



Fire Engineering Consultants

Report

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Contents

- 1.0 INTRODUCTION
- 2.0 ACTIVE FIRE SAFETY SYSTEMS
- 3.0 MARKET AND OFFICE MEANS OF ESCAPE
- 4.0 BASEMENT ESCAPE
- 5.0 RETAIL UNIT MEANS OF ESCAPE
- 6.0 LEISURE UNIT MEANS OF ESCAPE
- 7.0 FIRE FIGHTING
- 8.0 STRUCTURE AND COMPARTMENTATION
- 9.0 EXTERNAL FIRE SPREAD
- 10.0 FIRE SAFETY MANAGEMENT
- 11.0 INFORMATION, LIMITATIONS AND ASSUMPTIONS

1.0 INTRODUCTION

1.1 The Building

The Metropolitan Centre is an existing market hall in Barnsley. As part of the larger Better Barnsley scheme it is proposed to demolish the existing building in phases to make room for a new market hall.

The building will consist of two new market levels and a smaller office level above, all above the existing basement car park and loading area. The first floor will contain a food court area.

The building will also contain several retail units on its perimeter which will not be accessible from the market hall. There will be a new large unit at first floor most likely for leisure use that will share a stair with the market hall. The building layout is shown in Figure 1.

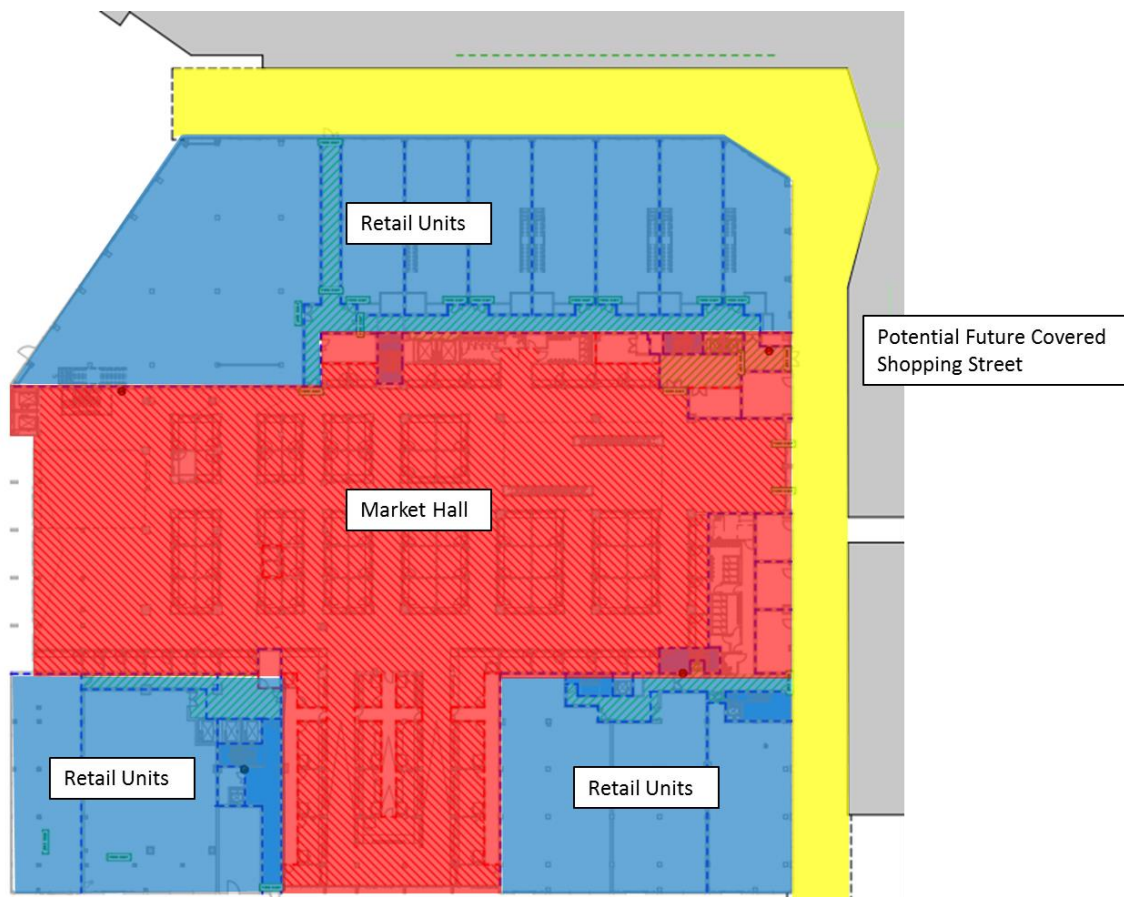


Figure 1 – Metropolitan Centre Ground Floor Layout

A potential option in the future will be the creation of a covered shopping street adjacent to the centre, shown in Figure 1.

