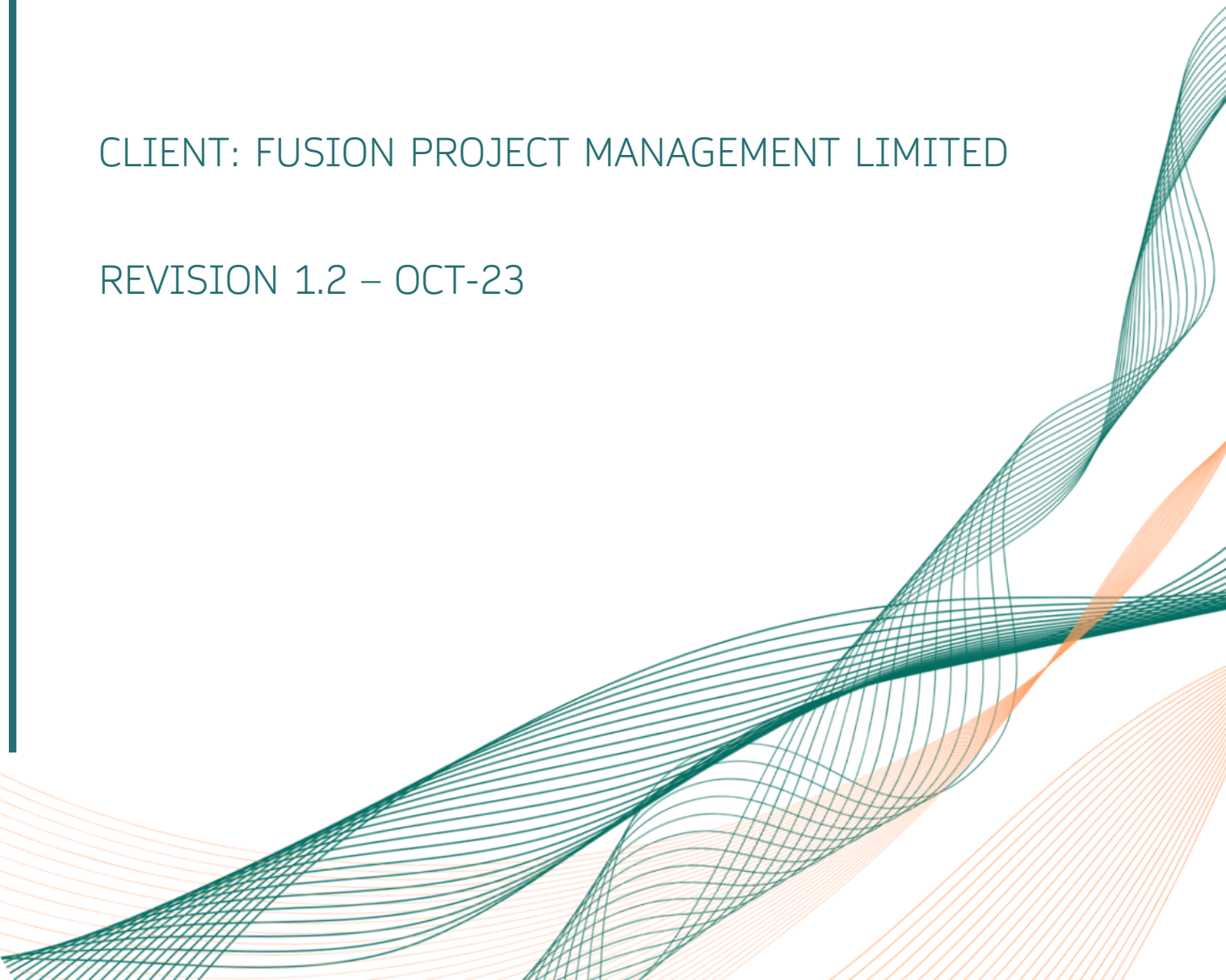


LINEAR BUILDING, CAPEL MANOR COLLEGE, MOTTINGHAM

STAGE 3 FIRE SAFETY STRATEGY REPORT

CLIENT: FUSION PROJECT MANAGEMENT LIMITED

REVISION 1.2 – OCT-23



NOTICE

This document has been prepared for Fusion Project Management Limited and is intended for their information only in relation to the proposed development of the Linear Building at Capel Manor College in Mottingham.

Cahill Design Consultants Limited will assume no responsibility to any other party in respect of, or arising out of, this document or its contents.

This document has 13 pages including the front cover.

