Fire Strategy (RIBA 2 Planning)

Plot B, Camden

14 May 2021

REEF

12491BB

Revision History

Version	Date	Author	Comments
01	14.05.2021	S. Michael	Initial planning issue

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Contents

1. Introduction

1.1 Project description

This report is prepared in support of the planning application for Plot B Camden site office workspace accommodation.

Plot B will comprise of ground and 8 upper storeys of office workspace accessed off a central core incorporating two main and independent stair cores. Two levels of basement are proposed for back of house, plant and flexible Class E planning use.

BB7 has been commissioned to produce a fire strategy plan to outline the strategic approach that will be taken to achieve compliance with the London Plan Policies including D12 Fire safety and to address outline compliance with Part B (Fire Safety) of the Building Regulations 2010. The report will provide an outline of the proposed fire safety arrangements for the development.

1.2 Drawings

This report is based on the following drawings provided by Reef Estates:

Table 1.1 Drawings

Drawing name	Drawing number	Revision	Date
Proposed site plan	1603_P_001	G	210125
Proposed basement B2 plan	1603_P_098	G	210125
Proposed basement B1 plan	1603_P_099	M	210125
Proposed level 00 ground floor plan	1603_P_100	N	210125
Proposed Level 01 plan	1603_P_101	L	210125
Proposed Level 02 plan	1603_P_102	K	210125
Proposed Level 03 plan	1603_P_103	K	210125
Proposed Level 04 plan	1603_P_104	J	210125
Proposed Level 05 plan	1603_P_105	L	210125
Proposed Level 06 plan	1603_P_105	K	210125
Proposed Level 07 plan	1603_P_107	G	210125
Proposed Level 08 plan	1603_P_108	N	210125
Proposed section AA	603_P_240	G	210125

1.3 Strategy limitations

This document has been produced to address compliance with Part B (Fire Safety) of the Building Regulations for England and Wales, or some specific part of these regulations. The primary guidance utilised within the design recommendations is BS 9999: 2017 and the report will also address the requirements of the London Plan 2021.

The Building Regulations deal explicitly with life safety and the aim of this report is to inform the design team of the recommended measures and to assist in design submission for approval. Whilst fire safety measures introduced for compliance with this life safety objective have a beneficial effect on reducing potential fire losses and extent of any consequential damage, it cannot be guaranteed that a fire will not start on the premises. In view of this the opinion of the nominated insurance company and any other interested stakeholders should be sought.

Systems and measures described establish a principle on which reliance may be placed by other parts of the fire strategy. This is done so on the assumption that all work will be done using appropriate materials and in a workmanlike manner, as per Building Regulations 2010.

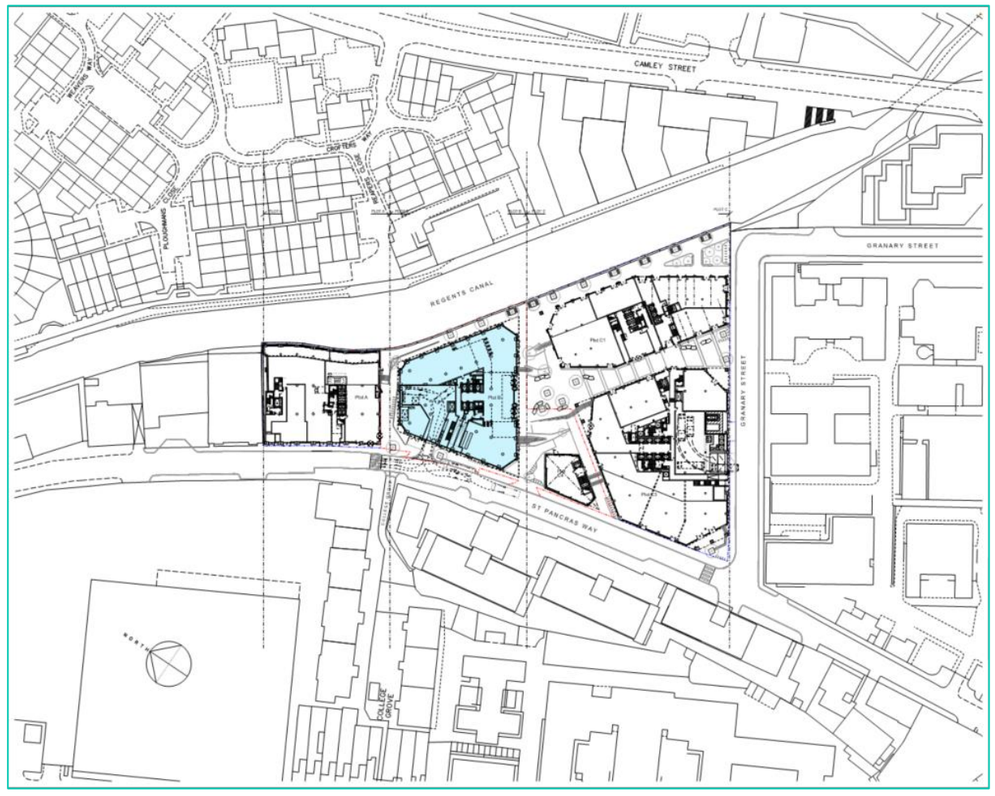
Whilst this document details the fundamental strategy for a safe building, there is an ongoing management obligation to ensure that not only the active and passive fire protection facilities are correctly maintained, but that there are appropriate management procedures in place to facilitate a safe evacuation in the event of a fire. This is a fundamental requirement of life safety and is enforceable under the Regulatory Reform (Fire Safety) Order 2005.

2. Project layout

2.1 Project location

The development will be located in the London Borough of Camden. The site is bounded by St Pancras Way, Granary Street and Regents Canal. The following plan details the location of the development:

Figure 1. Site location



2.2 Building description

The building will comprise 9 upper storeys (including ground storey) of office workspace with a gross floor area of approximately 1500 - 1600m$^{2.}$ The accommodation is accessed off a main central core arrangement with the top floor slab situated approximately 32.8m above ground level.

The central core arrangement includes two stairways which are independent of each other, a main bank of lifts, goods lift and WC accommodation.

Both stairways will be designed as firefighting shafts as the floor area exceeds 900m^2.

The ground floor will include flexible class E planning use, a loading bay and some plant space.