1.2 Building Regulations Guidance

The fire strategy for the Metropolitan Centre has been developed using the guidance in BS9999:2008. Fire engineering solutions have been developed where beneficial to the design and life safety.

1.3 Aim of Report

The report describes the centre's fire strategy. It is intended for submission to Building Control for approval.

The report addresses life safety not property protection.

The covered shopping street shown in Figure 1 is not addressed in this report. However the fire strategy design will allow for its development in the future.

2.0 ACTIVE FIRE SAFETY SYSTEMS

2.1 Sprinklers

The centre is currently provided with a mains fed sprinkler system. The sprinkler system will be upgraded to meet current British Standards with quick response heads.

Sprinklers are not required in the retail units but, depending on the size of the units, their provision decreases the required extent of fire resisting construction in their shopfront. A sprinkler connection will be provided to the rear of each retail unit and the leisure unit to allow tenants to install their own system if required.

Sprinkler coverage will be maintained in the basement.

The market hall and office will be sprinklered.

2.2 Fire Alarm and Detection

The building will be provided throughout with a linked L1 standard fire detection and alarm system serving the retail units, market hall and offices. The market hall will be provided with a voice alarm system.

A double knock system will be implemented to reduce false alarms, where the initial detection of smoke will instigate an investigation period. The alarm would then activate upon either a second detector activating, a sprinkler head activating, the fire being confirmed by staff or the investigation period elapsing.

For a confirmed fire in the market or offices both areas will evacuate simultaneously. The adjacent retail units will not evacuate immediately.

A confirmed fire in a retail unit will cause the unit to evacuate. It will not be necessary for the rest of the building to evacuate immediately.

The leisure unit will evacuate separately to the market hall.

The alarm will be configured so that a full evacuation can be carried out if considered necessary by the building management or the fire service.

3.0 MARKET AND OFFICE MEANS OF ESCAPE

3.1 Occupant Numbers

BS9999 provides a floor space factor for a bazaar of 2m² per person. Occupant numbers in the circulation areas of the market hall have been calculated using this figure. Some stall areas will be accessible to the public but most will be kiosks with a small number of staff. A conservative occupant density of 6m² per person has been assumed for these areas.

Occupant numbers in the market have been assessed using the following occupant densities:

Area	Occupant Density
Market Circulation Areas	2m ² per person
Market Stall Areas	6m ² per person
Food Court Seating Areas	Number of seats
Food Court Kiosks	7m ² per person
Offices	6m ² per person

Table 1: Occupant Densities

The calculated occupant numbers are given below:

Floor	Total Occupants
Ground Floor	1382
First Floor	1370
Second Floor	83

Table 2: Occupant Numbers

3.2 Risk Profile

The market area has been assessed using a B2 risk profile, in line with the guidance in BS9999 for a sprinklered retail area. Required exit widths and maximum travel distances have been calculated using the reduction allowed in BS9999 for a building with a high standard of alarm and detection, including voice alarm, and with ceilings between 3m and 4m high.

The office has been assessed using an A1 risk profile, in line with the guidance in BS9999 for a sprinklered office.

3.3 Storey Exits

The required exit width per person is 3.28mm based on the exit width of 4.1mm per person for a B2 risk profile reduced by 15% due to the provision of an L1 alarm system and voice alarm and a further 5% as the ceiling heights are between 3m and 4m.

Occupants at ground floor require 4535mm of exits to outside after discounting the largest exit. Occupants have access to 7200mm of exits after the largest is discounted.

The number of occupants at first floor is 1370, requiring 4500mm of exits after the largest has been discounted. Discounting the open stair the remaining exits will provide at least 4500mm of exit width.

It is reasonable to consider the open stair for escape as a number of occupants are likely to use this route as it will be the familiar route. For a fire at ground floor in the market, occupants will be able to use the exits into the enclosed stairs. For a fire at first floor occupants will be able to use the open stair. Disabled refugees will be provided in all enclosed stairs or their adjoining lobbies and therefore, disabled occupants will have access to at least 3 exits which are provided with refugees.