Document history:

Revision	Comment	Originated	Checked	Authorised	Date
1.0	Initial issue for comment	JS	TM	BC	21/09/2023
1.1	Sprinkler standard revised	TM	BC	BC	17/10/2023
1.2	Amended to confirm BS 9251 may be used for non-residential buildings	TM	BC	BC	24/10/2023

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1 INTRODUCTION

- 1.1 Cahill Design Consultants Limited was appointed by Fusion Project Management Limited to provide fire safety and fire engineering advice to the development of the Linear Building at Capel Manor College, Mottingham.

2 CLIENT ASPIRATIONS

- 2.1 The aim of this report is to support the design and construction of the building and satisfy the building control body for the development that the completed building will meet the functional requirements for fire safety of the Building Regulations whilst also ensuring that the building design will meet the requirements of the client.

3 DRAWINGS AND ASSUMPTIONS

- 3.1 This report has been developed based on the information contained in the architectural general layout drawings listed in Table 1 and should be read together with full reference to these drawings.
- 3.2 Any revision made to the drawings listed in Table 1 may invalidate the fire safety solutions proposed in this report and should be discussed with a competent fire safety professional to determine what impact the changes may have on the fire safety strategy for the building.

Table 1: Drawings used in the assessment

Drawing Title	Drawing No.	Revision	Date
Proposed Buildings with Existing Site Plan	CMC-3BM-ZZ-RF-DR-A-10002-S0-R00	R00	14/08/23
Proposed Ground Floor GA Plan - LB	CMC-3BM-V2-00-DR-A-1200-S0-R01	R01	24/07/23
Proposed First Floor GA Plan - LB	CMC-3BM-V2-01-DR-A-1201-S0-R01	R01	24/07/23
Proposed Roof GA Plan - LB	CMC-3BM-V2-RF-DR-A-1202-S0-R01	R01	24/07/23
Proposed GA Elevations - LB - Page 1 of 2	CMC-3BM-V2-XX-DR-A-2100-S0-R01	R01	21/07/23
Proposed GA Elevations - LB - Page 2 of 2	CMC-3BM-V2-XX-DR-A-2101-S0-R01	R01	21/07/23

4 DESIGN GUIDANCE

- 4.1 Building Bulletin 100: Design for fire safety in schools, 2007, (BB 100) has primarily been used as the fire safety design guide for the Linear Building.
- 4.2 Fire Safety, Approved Document B, Volume 2: Building other than dwellings (ADB Vol. 2) has also been used to support the building design when BB 100 does not specifically address the design issue under consideration.

- 4.3 Where an appropriate design solution is not given in either BB 100 or ADB Vol. 2, a design solution using scientific and engineering principles to provide a performance-based solution may have been provided, in accordance with the guidance and recommendations given in BS 7974:2019, Application of fire safety engineering principles to the design of buildings – Code of practice.
- 4.4 Where a performance-based solution has been provided it will be clearly identified within this report.

5 LIMITATIONS

- 5.1 This report relates only to the Linear Building at Capel Manor College and should not be used for any other purposes.
- 5.2 The aim of this report is to demonstrate to the relevant building control body that the building design will meet the fire safety requirements of the Building Regulations only, it does not specifically address property protection or business continuity issues.
- 5.3 As such, additional fire prevention or protection measures may be required to fully satisfy the warranty or insurance providers for the building.

6 BUILDING DESCRIPTION

- 6.1 The project is located at Capel Manor College, Mottingham Campus.
- 6.2 The Linear Building consists of ground and first floor levels only.
- 6.3 The Capel Manor College, Mottingham Campus site can be accessed via Mottingham Lane.
- 6.4 All rooms can be accessed directly from the west elevation.
- 6.5 The height of the top floor will be approximately 3.8m above ground level.
- 6.6 The principal use of the building will be further education for students aged 16 and over. The building will therefore be classified as a 'Assembly and Recreation – Group 5' building in accordance with ADB Volume 2, Table 0.1 – Classification of purpose groups.
- 6.7 The proposed uses at each floor level are summarised in Table 2.

Table 2: Floor level uses

Floor Level	Uses
Ground Floor	Classrooms, staff areas, toilet facilities, plant room
First Floor	Classrooms, storerooms, toilet facilities, plant room

7 MEANS OF WARNING AND ESCAPE

- 7.1 The general principle for means of escape is that the occupants of a building will be able to turn their back on a fire and escape via the nearest exit without additional assistance from other occupants or attending firefighters.
- 7.2 Satisfactory means of escape will be achieved by providing travel distances that are limited, alternative escape routes (where necessary), sufficient exit widths and escape routes that are protected by fire resisting construction.