Two levels of basement will include flexible class E planning use, cycle and shower facilities, back of house and plant accommodation, the lower basement being approximately 8.1m below ground level.

2.3 Typical floor layouts

Typical floor and section plans are shown below:

Figure 2. Ground floor

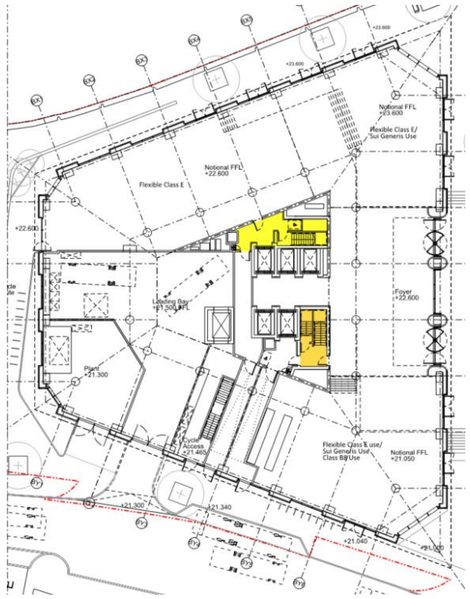


Figure 3. Typical upper floor

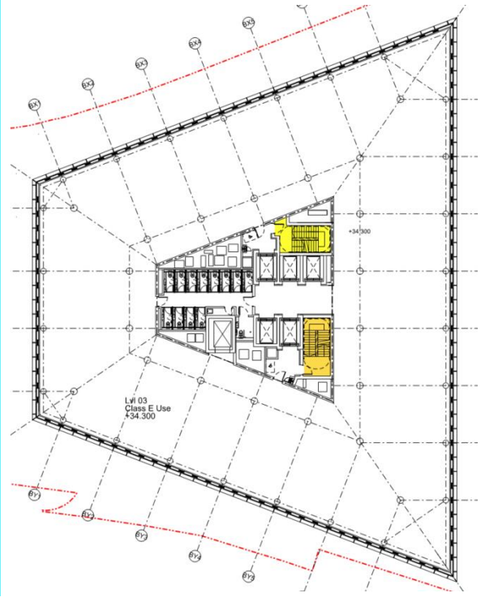
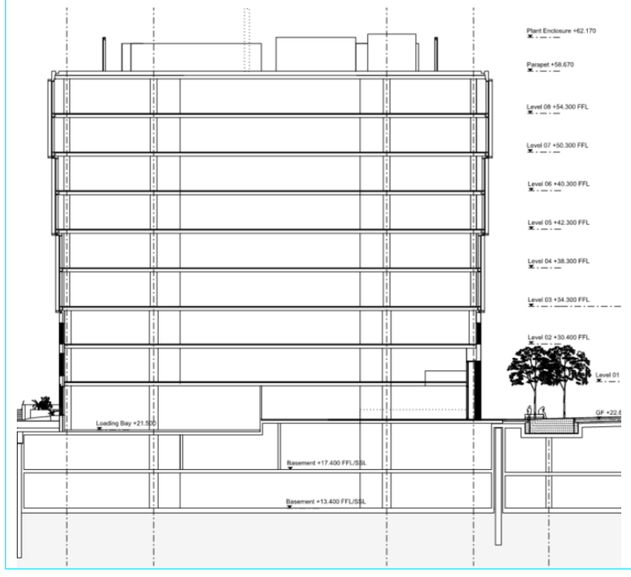


Figure 4. Section plan



2.4 Risk profile

Following the guidance under section 6 of BS 9999: 2017, a risk profile can be established for commercial buildings, which are based on a combination of occupancy characteristic and expected fire growth rate. Risk profiles are applied to determine the appropriate fire safety requirements that are suitable for the proposed use of the building.

The risk profile should reflect the occupancy characteristic and fire growth rate for a building and should be expressed as a value combining these two elements.

The data centre will be provided throughout with a pre-action deluge suppression system, which will be designed and installed in accordance with BS EN 12845. The remaining buildings and associated accommodation will be provided throughout with a sprinkler suppression system, which will be designed and installed in accordance with BS EN 12845 with the exception of the café. Due to the provision of a suppression system in each building, it is permissible to reduce the fire growth rate by 1 point in each case.

The final risk profile used for each area (incorporating the 1-point deduction) is detailed in the table below.

Table 2.1 Risk profiles

Use	Suppression	Risk profile
Office	Yes	A1
Medium risk plant rooms	Yes	A2
Loading bay	Yes	A2
Storage	Yes	A2
High risk plant rooms	Yes	A3
Flexible Class E planning use	Yes	B1

Note: Characteristic A is whereby the occupants are awake and familiar with the building. For this to be acceptable, a high reliance will be made on the management of contractors and visitors that will be working in these areas and robust management protocols/policies will be required during operation of the building to account for familiarity of access/egress.

Characteristic B is whereby the occupants are awake but unfamiliar with the building.

3. Design legislation and statutory control

3.1 Building Regulations 2010

The Building Regulations, produced under the Building Act 1984, is the primary legislation controlling building work and applies to the majority of new or materially altered buildings.

The fire safety requirements are given in Part B of Schedule 1 to the Regulations and make requirements for specific areas:

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

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

3.2 Construction Design and Management

UK projects are subject to the requirements of the Construction (Design and Management) Regulations 2015 (CDM). The CDM Regulations 2015 govern the management of health, safety and welfare when undertaking construction projects. The CDM Regulations apply to all building and construction work including the construction, alteration, conversion, fitting out, commissioning, repair and maintenance, decommissioning, demolition or dismantling of a structure.

When preparing or modifying a design, the designer must take into account the general principles of prevention and any pre-construction information to eliminate, so far as is reasonably practicable, foreseeable risks to the health or safety of any person. These set out the principles duty holders should use to direct their approach to identifying the measures necessary to control the risks to health and safety in a particular project. The general principles of prevention are set out in full in Appendix 1and can be summarised as:

a. avoiding risks where possible;

b. evaluating those risks that cannot be avoided; and

c. putting in place proportionate measures that control them at source.

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

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

3.3 Draft London Plan

The London Plan is the statutory Spatial Development Strategy for Greater London, prepared by the Mayor of London in accordance with the Greater London Authority Act 1999 (incorporating amendments) and associated regulations.

The London Plan has been developed to outline the Mayor's general policies with regard to the development and use of land in Greater London and to ensure that this aligns with National policies with regards to development. When published, the London Plan will form part of the statutory development plan for Greater London.