3.4 Stairs

Occupants in the market will have access to four stairs and an open stair. These are shown in Figure 2 below. The open stair has not been included in the stair capacity calculations.

Stair capacity is calculated using a width of 3.84mm per person based the recommended 4.8mm per person and the 20% reduction given by the combination of a high standard of alarm and ceilings between 3m and 4m.

The four stairs will provide capacity for 1445 occupants at first floor.

One stair is shared with an adjacent leisure unit. The stair will be lobbied from both sides. This is shown in Figure 2.

Final exits from the stairs will be as wide as the stairs themselves and will open in the direction of escape. Storey exits will also open in the direction of escape.

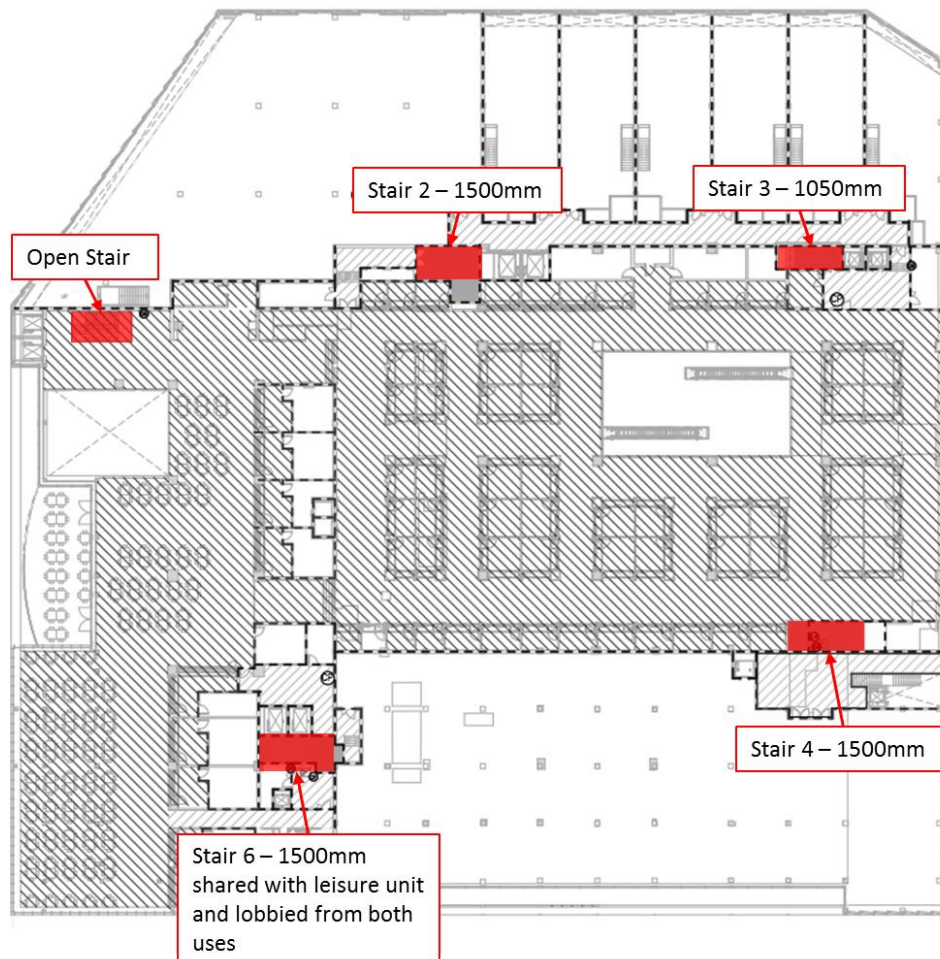


Figure 2 – Escape Stair Locations

3.5 Office Escape Capacity

Occupants in the office have access to Stair 6 and to Stair 3 via a rooftop escape route.

The number of office occupants is calculated to be 83 using a typical 6m² per person occupant density. There is a surplus of 105 occupants in the total stair capacity therefore accommodating the office occupancy.

Both exits from the offices into the stairs and onto the roof will be at least 800mm wide.

3.6 Travel Distances

BS9999 recommends travel distances of 20m in a single direction and 50m where occupants have a choice of directions for a B2 risk profile. This applies to the market hall. The provision of a high standard of alarm and high ceilings allow these to increase to 24m and 60m. Travel distances in the market will be within these limits.

