MARSHALL FIRE

Title:	Project 1 21 Southampton Row & Sicilian Avenue Fire Strategy Report
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Revision	Description	Author	Approver	Date
00	Initial Issue	Daniel Taylor	Richard Baker	5th October 2021
01	Updated Plans, incorporated Sweco BC comments, See Sections 2.3.1, 3.2.1, 3.2.2, 3.3, 3.5, 5.2.2, 5.4, 5.6, 5.7, 7.1, 7.3 & 7.4.	Daniel Taylor	Richard Baker	7th July 2022

Contents

1. Executive Summary

The proposals outlined in this document are considered to demonstrate a level of fire safety equal to or greater than the general standard implied by compliance with the recommendations in BS 9999: 2017. This level of safety therefore satisfies the functional requirements of Part B of the Building Regulations.

The following project is an existing office building consisting of two adjacent buildings referred to as 21 Southampton Row and Sicilian Avenue. Both buildings are listed and therefore limitations to meet current guidance prevail. The scope of works is to undertake general refurbishment with the removal of various internal partitions creating an open plan floor plate. Where improvements can be achieved to compensate it has been done and improvements will be adopted to protect means of escape and firefighting phases will be made with respect to the site constraints.

21 Southampton Row with a floor greater than 18m above ground would in accordance with current guidance require a firefighting shaft including firefighting lift and all stairs to be approached via a protected lobby. It is not possible for the central stair to be upgraded in full as a fighting shaft but will be improved by the following:

- The stair will be rebuilt with 2 hours fire resistance and serving all floor levels.
- An Automatic Opening Vent will be provided at the head of the stair.
- A dry riser system will be installed.

The works are for refurbishment to the existing buildings that do not necessarily comply with current guidance to the Building Regulations. The existing provisions are however deemed as satisfactory to meet the functional requirements of the Building Regulations and works to the buildings will result in being no less satisfactory than before the work was carried out.

The fire strategy described in this report can be summarised as follows (note this is not an exhaustive list but outlines the main fire safety requirements. Please read the remainder of the report for the full requirements):

- A Category L1 fire alarm system consisting of smoke detectors, manual call points and sounders is proposed to be installed incorporating fire detection throughout the building in accordance with BS 5839-1.
- It is proposed that each separate building (office and retail units) will operate a simultaneous evacuation regime and therefore in the event of a fire, the unit with the fire will be evacuated in full but all other buildings/units can remain in place due to separate detection systems and party wall separation. It is not currently proposed to incorporate an investigation period given the nature of the building.
- The occupancy is based on $6m^2$ as per open plan office layouts or based on the architectural drawing occupancy.
- For the office floor levels the occupants are awake and familiar and with a medium fire growth rate applied an A2 risk profile is used. The maximum recommended travel distances where the layout is known for a is 22m in a dead-end condition and 55m where more than one direction of escape is available.
- The existing elements of structure for 21 Southampton Row will maintain 90 minutes fire resistance as it is considered no less satisfactory than before the refurbishment works. Any new elements of structure will also achieve at least 90 minutes fire resistance given the topmost storey is greater than 18m in height.
- The existing elements of structure for Sicilian Avenue will maintain at least 60 minutes fire resistance when having a floor less than 18m but any new elements of structure will be required to achieve at least 90 minutes where a building has a top occupied floor exceeding 18m in height.
- The building will be served by dry risers serving Stairs 01, 03 and 04 with an outlet position on every floor level so that coverage to all areas at each floor can be achieved within 45m along a route suitable for laying a hose.
- The external escape stair labelled Stair 02 is protected having a 1800mm fire rated wall along the building façade.