The London Plan spatial development strategy for Greater London was published in March 2021. In particular, this report will observe policies D5 (Inclusive Design) and D12 (Fire Safety) of the London Plan.

In accordance with D12 of the London Plan 2021, consideration should be given to any likely building modification during operation and future works to the building. At this stage, BB7 are not aware of planned future works to the design other than traditional RIBA Stage design development. Should changes be formally acknowledged, BB7 reserve the right to amend this fire safety plan accordingly.

3.4 Regulatory Reform Fire Safety Order

The Fire Safety Order is the primary piece of legislation relating to fire safety in existing, non-domestic premises, and is usually enforced by the local fire authority.

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

3.5 Regulation 38

The aim of this regulation is to ensure that the person responsible for the building has sufficient information relating to fire safety to enable them to manage the building effectively. Regulation 38 will be achieved when the person responsible for the building has all the information to enable them to do all of the following.

d. Understand and implement the fire safety strategy of the building.

e. Maintain any fire safety system provided in the building.

f. Carry out an effective fire risk assessment of the building.

Fire safety information should be given to the responsible person at one of the following times.

a. When the project is complete.

b. When the building or extension is first occupied.

3.5.1 Essential information

Basic information on the location of fire protection measures may be sufficient. An as-built plan of the building should be provided showing all of the following.

a. Escape routes – this should include exit capacity (i.e. the maximum allowable number of people for each storey and for the building).

b. Location of fire-separating elements (including cavity barriers in walk-in spaces).

c. Fire door sets, fire door sets fitted with a self-closing device and other doors equipped with relevant hardware.

d. Locations of fire and/or smoke detector heads, alarm call points, detection/alarm control boxes, alarm sounders, fire safety signage, emergency lighting, fire extinguishers, dry or wet fire mains and other firefighting equipment, and hydrants outside the building.

e. Any sprinkler systems, including isolating valves and control equipment.

f. Any smoke control systems, or ventilation systems with a smoke control function, including mode of operation and control systems.

g. Any high-risk areas (e.g. heating machinery).

Details should be provided of all of the following.

a. Specifications of fire safety equipment provided, including routine maintenance schedules.

b. Any assumptions regarding the management of the building in the design of the fire safety arrangements.

c. Any provision enabling the evacuation of disabled people, which can be used when designing personal emergency evacuation plans.

4. Means of escape.

4.1 Evacuation strategy

It is proposed that building will adopt a phased evacuation procedure, whereby 2 phases of evacuation will be undertaken above ground storey with each phase comprising the evacuation of four storeys. Occupants of the ground and basement storeys will also evacuate at the same time as the upper levels.

The client may wish to adopt an inspection period to the evacuation strategy, whereby a period of time is allowed between the activation of a single detector and the full building alarm to allow the building management to establish whether or not it is a false alarm. Should a second detector or manual call point activate within this time, the buildings will go into full evacuation of the appropriate phase. This can be developed further at the next stage of the design if necessary, in conjunction with client operational needs and the mechanical and electrical consultant.

In accordance with the Policy D12 of the London Plan 2019, evacuation assembly points are required to be considered for final occupancy capacity as well as management levels during operation of the building. Upon design development and consideration given to final occupant levels within the building and associated management levels, evacuation assembly points will be identified.

4.2 Projected occupancy numbers

The occupancy figures below are based on floor space factors (as detailed in BS9999) for the various accommodation use at each level. These figures are specified for conservative projected occupancy calculations however it is recognised that these projected occupancies are subject to final client input.

Table 4.1 Occupancy figures

Level	Use	Floor area (m^2)	Occupancy factor (m^2/ person)	Projected occupancy
Level – 02	Flexible Class E	≈ 1650	4	412
Level – 01	Flexible Class E	≈ 273	4	68
	Cycles	330 cycles	20% of cycles	66
	Showers	28 showers	50% of showers	14
	Plant	612	30	20
Ground	Flexible Class E	≈ 810	1	810
	Foyer	≈ 225	6	38
	Loading bay/plant	≈ 379	30	12
Level 1	Office	≈ 1384	6	230
Level 2		≈ 1404	6	234
Level 3		≈ 1486	6	247
Level 4		≈ 1493	6	248
Level 5		≈ 1550	6	258
Level 6		≈ 1550	6	258
Level 7		≈ 1616	6	269
Level 8		≈ 1616	6	269
			Levels 1-8 total	**2013**

Table 4.1 provides an estimate of maximum occupancy numbers based on spatial occupancy load factors.

4.3 Travel distances

Travel distances have been assessed against the recommendations of BS 9999: 2017, using the appropriate risk rating.

Where the exact travel distance is not known, direct distances have been taken as two thirds of the travel distance, this is shown by the figures in brackets in the table below.

Table 4.2 Maximum recommended travel distances

Risk profile	Use	Travel possible in more than one direction (m)	Travel possible in one direction only (m)
A1	Offices	65 (44)	26 (17)
A2	Plant areas (assumed medium risk at this stage) Loading bay / Storage	55 (37)	22 (15)
A3	High risk plant rooms	45 (30)	18 (12)
B1	Flexible Class E space	60 (40)	24 (16)

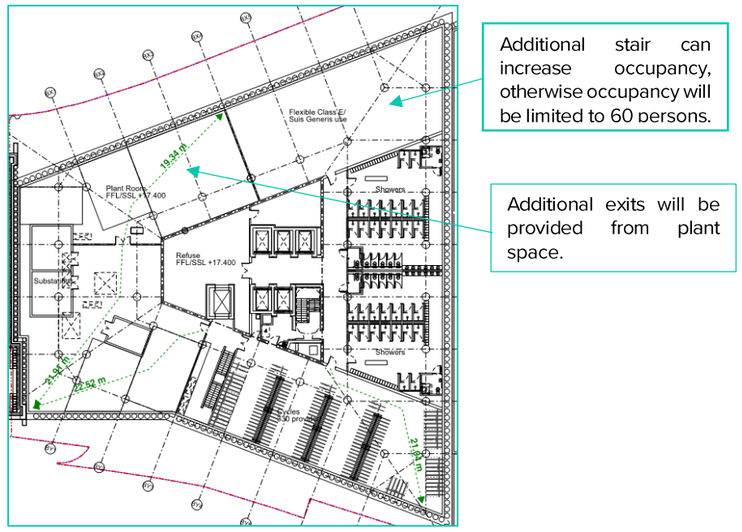
Level -02

Travel distances are achieved for the open plan layout. Subdivision of this space is likely to require some protected corridors to the central core arrangement to maintain adequate travel distance limitations. Additional stairways will be considered depending on occupancy numbers. The design and likely layout of this level will be developed in the next design stage.