Recommended distances for an A1 risk profile, such as the offices, are 26m in a single direction and 65m where alternatives are available. The provision of a high standard of alarm in the offices allows the A1 risk profile to increase travel distances to 30m and 74m respectively.

Travel distances in the office are a maximum of 23m in a single direction.

3.7 Food Court and Terrace

The food court will remain open in the evening when the rest of the centre is closed. The calculated number of occupants in the food court is 551 based on the occupant densities given in Table 1. This number of occupants require 1.81m of exits after the largest has been discounted.

Occupants will have access to Stair 6 and the open stair. An additional escape route will be provided via the closed market area. The door will be alarmed to prevent occupants accessing the market area in the evening when the rest of the centre is closed, except for escape. This will provide sufficient capacity for all occupants.

The terrace will be an inner room and will be limited to 60 occupants.

3.8 Disabled Means of Escape

Disabled refuges with communication points will be provided in all enclosed stairs or their adjacent lobby at First and Second Floor.

A refuge will be provided in the stair from the office to the rooftop escape route.

4.0 BASEMENT ESCAPE

4.1 Occupant Numbers

The total number of occupants calculated in the basement is 383 based on 2 occupants per car parking space and 30m²/person in storage areas.

There are two small storage areas for the retail units above. These are provided with their own stairs and are excluded from the basement occupancy calculations.

4.2 Stair Capacity

Occupants have access to five stairs and the vehicle ramps to escape. These are shown in Figure 3.