Evacuation strategies

- 7.3 The building will adopt a single stage simultaneous evacuation strategy, whereby, all occupants will immediately evacuate the building when a fire alarm is activated.

Fire detection and warning systems

- 7.4 The building will be provided with a minimum Category L3 fire detection and alarm system in accordance with BS 5839-1:2017, Fire detection and fire alarm systems for buildings - Code of practice for design, installation, commissioning and maintenance of systems in non-domestic premises to support the simultaneous evacuation strategy.
- 7.5 Category L3 coverage requires a means of fire detection in escape routes and all rooms that open directly onto an escape route.
- 7.6 A manual fire alarm break-glass call-point will be provided adjacent to each fire door or final exit from the building.

Fire suppression systems

- 7.7 As the building is less than 11m in height a sprinkler system is not required for Building Regulation purposes but has been included within the design to satisfy the Greater London Authority Planning Department to permit the use of materials within the external walls of the building (e.g. cross laminated timber-CLT) that do not achieve the limited combustibility classification of A2-s1, d0, or better.
- 7.8 A residential grade fire sprinkler system will be provided to a minimum category 2, designed in accordance with BS 9251:2021, Fire sprinkler systems for domestic and residential occupancies. Code of practice.
- 7.9 It should be note that BS 9251:2021 may be used for non-residential areas of a building where a category OH1 Hazard is appropriate and the guidance in BS 9251:2021, Table 3 and table 4 is followed.
- 7.10 An OH1 hazard is appropriate for the Linear Building and the sprinkler heads throughout the building will be in accordance with BS EN 12259-14, as recommended in Table 3 and Table 4 of BS 9251.

Means of escape

7.11 The maximum estimated occupancy numbers for each floor are given in Table 3.

Table 3: Maximum estimated occupancy numbers

Floor	Number of people
Ground Floor	132
First Floor	132

7.12 Escape from the ground floor is possible in one direction, with all rooms having direct access to outside on the west elevation. The exception to this is the plant room that opens directly to outside on the east elevation.

7.13 Escape from the first floor is possible in two directions, with access to two external escape stairs located on the south elevation and the centre of the building.

7.14 Travel distances should not exceed 45m from any point of the building to a final exit.

7.15 The recommendations for the number of escape routes from each room, storey or compartment are given in Table 4.

Table 4: Minimum number of escape routes/exits

Maximum number of persons	Minimum number of escape routes/exits
60	1
600	2
More than 600	3

Escape route widths

7.16 As the expected occupancy of the first floor is more than 110 but less than 220 people, the minimum width of the escape routes and storey exits should be a minimum width of 1050mm.

Exit signs

7.17 Fire route signage should be provided throughout the building in accordance with the recommendations given in BS 5499-4:2013, Safety signs. Code of practice for escape route signing and BS ISO 3864-1: 2011, Graphical symbols. Safety colours and safety signs. Design principles for safety signs and safety markings.

Lighting of escape routes

7.18 Emergency escape lighting should be provided throughout the building in accordance with the recommendations given in BS 5266-1, Emergency lighting. Code of practice for the emergency lighting of premises and BS EN 1838, Lighting applications. Emergency lighting.

7.19 Emergency lighting should be provided in the following areas:

- All internal circulation areas, open plan areas with a floor area greater than 60m², and any windowless accommodation
- At every exit and final exit door from the building
- External escape routes and external areas in the immediate vicinity of exits
- At any changes in direction of escape routes
- Close to (typically within two metres of) all fire safety, or other safety equipment
- All toilet accommodation greater than 8m² in area; and
- All plant rooms

8 INTERNAL FIRE SPREAD

Wall and ceiling linings

8.1 The wall and ceiling linings within the building should meet the following classifications:

- Small rooms with a maximum internal floor area of 30m² must meet a minimum of class D-s3, d2.
- All other rooms must meet a minimum of class C-s3, d2.
- Other circulation spaces such as common areas must meet a minimum of class B-s3, d2.

Loadbearing elements of structure

8.2 As the height of the top occupied floor is less than 5m and a sprinkler system will be present, all load bearing elements of structure should be a minimum of 30 minutes for loadbearing capacity, in accordance with BB 100, Table A2 and Table A2.

Compartmentation

8.3 The minimum periods of fire resistance for each part of the building are given in Table 5. These values are in accordance with BB 100, Appendix A, Table A1 and Table A2.