Level – 01

Additional exits will be provided to the plant room spaces in order to satisfy the travel criteria in table 4.2. The occupancy within the Flexible Class E space will be limited to 60 persons. This may be increased if on fitout an additional stair is provided to ground storey. These measures will be addressed in the next design stage but there is nothing fundamental in the design that would prevent such measures being incorporated.

Figure 5. Basement Level – 01



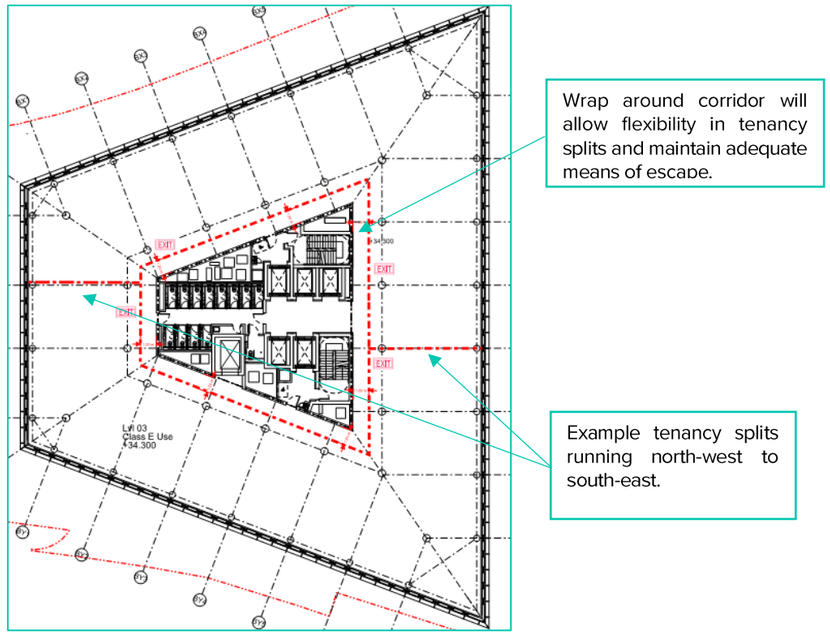
Ground floor

The ground floor accommodation is provided with numerous doors to the surrounding streets and travel distances can be seen to be adequate within the limitations of table 4.12 above.

Levels 1-8

The central core arrangement has exit doors located north and south of the core such that the travels limitations in table 4.2 above are achieved. Sub-division of the floor plate is likely to require a common corridor to the central core. A typical arrangement can be seen below.

Figure 6. Split tenancies



4.4 Exit widths.

Exit widths are determined by the number of people who may potentially use the routes and the appropriate factor from Table 12 of BS 9999.

The below table indicate the exit width criteria for each occupancy use within the building.

Table 4.3 Exit widths.

Risk profile	Building occupancy use	Exit width (mm/person)
A1	Offices	3.3
A2	Plant areas (assumed medium risk at this stage) Loading bay / Storage	3.6
A3	High risk plant rooms	4.6
B1	Flexible Class E space	3,6

Where a door width is less than 1050mm, including where the minimum width has been reduced by the provision of additional fire protection measures, the number of persons safely accommodated by that exit width should be calculated using the following equation:

$$n = 500/m$$

Where:

n is the number of persons safely accommodated by the door width.

m is the minimum exit width per person (i.e. 3.1mm/person for e.g. office accommodation)

The following table sets out the minimum exit widths at each level of each building based on the projected occupancy numbers of each space, as detailed in Table 4.1. The minimum exit widths have been calculated by assuming that at least one exit will become unusable due to fire in each case, which provides the worst-case situation.

Table 4.4 Minimum exit widths

Level	Location	Projected occupancy	Minimum exit widths	Proposed exit widths
Level – 02	Flexible Class E space	412	3 x 1050mm	2 x 900mm
Level – 01	Flexible Class E space	68	2 x 800mm	1 x 900mm
	Cycles	66	2 x 800mm	2 x 900mm
	Showers	14	1 x 800mm	2 x 900mm
	Plant	20	1 x 800mm	1 x 900mm
Ground	Flexible Class E	810	4 x 1050mm	9 x 2100mm 1 x 900mm
	Foyer	38	1 x 800mm	2 x 1050mm
	Loading bay/plant	12	1 x 800mm	1 x 3550mm each space
Levels 1 - 8	Office workspace	269 (worse case)	2 x 1050mm	2 x 900mm

Note 1: Please note that the proposed exits shown in red will need to be reconsidered. A review of the plans indicates that the minimum exit widths can be achieved without fundamental changes to the design.

Note 2: Where occupancy passing through an exit door exceeds 60 persons the exit door will be hung to open in the direction of escape.

Note 3: The minimum exits widths specified above take account of loss of the worst-case exit due to fire i.e. where an accommodation is provided with more than one exit and in accordance with BS 9999: 2017, the largest exit is discounted on the basis the seat of fire renders the largest exit unusable.

The changes to exit width criteria picked up in the table above will be discussed with the design team and appropriate changes will be made for the next design issue of the fire strategy.

4.5 Vertical escape

The vertical escape routes each floor is available via two protected stairways. The main stairways serve all upper floors with one of the stairways continuing to basement level -01 and -02. Basement levels -01 and -02 are also served by a second independent stairway.