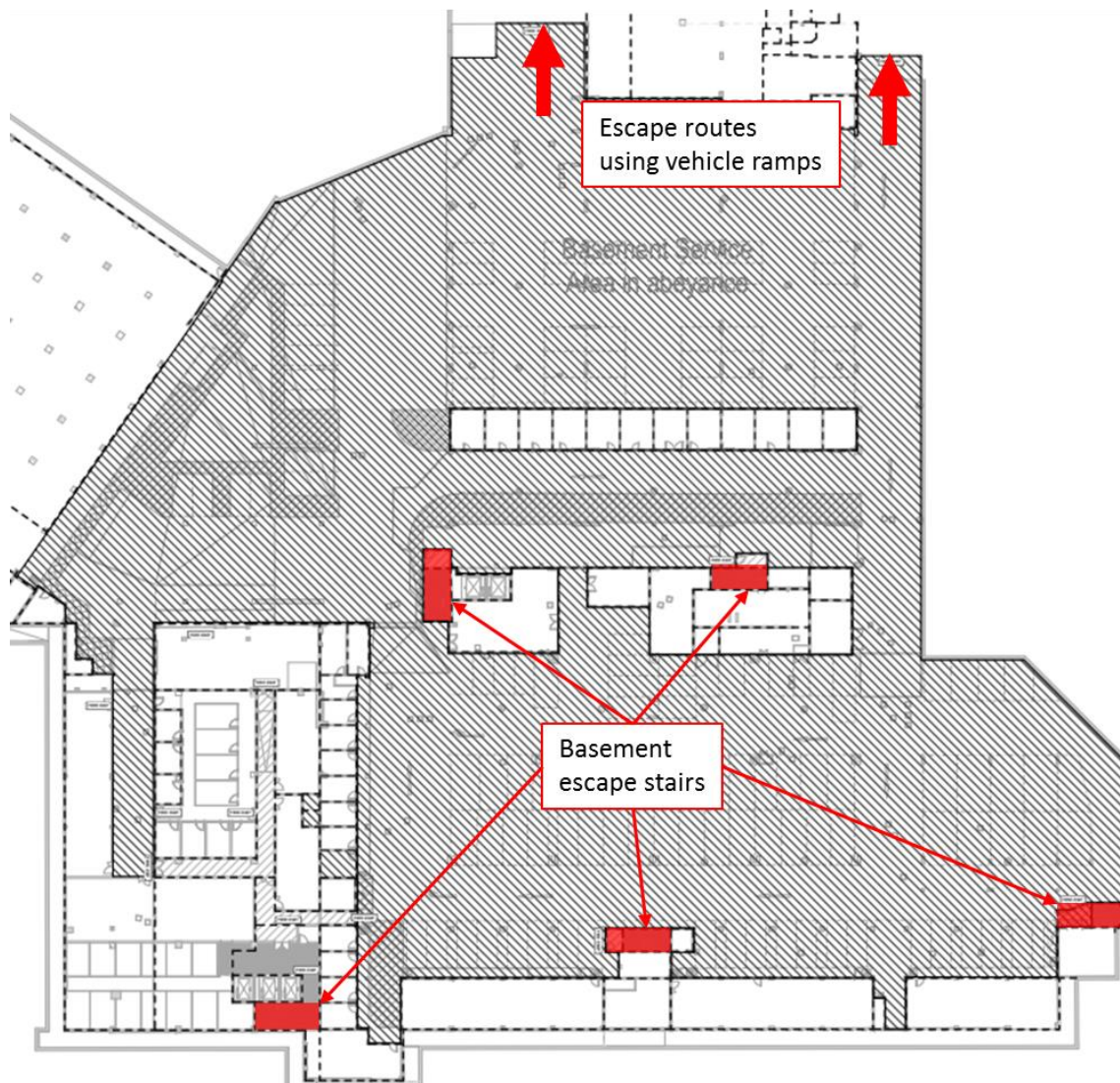


Figure 3 – Basement Escape Routes

Exits into the stairs will be at least 800mm. There will be sufficient capacity for up to 780 occupants.

Stairs shared with other uses will be separated from the accommodation by protected lobbies.

4.3 Travel Distances

Escape is available in two directions from all areas and travel distances are a maximum of 48m. This is within the 50m recommended in BS9999 for a B2 risk profile.

5.0 RETAIL UNIT MEANS OF ESCAPE

5.1 Tenant Fire Strategy

Retail unit tenants will be responsible for developing their own fire strategy. The landlord will provide each unit with a rear exit into an escape corridor or stair at both levels, and another exit via the main entrance at ground floor. The tenant may wish to provide an alternative escape route at the front of the unit from the first floor mezzanine. This could be via a protected escape stair, or their preference may be to provide an open accommodation stair in which case they will need to develop a fire strategy to support this. Consideration will need to be given to the management of escape for disabled occupants.

5.2 Evacuation Strategy

Retail units will evacuate for a fire in their own unit. There will be no requirement for the other retail units to evacuate immediately. The retail units will not immediately evacuate for an alarm activation in the market, car park or offices.

5.3 Escape Capacity

Exits serving the units will be 1050mm wide. This is sufficient to allow their use as shops or restaurants in the current layout. The rear corridor at first floor will lead to two landlord escape stairs which will be 1050mm and 1500mm wide. This is shown in Figure 4.

Units will be separated from the landlord areas by protected lobbies achieving 30 minutes fire resistance.

5.4 Travel Distance

Travel distance limitations will depend on each tenant's approach to the fire strategy. The shell and core layout provided by the landlord will allow a design to be developed with escape in two directions from each level.



Figure 4 – Retail Units Escape Corridor

6.0 LEISURE UNIT MEANS OF ESCAPE

6.1 Evacuation Strategy

The first floor leisure unit will have a dedicated entrance from New Street and will share a stair with the market hall. The leisure unit will evacuate separately to the market hall. For a fire in the leisure unit the market hall does not need to evacuate immediately and vice versa. Centre Management or the Fire Service will be able to evacuate the entire building if necessary.

6.2 Escape Capacity

The leisure unit is provided with two exits which lead to a 1390mm wide stair and a 1500mm wide stair. This will provide capacity for 278 occupants in the unit following the guidance of ADB.

A gym is currently proposed for this unit and occupancy will be restricted to 278. If the use of this unit changes or a larger occupancy is required, the tenant may wish to provide sprinklers or an additional protected stair to the unit.

7.0 FIRE FIGHTING

7.1 Market and Retail Units

To comply with the recommendations in BS9999, fire vehicle access should be provided to 75% of the perimeter of the building. This will not be achieved as vehicle access cannot be provided to New Street or to the Shopping Street.

Fire vehicle access will be provided to approximately 40% of the perimeter as shown in Figure 5 below. Dry risers will be provided to all four stairs serving the market hall as indicated in Figure 5. This will achieve hose coverage within 45m of a dry riser outlet. Horizontal fire mains will be provided so that the dry riser inlet point is within 18m of fire vehicle parking positions. Therefore, the standard for fire fighting will be at least as good as a code compliant building.