Table 5: Minimum periods of fire resistance

Part of building	Required fire resistance performance		
	R	E	I
Structural frame, beam or column	30	-	-

Part of building	Required fire resistance performance		
	R	E	I
Loadbearing wall	30	30	30
Floor	30	30	30
External wall (<1m from boundary)	30	30	30
External wall (≥1m from boundary)	30	30	15
Compartment wall	30	30	30
Protected shaft/service riser/smoke shaft	30	30	30
Protected stair enclosure	30	30	30
Protected lobby enclosure	30	30	30
Place of special fire hazard e.g. Plant room	60	60	60
Cavity barrier	-	30	15

Fire resisting doors

- 8.4 With the exception of doors to service risers, storerooms and plant rooms, which are normally locked shut, all fire doors will be fitted with self-closing devices.
- 8.5 The recommended fire door ratings for the building are given in Table 66, in accordance with BB 100, Table C1.

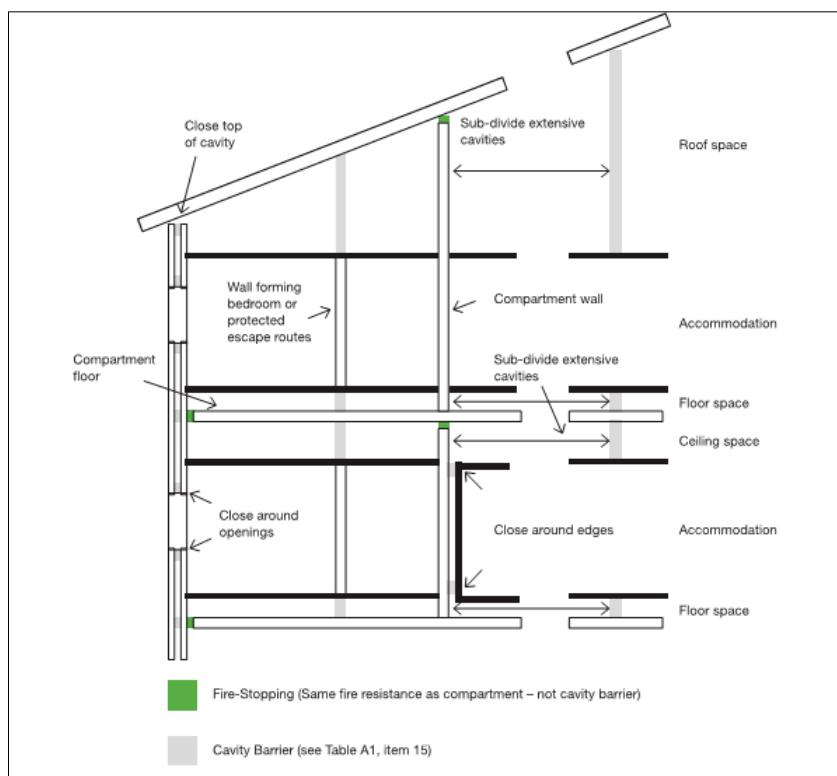
Table 6: Provision for fire doors

Door location	Door rating	Self-closing device required
Doors opening into upper atrium	E 30Sa	Yes
Doors entering refuge areas	E 30Sa	Yes
Final exit doors	E 30Sa	Yes

Concealed spaces (cavities)

- 8.6 Concealed spaces in the walls, floors, ceilings and roofs of a building provide a potential route for smoke and flame to spread without being detected, the provision of cavity barriers in these spaces will restrict this unseen spread.

Figure 1: Locations of cavity barriers and fire-stopping



8.7 Cavity barriers will be provided within any large cavity with the potential for extensive unseen fire spread. The key areas where cavity barriers will be provided are as follows:

- At the junction between an external cavity wall and a compartment wall that separates buildings; and at the top of such an external cavity wall.
- At the junction between an external cavity wall and every compartment floor and compartment wall.
- At the junction between a cavity wall and every compartment floor, compartment wall, or other wall or door assembly that forms a fire resisting barrier.
- In a protected escape route, above and below any fire resisting construction that is not carried full storey height.
- Where the corridor will be sub-divided to prevent fire or smoke affecting two alternative escape routes simultaneously.
- Within the void behind the external face of rain-screen cladding at every floor level, and on the line of compartment walls abutting the external wall of buildings.
- At the edges of cavities (including around openings).

- 8.8 The cavity barriers will provide at least 30 minutes fire resistance for integrity (E 30) and at least 15 minutes fire resistance for insulation (EI 15), in accordance with BB 100, Table A1.