The stairways have been numbered 1, 2 and 3 as indicated below:

Figure 7. Typical upper floor

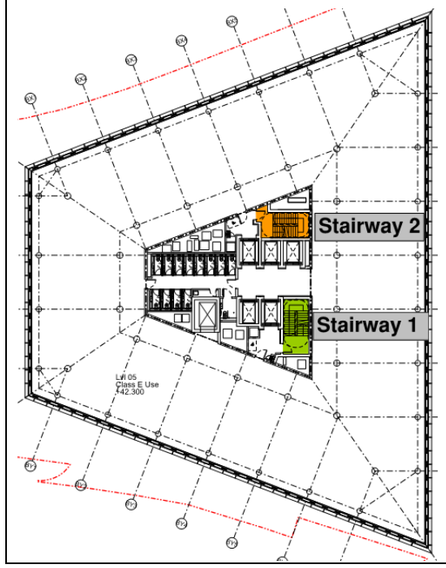
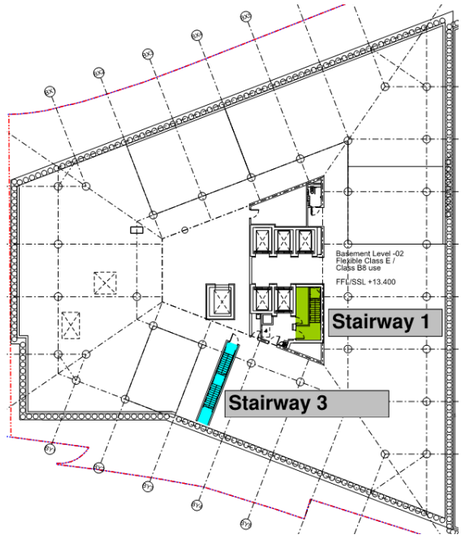


Figure 8. Basement level - 02



Staircase widths and capacity

The staircase capacities will be based on the minimum width of the stair per person and the number of floors served by the stair in each case. The building will adopt a phased evacuation incorporating two phases of evacuation. Each phase will allow four storeys to evacuate simultaneously.

As the buildings will be fitted with a sprinkler system, it is not necessary for any of the staircases to be discounted as part of these calculations.

Office escape stairways servings levels 1 - 8

The office levels are served by two stairways and the total estimated occupancy for the office space is 2013 persons. The evacuation is based on 2 phases; these being levels 1-4 inclusive and levels 5-8 inclusive.

The risk profile is A1 for which BS 9999 recommends a stair width factor of 2.45mm/person based on 4 storeys evacuating at any one time. The maximum occupancy for 4 storeys is on levels 5 – 8 and is 1054 persons.

Accordingly, the minimum stairway widths will be **1300mm per stairway** (1054 x 2.45 / 2 = 1291mm).

Basement storeys

The maximum occupancy of the two basement levels has been estimated as a maximum of 580 persons and each basement served by two stairways. The risk factor of 3.6 is applicable for the risk profile B1.

The minimum width of stairways for upward travel is **1200mm** for which each would have a capacity of 333 persons based on the risk profile. This is adequate for the estimated total occupancy of 580 persons.

Stairway exit corridors and merging flows.

At ground level the stairway exit corridor from stairway 1 will serve both the upper floor occupants and the basement occupants and thus a merging flow will occur at ground level.

The merging flow from stairs above and below ground level can be calculated from the following equation taken from BS 9999:

$W_{FE} = BX + 0.75S_{up}$

Where:

B is the number of people served by the stair from below the final exit level;

W_{FE} is the width of the final exit, in millimetres (mm);

S_{up} is the stair width for the upward portion of the stair, in millimetres (mm);

X is the minimum door width per person, in millimetres (mm);

Stairway 1

Stairway 1 serves both levels of the basements and will take half the occupancy.

W_{FE} = [(290 x 3.6) + (0.75 x 1200)]

= 1944mm

Therefore, based on the estimated occupancy and risk profile the minimum width of corridor and final exit leading from stairway 1 will be **1944mm**.

This will also satisfy fire service access requirements.

Stairway 2

Stairway 2 does not serve the basement levels but does act as the fire service access route to the firefighting shaft and should therefore be 500mm wider than the stairway.

As such, the minimum width of corridor and final exit leading from stairway 2 will be **1800mm**.

4.6 Final exits

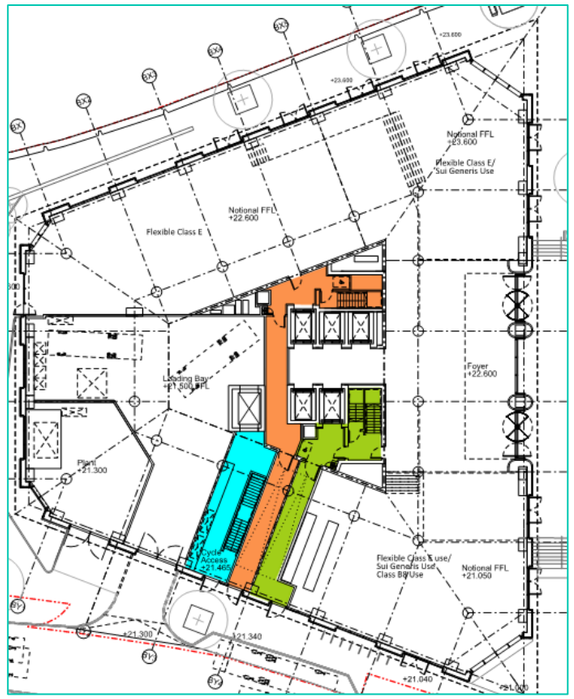
General

The discharge from common stairs and final exits should meet the following recommendations:

- Final exits from the stairs and to the external should swing in the direction of escape.
- Protected staircase should discharge either directly to a final exit or into a protected corridor leading to a final exit which is lobbied from any accommodation.
- Final exits should have a level threshold and preferably lead to ground. Where there is no level ground, a suitable ramp or a step should be provided. Where a step is provided there should be suitable and apparent landing.
- Finals exits should discharge directly to a street, passageway, walkway or open space that allows for the rapid dispersal of persons away from the vicinity of the building.

The final stairway escape routes from the building are shown below:

Figure 9. Final stairway escape routes



4.7 General provisions

Corridors and escape routes

Where provided, all corridors will satisfy the minimum widths required for means of escape or generally maintain a minimum width of 1200mm; whichever is the greater.

Where double doors are provided within corridors, the minimum width of at least one of the doors will be designed to be not less than 800mm to satisfy Part M to the Building Regulations.

All corridors exceeding 12m in length and connecting two or more storey exits will be suitably subdivided by self-closing fire doors and associated fire rated screens. This compartmentation will run through the accommodation either side of the corridors.

All escape routes will have clear headroom of 2m, except for doorways etc.

The light wells on the west and east side of tenant 2 are used as escape routes, which have louvered vents to the basement. It is proposed to use louvered vents that have a smaller free area to prevent occupants from trapping their feet within the grilles when making their escape.