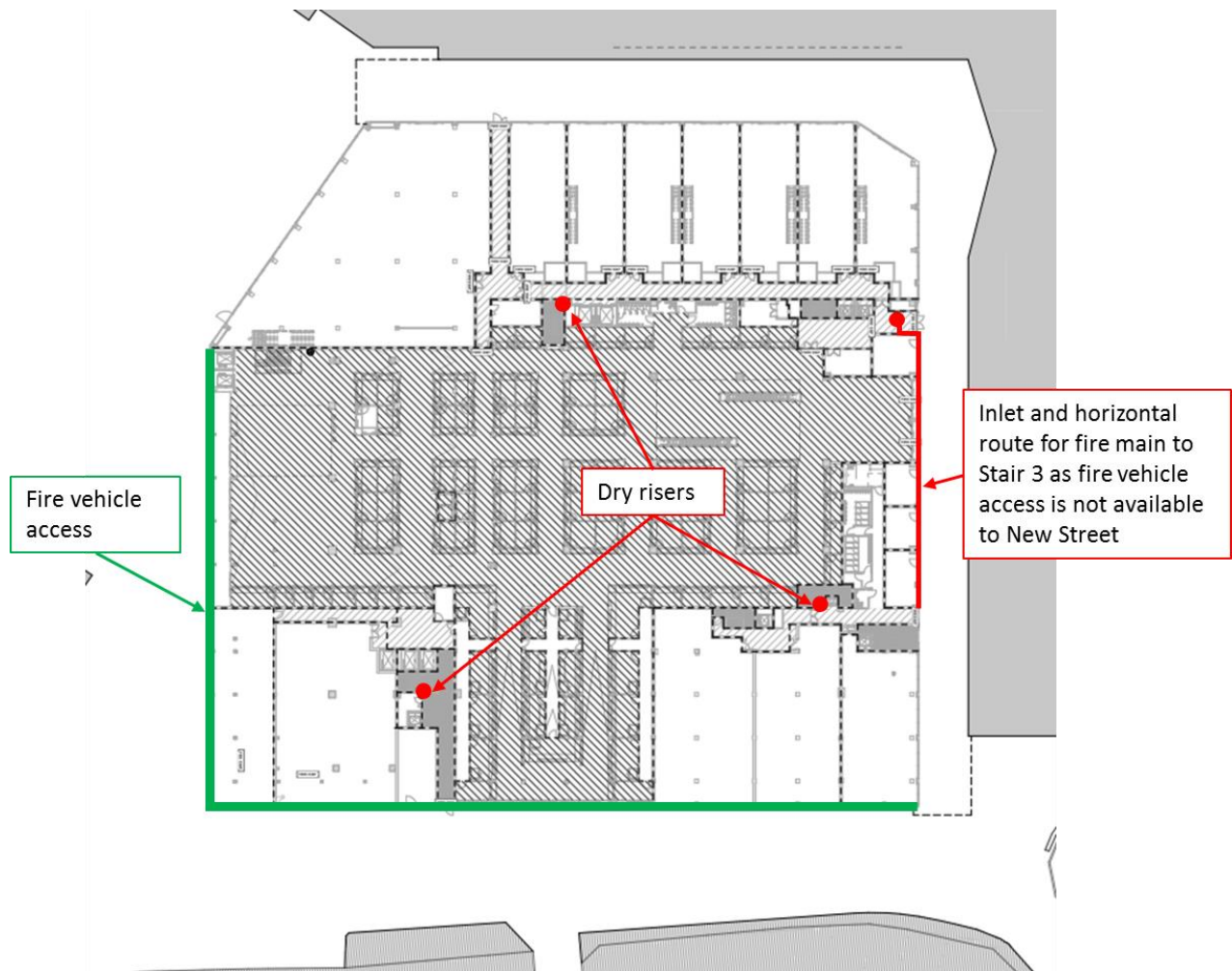


Figure 5 – Fire Fighting Provisions

7.2 Basement

The changes to the basement will improve fire fighter access due to the additional stairs.

The basement will be provided with a smoke extract system. This will be a mechanical smoke extract system achieving 10 air changes per hour. Subject to specialist input the mechanical system may be zoned into different areas to reduce the total extract rate required.

8.0 STRUCTURE AND COMPARTMENTATION

8.1 Structure

New elements of structure will achieve 60 minutes fire resistance. Existing structure that will support new floors will be upgraded if necessary to achieve 60 minutes fire resistance.

8.2 Compartmentation

The market hall will be separated from the adjacent retail units, leisure unit, car park and corridors by construction achieving 60 minutes fire resistance. Retail units will be separated from one another and landlord areas by construction achieving 60 minutes fire resistance.