The fire strategy for the proposed building complies with BS 9999 except for the following departures:

- 21 Southampton Road having a floor greater than 18m above ground does not have a firefighting shaft including firefighting lift. Due to listed constraints, it is not practically possible to arrange Stair 01 as a fully compliant firefighting shaft. Given the floor plate and building height have not changed, then it is deemed that conditions are not being made any worse and the proposed upgrades to the existing core are deemed as reasonable. See Section 7.1 for more information.
- The use of fire and smoke curtains are a fire engineered solution and require agreement with the approving authority. See Section 5.2.2 for more detail on locations.
- In certain instances, the clear width of a horizontal storey exit is less than 800mm on the existing floor plates, as it is no less satisfactory than before and with the occupancy/risk profile not changing this is deemed acceptable.

The above departures are subject to agreement with the Approving Authority.

2. Introduction

2.1 Overview

Marshall Fire has been appointed by Polestar Plc to provide fire safety advice to the project. Our role is therefore to advise on the design of the buildings against compliance with Part B of the Building Regulations and assist in steering the designs towards Building Regulation approval.

2.2 Purpose of this report

This report details how we consider the building will comply with the requirements of Part B of the Building Regulations. In doing so the guidance contained in BS 9999: 2017 has been used, with the main structure of the report following the main parts of Part B of the Building Regulations.

The approval status of the fire strategy should be considered as a risk until such time as the appointed Building Control Body has reviewed the proposals and provided their approval in principle. Once approved in principle the building should be constructed in accordance with the contents of this report and any amendments should be reviewed and approved accordingly by the Building Control Body.

The findings of this report are based on the information available at the time of writing this report. We cannot be held responsible for any subsequent changes to the design that we are not made aware of.

2.3 Scheme description

The proposed project consists of the refurbishment of office floors of both 21 Southampton Row and Sicilian Avenue with the intent to create an open plan layout by removing internal partitions and to rebuild the central stair of 21 Southampton Row (Stair 01) to better serve the building. There is no change to the building use, area or building height.

The project is split into two separate buildings known as 21 Southampton Row and Sicilian Avenue. 21 Southampton Row is office use only with amenity spaces whereas Sicilian Avenue has retail units at ground and basement and office on the upper floor levels with independent access via two separate stairs.

The topmost floor of 21 Southampton Row is the existing 6th floor that measures 20.3m above ground floor.

The existing condition is considered no less satisfactory than before and therefore will be maintain as it is, however any new or modified construction will meet the current guidance where practically achievable.

Sicilian Avenue measures 16.1m to the 5th floor as the topmost storey.