Exits generally.

In general, doors on escape routes will be fitted with simple fastenings that can be readily operated from the side approached by people making an escape.

The operation of these fastenings will be readily apparent; without the use of a key and without having to manipulate more than one mechanism.

Where provided, electrically powered secure locks will return to the unlocked position:

- On operation of the fire alarm system; and
- On loss of power or system error; and
- On activation of a manual door release unit (Type A) to BS EN 54- :200 positioned at the door on the side approached by people making their escape. Where the door provides escape in either direction, a unit will be installed on both sides of the door.

4.8 Disabled evacuation

Locations for temporary safe refuge will be provided within each of the stairway lobbies.

Each refuge will be a notional space measuring 1400 mm x 900 mm, located outside of the path of escape within the protected corridor/stair and each refuge will be provided with emergency voice communication (EVC).

The EVC system will be linked to a management centre within the building which will be permanently managed.

The proposed refuge locations on the low- and high-rise typical floors are shown in the following figures:

Figure 10.

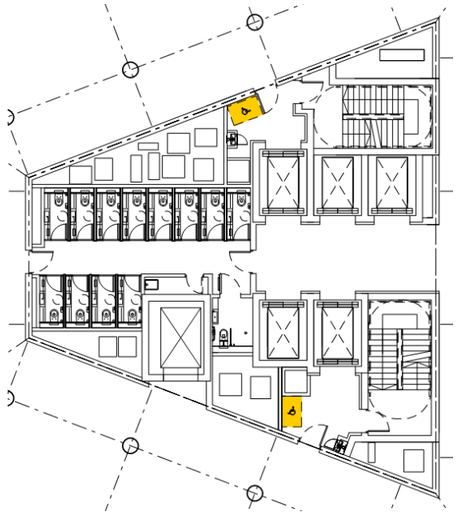
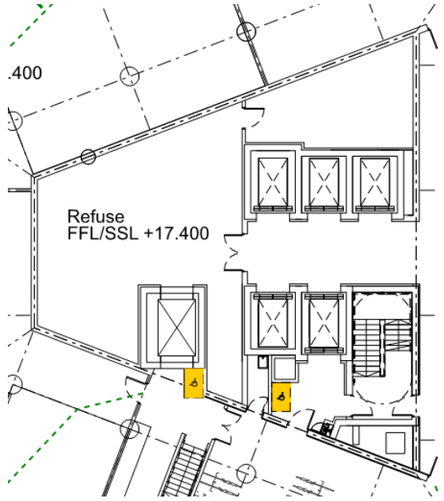


Figure 11.



Lifts will be made available for the evacuation of disabled occupants. This may be the fire fighting lifts on the upper floors which open directly onto the lobbies containing the safe refuge areas and a dedicated evacuation/cycle lift from the basement floors.

4.9 General escape assembly points

Once outside, occupants should be able to escape away from the buildings to a designated muster point.

Assembly points will be located sufficiently away from the premises to minimise interference with Fire and Rescue operations or danger from falling debris but should be fully accessible and at a distance as to discourage people choosing not to assemble at the designated point(s).

Routes to the assembly point(s) should be subject to ongoing inspection and maintenance to ensure they are not blocked or adversely impacted by material obstructions, vehicles, or adverse weather conditions. Subject to design progression, designated assembly points will be identified.

5. Internal and external fire spread

5.1 Elements of structure

Test standards

Fire resisting elements selected should meet the performance standards recommended by the relevant part of BS 476, BS EN 1363, BS EN 1364, BS EN 1365 or BS EN 1366.

Overview of elements of structure

There is a threefold purpose to providing the structure of a building with a quantified period of fire resistance:

- Protection for occupants during their evacuation and for people who may remain in the building for an extended period while duties are completed, for example fire wardens or those assisting with wheelchair escape;
- Protection of firefighters who may be called upon to enter the building sometime after the first ignition to complete search and rescue or firefighting operations; and
- Reduce the danger to people outside and to neighbouring buildings through premature collapse.

As a rudimentary risk-based approach the following periods of fire resistance have been proposed and are based on the building height and class of use, which is **120 minutes** fire resistance.

Application to elements of structure

Elements of structure subject to protection in order to achieve the designated building fire time include:

- Beams and columns;
- Floors (whether compartment floors or not); and
- Loadbearing walls

Structural elements that are self-supporting or support only a roof need not have any applied fire protection except if the stability of the building depends on it, or unless the roof serves as a floor, for example the roof is used as an escape route. Where one element has reliance for stability on another element with a lesser fire time requirement then the higher of the two periods will be applied to both elements.

Other internal fire spread measures

The building relies heavily on compartmentation to prevent internal fire spread so it does not affect occupants escaping as well as protection to the fire service.

The internal fire spread measures will consist of compartmentation, fire stopping, duct work protection, fire dampers, cavity barriers and internal surface finishes and linings.

All banks of lifts will also be lobbied or provided with fire and smoke curtains to support the phased evacuation.

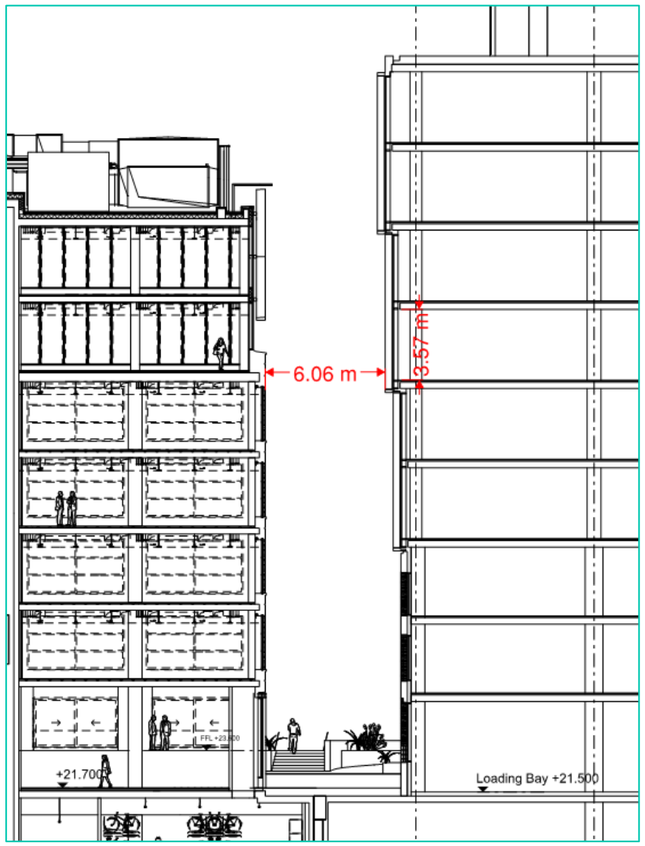
These elements will be developed throughout the design.