Stairs will be enclosed in construction achieving at least 30 minutes fire resistance. The escape routes across the roof from the office to stairs and any openings within 3m of the escape route will be 30 minutes fire resisting.

The offices will be separated from the market by construction achieving 60 minutes fire resistance.

9.0 EXTERNAL FIRE SPREAD

If adjacent buildings are operated by the same landlord there is no requirement to have fire resisting elevations to prevent fire spread between the two buildings. This may apply to Development Sites 5 and 7. However, it has been assumed in these calculations that these buildings are operated by different landlords.

The number and width of the individual retail units may be subject to change in future. The figures below give an indication of the elevation requirements based on the layout in the current plans. It has been assumed the retail units are sprinklered for these calculations. The extent of protected area required to the elevations may need to be reassessed if the layout changes.

Calculations have been carried out using the Tables Method in BR187: *External Fire Spread – Building Separation and Boundary Distances*.

There is no requirement for any percentage of the Cheapside and May Day Green elevations to be fire resisting.

The two retail units with elevations onto New Street will each have no more than 60m² of unprotected façade. The market hall and leisure unit elevations onto New Street will each have no more than 50m² of unprotected façade.

The large retail unit with an elevation onto Shopping Street will have no more than 80m² of the façade non-fire resisting. The smaller retail units do not require any of the elevation to be fire resisting.

10.0 FIRE SAFETY MANAGEMENT

10.1 General

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

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

10.2 Staff

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

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

10.3 Fire Safety Manual

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

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

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

10.4 Maintenance and Housekeeping

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

10.5 The Regulatory Reform (Fire Safety) Order 2005

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

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

A Fire Risk Assessment should be carried out:-

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

Other legal duties include: -

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

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

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

11.0 INFORMATION, LIMITATIONS AND ASSUMPTIONS

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

Drawings

This report is based on drawings issued to us. Dimensions have been taken from these drawings. The following drawings by IBI group were used:

BBTC_IBI_MC_A_G571_PL_00_02_4	–	Ground Floor
BBTC_IBI_MC_A_G571_PL_01_03_4	-	1 st Floor
BBTC_IBI_MC_A_G571_PL_02_04_4	-	2 nd Floor
BBTC_IBI_MC_A_F100_PL_RF_01_2	-	Roof
BBTC_IBI_MC_A_G571_PL_B1_01_4	-	Basement
BBTC_IBI_MC_A_F100_EL_XX_01_3	-	Building Elevations

Information

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

BBTC_IBI_MC_A_RPT_Stage 2_1.0 IBI Stage 2 Report

Survey (Existing Building)

This building has not been surveyed by Jeremy Gardner Associates.

Building Regulations

This report considers building regulations, which deal with life safety. Property protection and insurance issues are not addressed in this report. Guidance on property protection and insurance requirements can be found in the document *Approved Document B: Fire Safety (Volume 2) – Buildings other than dwellinghouses Incorporating Insurer's Requirements for Property Protection*, RIBA Publishing 2008.

Other Limitations

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

The design of mechanical and electrical systems such as fire alarm and sprinklers is a specialist area. Fire Strategy recommendations are given in this report, however, the design and specifications need to be developed at the appropriate stage in consultation with the specialist designers of these systems.

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

OFFICES AND CONTACT INFORMATION

Should you have any queries with this report please contact our Manchester Office.

Manchester Office:

12 Hilton Street

Manchester

M1 1JF

Tel: 0161 236 6527

manchester@jgafire.com

OTHER JGA OFFICES AT:

London Office:

11 Risborough Street

London

SE1 0HF

Tel: 020 7202 8484

london@jgafire.com

Edinburgh Office:

22 Hanover Street

Edinburgh

EH2 2EP

Tel: 0131 226 1661

edinburgh@jgafire.com

Glasgow Office :

30 Gordon Street

Glasgow

G1 3PU

Tel: 0141 847 0446

glasgow@jgafire.com

Dublin Office:

66 Lower Baggot Street

Dublin 2

Tel: 01 661 4925

dublin@jgafire.com

Belfast Office:

Howard House

1-3 Brunswick Street

Belfast

BT2 7GE

Tel: 02890 230 300

belfast@jgafire.com

Galway Office:

Office 3, Monterey Court

Salthill, Galway

Ireland

Tel: 091 528 342

galway@jgafire.com



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