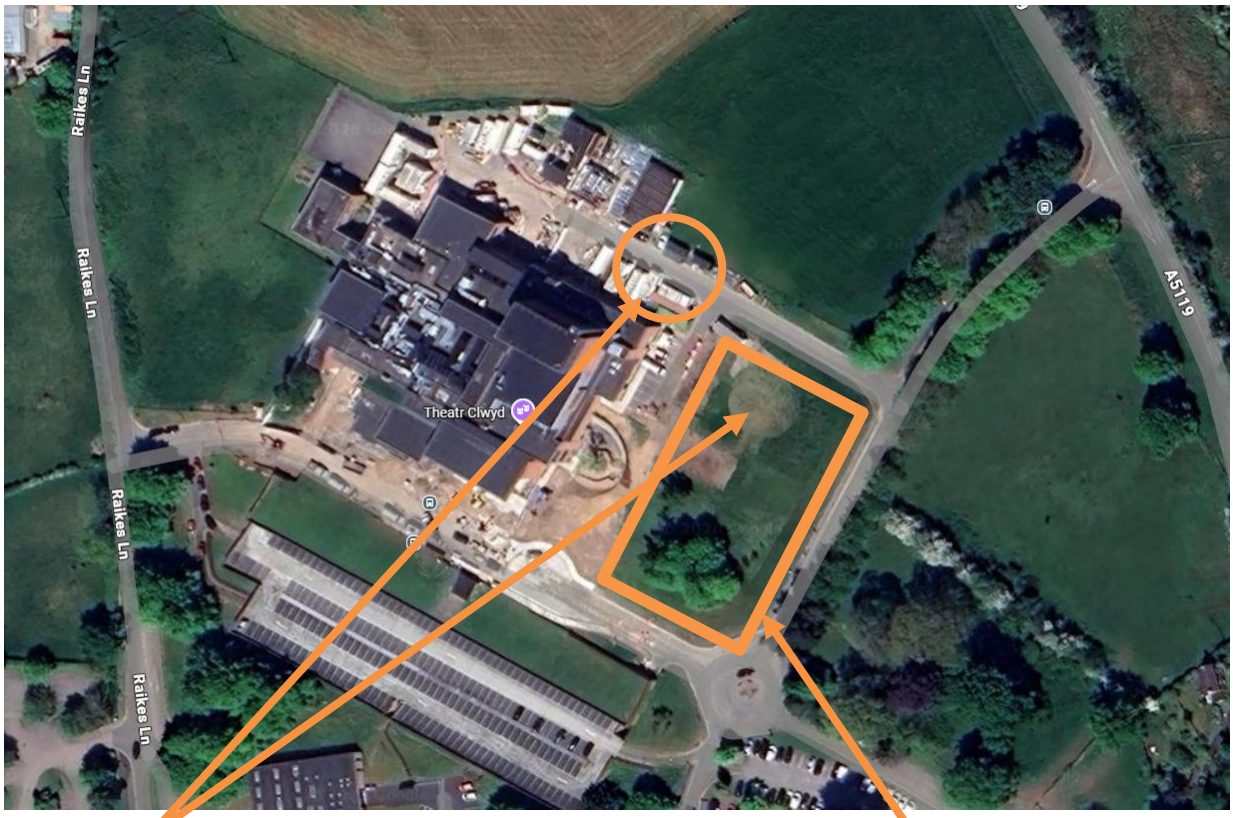
Access and Facilities – Fire Service

The building is set within its own grounds and is accessed off Raikes Lane.

Access – Fire Service access will be into the rear car park where access to the premises and upper floor can be made. There is also the option to park on the road and access the public entrance.

Access for fire appliances and for high reach appliances is greater than 50%, which is an enhancement over the requirements of BS9999-2017.

Water - Adequate water supplies for firefighting appear to be provided by existing hydrants that are situated within 100m of the building, with the nearest being shown in the diagram below.



Hydrant

Figure 9 - Site location

Fire Safety Management

Fire Safety Management Assumptions

The strategy contained herein has been written on the assumption that the building concerned will be properly managed. This section of the report defines the minimum standard of management that has been assumed as well as any specific management requirements or procedures that are required to validate the strategy defined in subsequent sections. Failure to comply with these requirements will invalidate this fire strategy.

Management Standards

The building should be properly managed and a Fire Safety Management Plan and Manual should be developed. Once the building is in use, the management regime should be maintained and any variation in that regime should be the subject of a suitable Fire Risk Assessment.

Regulatory Reform (Fire Safety) Order 2005

The Regulatory Reform (Fire Safety) Order came into force on the 1st October 2006. The order consolidates nearly all previous fire safety legislation revoking the Fire Precautions Act and the Workplace Regulations. The Order places a general duty of fire safety care on employees, occupiers and / or owners of businesses to provide and maintain adequate fire precautions throughout their premises.

The responsible person has a duty to carry out a fire risk assessment which must focus on the safety in case of fire of all 'relevant persons'. The risk assessment should pay particular attention to following areas:

- Identifying Fire hazards – sources of ignition, fuel, oxygen
- Identifying people at risk
- Reducing the risk
- Recording the findings
- Reviewing the outcomes

Arson reduction - The client will ensure that they put measures in place to minimise the potential for arson or accidental damage caused by fire. Where possible, ensure combustibles are remote from the premises. On this project, the bins are located away from the premises.

Security – Site security personnel will maintain and monitor unauthorised persons and also the security of the proposed premises.

Building Regulations 2010 (as applied in Wales).

The building regulations 2010 (as applied in Wales) and relevant technical guidance requires that, where building work involves the erection or extension of a relevant building, or relevant changes of use of a building, fire safety information shall be given to the responsible person at the completion of the project or when the building or extension is first occupied. The information will facilitate the production of the fire risk assessment. This strategy should be maintained throughout the building works and all stakeholders are required to inform the Fire Engineers of any changes to the building design to ensure that the finished strategy accurately reflects the complete design.