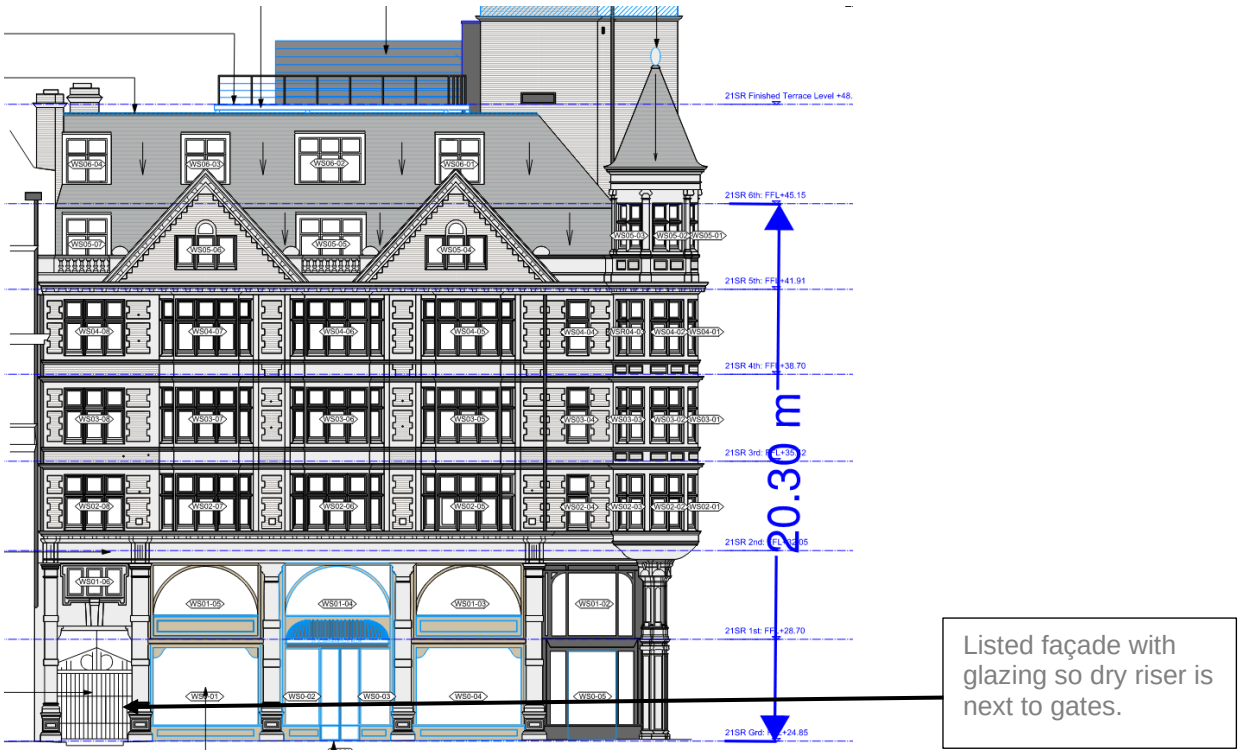


Figure 1: 21 Southampton Row – Elevation

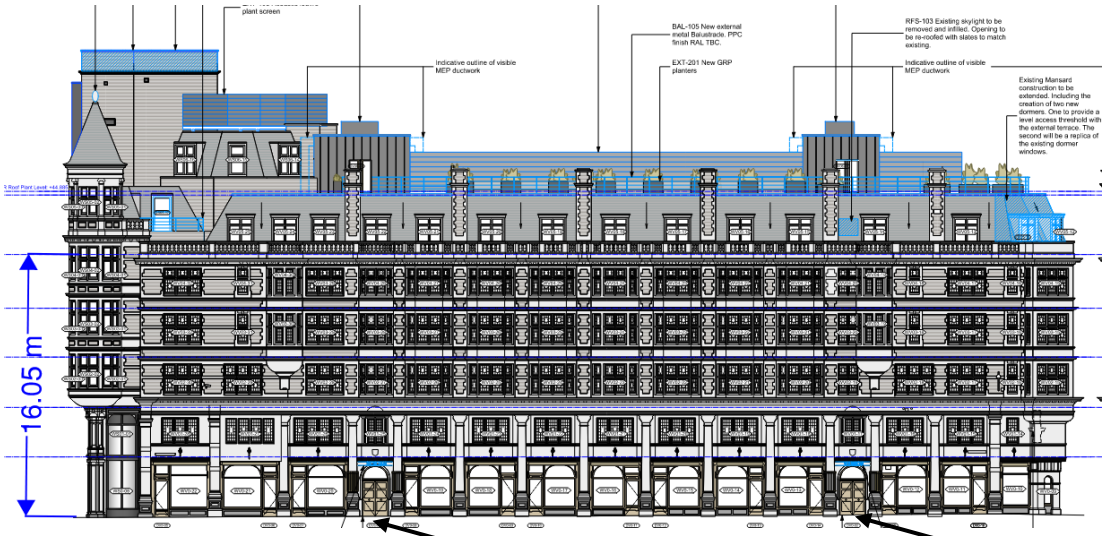


Figure 2: Sicilian Avenue – Elevation

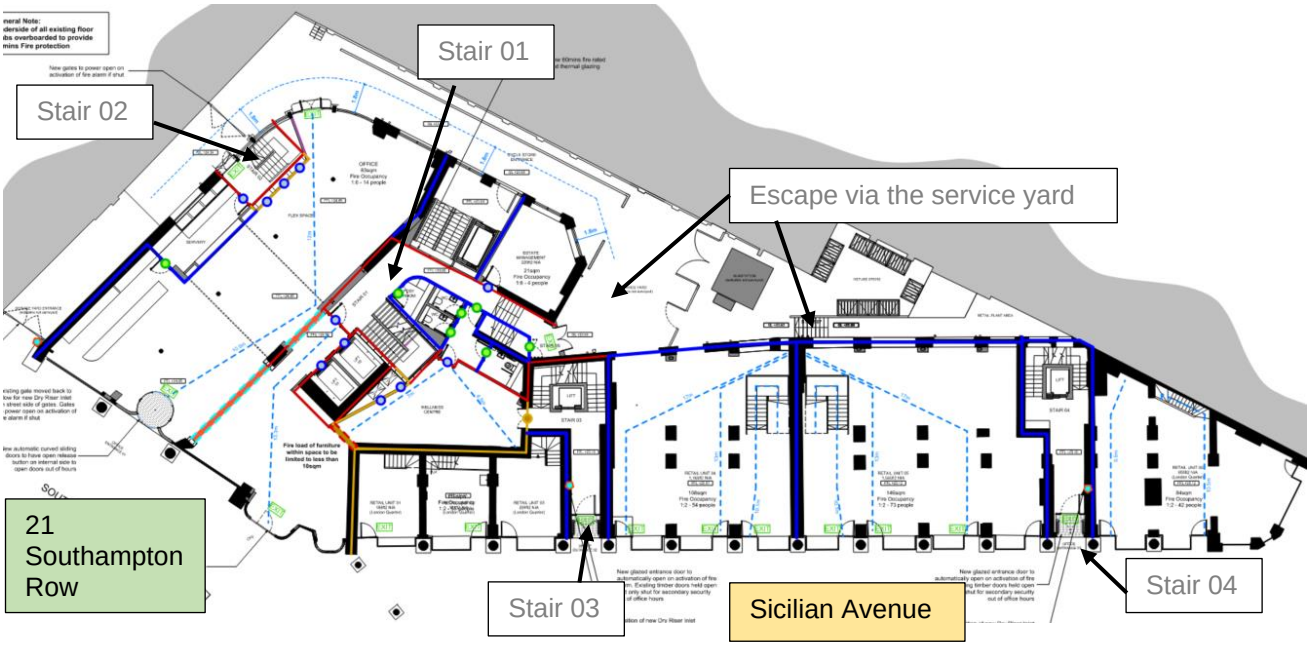


Figure 3: 21 Southampton Row and Sicilian Avenue ground floor plan

2.3.1 Anticipated Occupancy Figures

Table 1: Anticipated Occupancy Figures - 21 Southampton Row

The maximum anticipated occupancy figures for 21 Southampton Row are noted below:

Level	*Floor Area m²*	*Anticipated Occupancy*
Basement	353 (Amenity/Plant/Cycle Stores/Fitness +Wellbeing)	60 people
Ground	123	21 people
First	415	70 people
Second	444	74 people
Third	445	75 people
Fourth	451	76 people
Fifth	423	71 people
Sixth	322	54 people
TOTAL		**439 people**
Total Upper floor occupancy		**358 people**

Note: Open Plan office floor space factor is 6m² /person.

Table 2: Anticipated Occupancy Figures - Sicilian Avenue

The maximum anticipated occupancy figures for Sicilian Avenue are noted below:

Level	*Floor Area m²*	*Anticipated Occupancy*
Basement	Retail Unit 02 Retail Unit 03 Retail Unit 04	63 people 76 people 54 people
Ground	Retail Unit 01 Retail Unit 02 Retail Unit 03 Retail Unit 04	55 people 54 people 73 people 42 people
First	443	72 people
Second	439	74 people
Third	446	75 people
Fourth	448	75 people
Fifth	328	55 people
TOTAL		**768 people**
Total Upper floor occupancy		**351 people**

Note: Open Plan office floor space factor is 6m² /person.

Retail Units have adopted a floor space factor of 2m² /person

2.3.2 BS 9999 Risk Profiles

Rather than band buildings by broad occupancy type, BS 9999 uses the principle of risk profiles when prescribing an appropriate package of fire safety measures. This varies depending on the type of occupancy and inherent fire risk within the building. Where suitable separation is afforded between different uses then the appropriate risk profile can be applied to the applicable area.