5.2 External wall appraisal

The north west elevation is in reasonably close proximity of the adjoining building Plot A. The width of this elevation is approximately 24m and the height of a single typical office storey is 3.6m. the distance between buildings is approximately 6m and so the notional boundary line between buildings has been taken as 3m.

The typical arrangement is shown below:

Figure 12. Plot A to Plot B separation



From BR 187 the following calculation can be made:

Enclosing rectangle (ER) = 24(w) x 6(h) = 144m^2

Unprotected openings = 24(w) x 3.6(h) = 86m_2 (assuming 100% unprotected).

% unprotected of ER = 60%

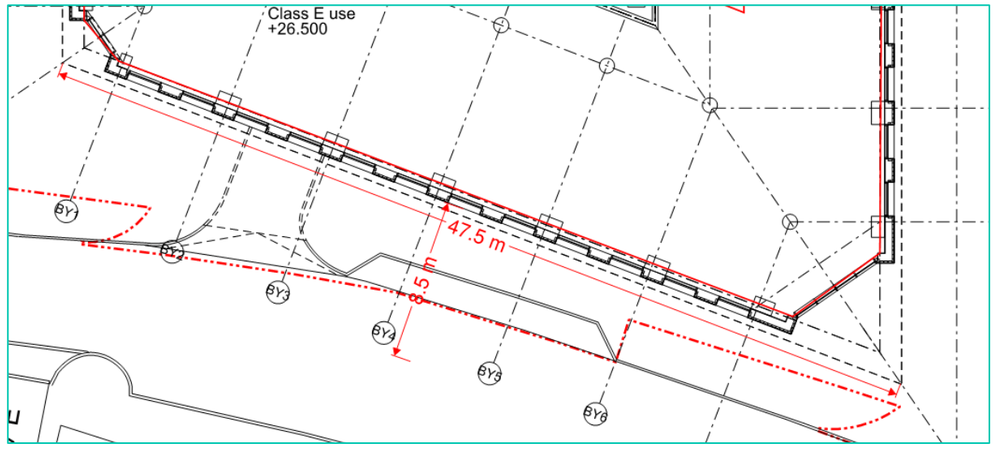
Minimum recommended boundary for office use is 2.5m (allowing a 50% reduction for sprinklers).

Based on the above the calculations suggest that external boundary conditions would be satisfactory with the installation of sprinklers.

The south west elevation faces on to St Pancras St which has the more onerous boundary condition compared to the elevation onto Regent's canal.

The width of this elevation is approximately 47m and the height of a single typical office storey is 3.6m. The distance to the centre of St Pancras St is approximately 8.5m.

Figure 13. South west elevation to St Pancras Street



From BR 187 the following calculation can be made:

Enclosing rectangle (ER) = 50(w) x 6(h) = 300m^2

Unprotected openings = 47(w) x 3.6(h) = 169m_2 (assuming 100% unprotected).

% unprotected of ER = 56%

Minimum recommended boundary for office use is 2.55m (allowing a 50% reduction for sprinklers).

Based on the above the calculations suggest that external boundary conditions would be satisfactory with the installation of sprinklers.

The above calculated elevations are considered the worst-case scenarios. Whilst more details calculations will be shown in the design development it can be considered that the boundary space separation requirements are met.

6. Active fire safety systems

6.1 Fire detection and alarm systems

A Category L1 system has will be proposed for the building to satisfy the criteria given in BS 5839-1.

6.2 Smoke control systems

Firefighting shafts

The firefighting shafts will be provided with a form of ventilation to support firefighting. Ventilation can be achieved by a pressure differential system, mechanical ventilation system or via natural ventilation.

If a pressure differential system is to be provided, it should be designed and installed in accordance with BS EN 12101-6 for Class B systems.

If a mechanical ventilation system is to be provided, it should be designed and installed in accordance with BS 7346-8 and should be shown to demonstrate equivalent or better conditions in the lobby and stairs when compared with a natural ventilation system (e.g. through the use of CFD modelling).

If a natural ventilation system is to be used, AOV windows or a natural smoke shaft should be provided within the lobby to provide at least 1.5m^2 natural ventilation either to the outside or into a natural smoke shaft. If a natural smoke shaft is to be used, it should have a minimum cross-sectional area of 3.0m^2, with a minimum dimension of 1m.

With both cases of mechanical or natural ventilation, an AOV should be provided at each level within the stair (or a single AOV can be provided at the head of the stair), which should have a minimum geometric free area of 1.0m^2.

Loading dock

The loading dock is approximately 240m^2 and will therefore require a system of smoke and heat ventilation. The objective of the system should be to clear smoke during the fire and after the fire has been suppressed.

The requirement for a smoke control system in this area and the subsequent design will be developed further as the design progresses subject to natural openings available or, if needed, a mechanical alternative ventilation strategy.

Below ground levels

The below ground should be provided with a system of smoke and heat ventilation. This can be achieved through natural smoke outlets or through the use of a mechanical ventilation system.

If natural smoke outlets are to be provided, they should be not less than 2.5% of the floor area of the below ground level, be sited at high level and be distributed evenly around the perimeter of the building. Furthermore, smoke vents should not be provided where they may obstruct escape routes from any building.

If a mechanical ventilation system is to be used, it should provide ten air changes per hour and be capable of handling gas temperatures of 300°C for no less than 60 minutes. The systems should operate automatically upon activation of the automatic smoke detection and alarm system or the sprinkler system. Replacement air should also be provided to the system.

6.3 Fire suppression

The building will be provided with a commercial sprinkler system to cover all accommodation, which will be designed in accordance with BS EN 12845.

Consideration will be given to the suitability of a suppression system in certain plant spaces. Depending on the equipment within the plant rooms, a sprinkler/ water mist system may not be appropriate and instead a gaseous suppression system would be preferred instead.

The design and coverage of the suppression systems will be developed further at the next stage of the design.