Protection of openings and fire-stopping

- 8.9 Any openings for services passing through a compartment wall or floor will be appropriately fire-stopped.
- 8.10 Where air handling ducts will pass through fire separating walls or floors the integrity of those elements will be maintained. This can be achieved by any of the following methods, in accordance with BB 100, 6.5.3 - Ventilation ducts, flues etc
- Protection using fire dampers
 - Protection using fire resisting enclosures
 - Protection using fire resisting ductwork
- 8.11 Any joints between elements of structure that serve as fire barriers will be fire-stopped to prevent the passage of fire and smoke.
- 8.12 Any door provided on an escape route, to sub-divide a corridor, or that will be hung to swing in either direction, will be provided with a vision panel.

9 EXTERNAL FIRE SPREAD

Site Boundary

- 9.1 The site boundary and minimum distance to the relevant boundary for each elevation has been taken as the following:
- North elevation: midpoint between Welcome Building and Linear Building - more than 8.5m
 - South elevation: site boundary - more than 7m
 - East elevation: site boundary - more than 7m
 - West elevation: midpoint between Linear Building and existing classroom - more than 3.5m
- 9.2 As the building will be sprinkler protected these distances may be increased by a factor of 2, giving the following total distances for space separation purposes:
- North elevation: midpoint between Welcome Building and Linear Building - more than 9m
 - South elevation: site boundary - more than 14m
 - East elevation: site boundary - more than 14m
 - West elevation: midpoint between Linear Building and existing classroom - more than 7m

- 9.3 The east and west elevations of the Linear Building will be more than 44m in length. The north and south elevations will be less than 12m.
- 9.4 The total height of the Linear Building to the roof level will be less than 9m.
- 9.5 Table C of the BRE publication: External fire spread, Building separation and boundary distances, Second Edition, 2014 (BR 187), was then used to determine the recommended percentage unprotected area for a sprinkler protected assembly and recreation building.
- 9.6 From paragraph 9.2 above it is estimated that the distances to the relevant boundaries for the north, south and east elevations of the Linear Building will be more than 9m and therefore these elevations may be totally unprotected.
- 9.7 The west elevation has a minimum distance to the existing classroom of only 7m so further analysis of this elevation was undertaken, as follows:
- An enclosing rectangle of 50m x 6m could cover all the doors, windows and vents on the west elevation and for this rectangle Table C of BR 187 permits a maximum of 75% of the elevation to be unprotected (219.3m²).

Roof coverings

- 9.8 The distance of the roof to the closest edge of the relevant boundary is more than 6m but less than 12m, therefore the roof covering should be designated as $B_{ROOF}(t4)$ or $C_{ROOF}(t4)$. The roof coverings should be tested to BS 476-3, Fire tests on building materials and structures.

10 FIRE SERVICE ACCESS AND FACILITIES

Fire mains and hydrants

- 10.1 The building is less than 18m in height and therefore a firefighting shaft is not required and will not be provided.
- 10.2 It has been assumed that there will be sufficient existing fire hydrants in the adjacent existing public roadways as the site is located in a built up area. But where an existing hydrant is not available within 100m of the main entry point to the building, at least one private hydrant will be provided within 90m of the main entrance to the building.
- 10.3 It is possible to reach all areas of the building within 45m from the fire service parking location on Kings Avenue therefore, it will not be necessary to provide a dry rising fire main in the stairway.

Vehicle access

- 10.4 Vehicle access will be available to the front of the building, with fire appliances able to enter the site via Mottingham Lane. This road will give adequate emergency vehicle access to the site.
- 10.5 The west facade of the building will give access to the main stair outside the building.

10.6 The following table gives the recommended specifications for access routes for the fire service.

Table 5: Fire service access route specifications

Appliance type	Min. width of road between kerbs (m)	Min. width of gateways (m)	Min. turning circle between kerbs (m)	Min. turning circle between walls (m)	Min. clearance height (m)	Min. carrying capacity (tonnes)
Pump	3.7	3.1	16.8	19.2	3.7	12.5

Access for firefighting personnel

10.7 Firefighting personnel access to the building will be available directly to all ground floor rooms and via the main stair on the west elevation.

11 FIRE SAFETY MANAGEMENT

11.1 The fire safety strategy proposed in this report is dependent on the provision of an appropriate level of management and assumes that the level of management provided will satisfy the requirements of the Regulatory Reform (Fire Safety) Order 2005.

11.2 Regulation 38 of the Building Regulations requires that, where work involves the erection of a building, fire safety information must be given to the responsible person at the completion of the project, or when the building, or extension is first occupied. The information provided will be required to facilitate the production of the fire risk assessment, a requirement under the Regulatory Reform (Fire Safety) Order. This fire strategy should be maintained throughout the duration of the building works and accurately reflect the completed design for the building.