- The office areas of the building are to be assessed under an A2 risk profile; 'occupants that are awake and familiar and with an inherent medium fire growth rate'.
- The internal plant areas and stores are to be assessed under an A3 risk profile; 'occupants that are awake and familiar (professional trade works familiar with plant room risks) and with an inherent fast fire growth rate'.
- The retail units will have awake and unfamiliar occupants and therefore will be assessed under a B2 risk profile with an inherent medium fire growth rate'.
- External Plant Areas and the roof terrace will adopt a normal fire hazard due to their noisy environments.

2.4 Report limitations

This report is intended for use on this project only and the contents and approaches should not be applied to any other building. This report details how the building will be constructed and does not guarantee that the building has been constructed in accordance with this document. We cannot take any responsibility for any shortfalls in the standard of construction on site as this would lie with the installer.

The proposals within this report are strategic only and any works listed herein will need to be appropriately designed and installed by others. Where it is considered that the proposals within this report may present a risk under the Construction (Design and Management) Regulations 2015 (CDM) these will be highlighted to the Principal Designer.

This report focuses on Part B of the Building Regulations. Compliance under the other Parts of the Building Regulations will also need to be achieved through works undertaken by others.

The contents and findings herein are based on the information available at the time of publication and referred to within this document. The contents should be considered an approvals risk until formally approved by the appointed Building Control Body.

By complying with the recommendations in this report it will not ensure that fires will not occur and ongoing management of the building is essential to ensure the fire risk is controlled as much as possible. This is controlled in part by the risk assessment required under the Regulatory Reform (Fire Safety) Order 2005. This legislation applies to the common areas in the building and requires that a fire risk assessment is undertaken and regularly reviewed (including whenever changes occur that might affect standards of fire safety within the building). The risk assessment will need to be made available to the Fire Service upon inspection of the building and any findings within the risk assessment are required to be addressed by the person responsible for fire safety within the building. If this is not undertaken the Fire Service have powers to serve notices on the building which could ultimately lead to it being shut down.

3. B1 - Means of Warning and Escape

Schedule 1 of the Building Regulations provides the following functional requirement in relation to 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."

3.1 Means of Warning and Evacuation Regime

It is proposed that both buildings and retail units will operate under a simultaneous evacuation regime where in the event of a fire being detected a full evacuation of that unit is carried out. (i.e Southampton Row is independent of Sicilian Avenue and both a separate from the Retail Units due to the party walls and independent fire alarm systems).

It is not currently proposed to incorporate an investigation period given the nature of the building.

To enable an efficient evacuation of the building, the fire alarm system will be designed and installed in accordance with BS 5839-1 to a minimum standard of Category L1 fire and detection system. This will consist of smoke detection, manual call points and sounders throughout the building. The proposed fire detection and alarm system will incorporate fire detection in all rooms and areas of the building. Areas with suitably low fire risk need not be protected, as follows:

- Toilets, shower rooms,
- Small cupboards less than $1m^2$, and
- Some shallow voids (less than 800mm in depth) and concealed spaces.

In areas with noisy environments or where people might otherwise have difficulty in hearing the fire alarm, visual alarm devices (flashing warning beacons) should be used.

3.2 Horizontal Means of Escape

3.2.1 Travel Distance

The maximum recommended travel distances where the layout is known is as follows:

- Areas with an A2 risk profile (Office) – 22m in a dead-end condition and 55m where more than one direction of escape is available.
- Areas with an A3 risk profile (Plant Rooms/Stores) – 18m in a dead-end condition and 45m where more than one direction of escape is available.
- Areas with an B2 risk profile (Retail) – 20m in a dead-end condition and 50m where more than one direction of escape is available
- The external roof plant areas - 60m travel in a single direction and 200m where alternative travel is available.

It should be noted that the above limits are actual travel distances where the layout is known. Where the internal layout is not known the maximum distances should be reduced to 2/3rds of those shown above. Therefore, the above limits should be borne in mind when the internal layout is being developed.