6.4 Other fire safety systems

The following fire safety systems are also provided to each of the buildings:

- Emergency escape lighting;
- Escape signage;
- Portable firefighting equipment;
- Secondary power supplies and protected circuits for life safety systems.

Further details of these systems will be provided at the next stage of the design.

7. Fire service access

7.1 General vehicle access

Fire Service access is required to provide access for fire personnel and a water supply to within a reasonable distance of the building entrances. Where there are dead end routes within the site, these should either be limited to approximately 20m or a turnaround (turning circle or hammerhead) facility provided.

All routes will be suitable for a fire appliance in terms of hard standings supporting the mass of a fire appliance (14 tonnes). Fire access routes should also have dimensions in accordance with the table below:

Table 7.1 Vehicle requirements

Appliance type	Minimum width between kerbs	Minimum width of gateways	Minimum turning circle between curbs	Minimum turning circle between walls	Minimum clearance height	Minimum carrying capacity
Pump	3.7m	3.1m	16.8m	19.2m	3.7m	14
High Reach	3.7m	3.1m	26.0m	29.0m	4.0m	23.0
Note: Because the weight of high reach appliances is distributed over a number of axles, it is considered that their infrequent use of a carriageway or route designed to 14.0 tonnes is not likely to cause damage. It would therefore be reasonable to design roads bases to 14.0 tonnes, although structures such as bridges podium etc. should have the full 17 tonnes capacity.						

The fire service access to the site will be via St Pancras Way, where the fire service can access both firefighting shafts to the building.

The fire appliance parking locations in St Pancras Way are within 18m of the entry points and the dry riser inlets.

7.2 Firefighting access within the buildings

The building is in excess of 18m in height and has floor areas in excess of 900m^2.

Therefore the building will be provided with two firefighting shafts. Each firefighting shaft will comprise of a firefighting stair, firefighting lift and firefighting lobby (incorporating a dry rising main). Each of the firefighting shafts will serve all levels upper levels of the building with one serving the basement levels and will be provided with a form of smoke ventilation.

Both firefighting lifts are proposed as dual entry lifts.

All locations within the building's will be within 60m of a dry riser outlet.

Direct fire service entry

Fire service entry should be granted into the building(s) via a number of methods as security measures may cause delay in fire service intervention. One of the following approaches is recommended to be developed in the subsequent design stage:

- Rely on fire service gaining access by their own means (inclusive of by force);
- Include specific premise information in each dry riser inlet or Gerda protected boxes with access codes, fobs etc.;
- Drop key override to the access routes for the fire service to override security;
- Interface final exit doors to fail openable from the outside in the event of a fire.

7.3 Provision of fire hydrants

Hydrants should be provided within 90m of the dry fire main inlet on a route suitable for laying hose. The provision of existing hydrants will be checked during the design development and additional hydrants will be provided should these be required to satisfy the 90m criteria.

8. Management

Managing fire safety throughout the life cycle of a building is an essential element of an effectively engineered fire safety system. This bespoke building fire strategy should evolve into an 'As built building fire strategy' and become a useful reference document for the fire safety manager responsible. However fire risk management documentation is likely to exist at two levels:

- Fire risk management at an organisational level
- Fire risk management at a premises level.

Whilst this bespoke building fire strategy sets out fire risk management considerations at a premises level, it is acknowledged that fire risk management strategy at an organisational level will define the organisations fire risk management system, and method of implementing policy.

8.1 Fire risk management at an organisational level

In accordance with the Regulatory Reform (Fire Safety) Order 2005 and equivalent legislation in Scotland and Northern Ireland the responsible person must make and give effect to such arrangements as are appropriate to the size of his undertaking and the nature of its activities, for the effective planning, organisation, control, monitoring and review of the preventative and protective measures.

Successful governance of organisational fire risk begins with policy which is usually an overarching statement of intent that clearly establishes the direction and intentions of the organisation with respect to fire risk, as formally expressed by its top management. A documented fire risk management system provides a means of demonstrating that fire safety policy is translated into action to ensure that the fire risk to people and the business is reduced as far as reasonably practicable while ensuring legislative requirements are met.

The organisation would be well advised to consider the desirability of third-party certification of conformity with PAS 7: 2013 – Fire Risk Management Systems Specification (A British Standards Institution publication). Appropriate conformity attestation requirements are described in BS EN ISO/IEC 17021. This standard was drafted in accordance with International Standards Organisation (ISO) guidance and therefore can be applied across national and geographic boundaries.

8.2 Fire risk management strategy

The organisation should define and document its fire risk management strategy. The fire risk management strategy shall address the following seven factors of strategic fire risk management:

- Fire risk assessment
- Resources and authority
- Fire safety training
- Control of work onsite
- Maintenance and testing
- Communication
- Emergency planning

8.3 Fire risk management at premises level

The interaction between the building, the people and processes will be clearly evident and effective management is imperative. The fire safety manager should be aware of all of the fire safety features provided and their purpose. Specifically, with respect to life safety there are two key aspects that are imperative to the running of this building:

- To ensure that the fire safety measures that have been provided are kept in good working order;
- To initiate actions on the occurrence of a fire which will provide all the help and assistance those occupants need to reach a place of safety.

BB7 will be on hand to discuss any questions and queries the fire safety manager or any other duty holder may have. The fire safety manager will take overall responsibility for implementing the fire risk management system as it applies to the premises. Should third party certification of the fire risk management system be considered desirable then the scope of the certification could be limited to this single premise.

8.4 Fire risk assessment

The Regulatory Reform (Fire Safety) Order 2005 places a legal obligation upon the responsible person to undertake a suitable and sufficient fire risk assessment. This is indeed the cornerstone of this legislation.

BB7 was the first company in the United Kingdom to obtain Quality Assurance Certification of Companies Offering Life Safety Fire Risk Assessment Services. BB7 has demonstrated to Warrington Certification, technical and management competencies to undertake life safety fire risk assessments as required by, The Regulatory Reform (Fire Safety) Order 2005, The Fire Safety (Scotland) Regulations 2006 and The Fire Safety Regulations (Northern Ireland) 2010 and is now listed as a certified company. Having developed a bespoke building fire strategy for the premises we would be well placed to undertake this assessment. In any event we would recommend that only Certificated Fire Risk Assessors are used and full details of their UKAS accredited third party certification are sought to undertake this assessment.

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