From inspection of the drawings, the current travel distances noted will be satisfactory.

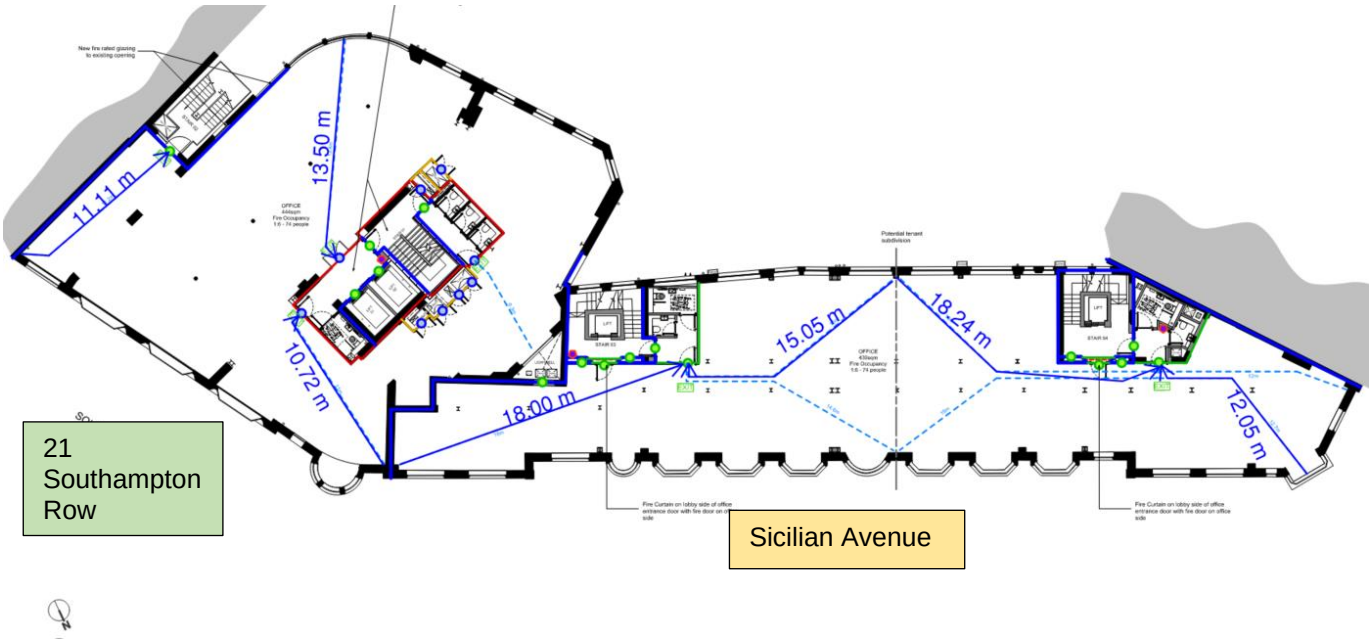


Figure 4: 21 Southampton Row – Typical Upper Floor Plan

3.2.2 Horizontal Means of Escape – Door Widths

Doors that are to accommodate more than 60 people in an emergency must swing in the direction of escape. All doors would require a minimum clear width of 800mm, or 850mm wide where persons of reduced mobility are expected to use when unassisted.

In certain instances, where the clear width of a horizontal storey exit is less than 800mm on the existing floor plates it is deemed as acceptable as it is no less satisfactory than before and the occupancy/risk profile has not changed. Given the listed nature and building constraints whilst having alternative escape routes on all floor levels then this is deemed reasonable however carries approval risk and therefore subject to agreement with the approving authority. Further survey works should be carried out to establish and confirm the extent of any exits that fall below the recommended minimum width

Any gradients on escape routes should be no steeper than 1:12.

Doors should either not be fitted with a lock, or provided with fastenings that are easily negotiated in the event of a fire. Doors where it is expected will be used by more than 60 people in the event of a fire should open in the direction of escape and any access controls on doors should be overridden in the event of a fire being detected.

The lifts are not part of the escape strategy, however where occupants are within the lift at the time of a fire breakout, the lifts will terminate on ground floor or when a fire is on the ground floor will terminate on another storey (either above or below) where they park and remain out of service. This will be part of the cause and effect matrix (developed by others).

The horizontal means of escape will be accessed using the following door width factors.

Table 3: Door Width Factors

Risk Profile	Door width factor (mm/person)
A2 (Office)	3.6
A3 (Internal Plant Areas)	4.6
B2 (Retail Area)	4.1

Ground Floor

On the ground floor of 21 Southampton Row, a reception area will be available with a flexible office space, the occupancy will be less than 60 people (anticipated as 21 people) and therefore a single exit is acceptable. The space will have two exits, a double door leaf to outside leading to the rear of the development of the main entrance having a turnstile door.

It is proposed to provide a single action push bottom for the main entrance door to open in the event of a fire.

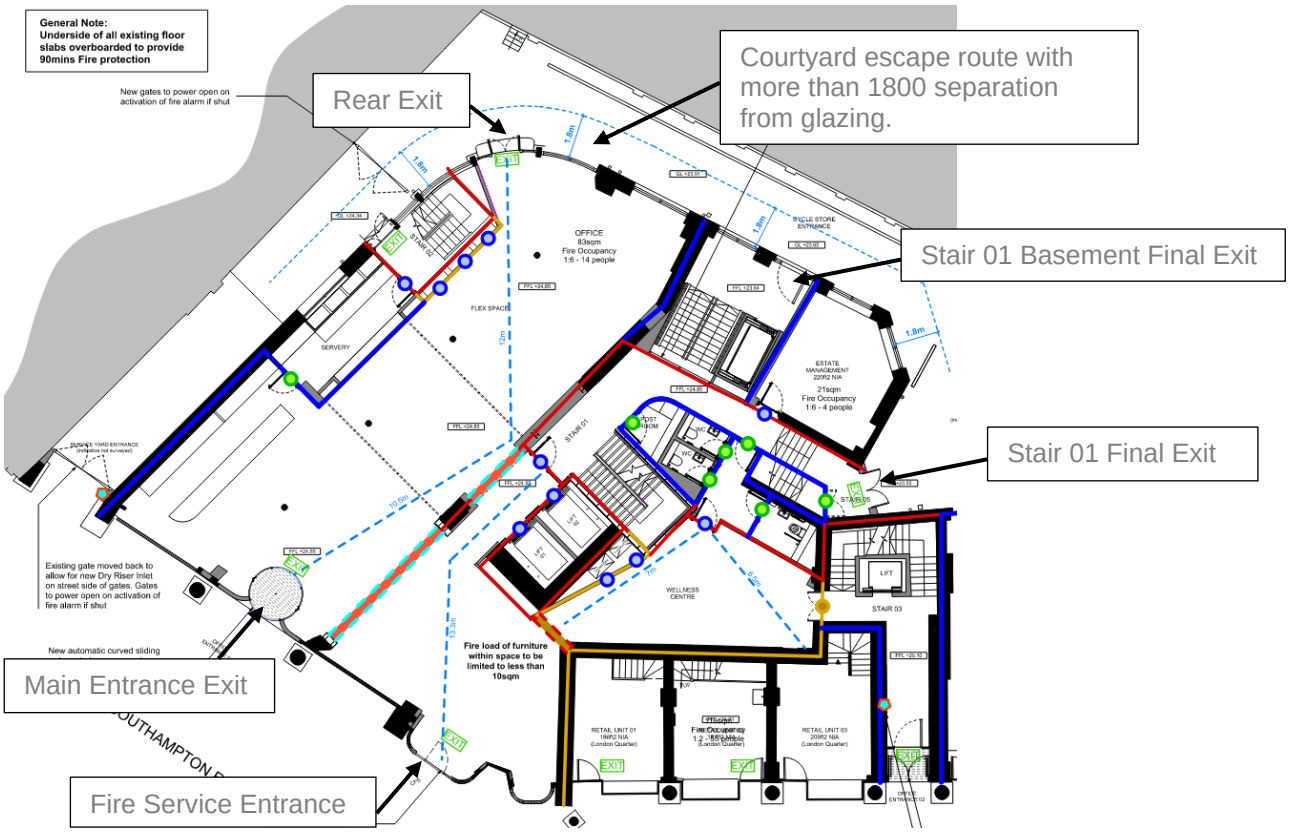


Figure 5: Ground Floor Final Exits

The retail shops on the ground floor of Sicilian Avenue have a minimum of one exit at ground floor level. The retail units also have a basement level so the travel distance and occupancy must be restricted to the maximum capacity to achieve compliance.

Each retail basement has been provided with an open accommodation stair leading to basement. Units 1, 2 & 3 on ground floor do not have alternative escape and therefore limited to 60 people and a 20m travel distance in a single direction.

All other retail units have alternative escape (exit) at the rear and therefore can increase the travel distance and occupancy. In the event of a fire the largest exit is discounted, therefore based on a B2 risk profile with a door measuring 800mm clear width the capacity is 121 people (using the equation 500/4.1mm/person). This is sufficient for the proposed occupancy numbers.

The reception space is separated from the Stair 01 entrance space by a fire and smoke curtain, however, the entrance lobby with the lifts is to be restricted to no more than 10m^2 of fire load given the upper floors are served by two stairs. For a fire event at ground floor, the fire service can intervene directly from outside with occupants on above ground floors having alternative and safe escape from the building from both Stair 01 and Stair 02.

Upper Floor Levels

Southampton Row will have two exits on each floor (one to each Stair 01 and Stair 02) providing means of escape provision to all floor levels. Given there is more than one exit, the largest is discounted due to fire and smoke. When using an A2 risk profile having a 3.6mm/person width factor with a door having a clear width of 800mm, the capacity is 138 people (using the equation - 500/3.6mm/person). This is deemed acceptable as the largest anticipated occupancy of 76 people.

Sicilian Avenue will have two exits on each floor (one to each Stair 03 and Stair 04) providing means of escape provision to all floor levels. Given there is more than one exit, the largest is discounted due to fire and smoke. When using an A2 risk profile having 3.6mm/person width factor with a door having a clear width of 800mm, the capacity is 138 people (i.e. 500/3.6mm/person). This is deemed acceptable as the largest anticipated occupancy of 75 people.

If floor levels 01, 02, and 03 of Sicilian Avenue are to be sub-divided creatin a single stair building with a topmost storey under 11m, then the floor plate will be limited to 60 people.

Basement

Southampton Row basement will contain amenity spaces and with an anticipated occupancy of 60 people or less. A direct exit is available or alternative escape via Stair 01.

Sicilian Avenue retail units within the basement have independent rear escape routes, on this basis, the basement has alternative escape. To simplify the escape strategy, the basement areas of these units will be limited to 60 people as adopting the approach of a single exit serving the area. This is deemed reasonable on the basis a fire could be located at the ground floor adjacent to the open accommodation stair and also recognises that the bottom of accommodation stair and rear exit are in close proximity to each other.

Unit 03 basement occupancy will based on 2m^2 per person equating to 76 people given the 151m^2 floor area. As alternative escape is available, this is deemed acceptable.

Unit 04 is existing and is will undergo the least amount of work. Whilst the existing condition is deemed no less satisfactory the basement accommodation staircase measures 700mm. Given there is an alternative escape route via Stair 4 it is intended to deem this the primary escape route and limit this space to 60 people. Given the anticipated occupancy is 54 people, therefore is satisfactory.

3.3 Vertical Means of Escape

The vertical means of escape calculations have been carried out in a tabular format with the stair width capacity calculated by applying a stair width factor based on number of floors served and associated risk profile. No further reductions allowable under the guidance of BS 9999 have been included in the calculations.

Where a stair has been lobby protected it is not required to be discounted, however given Stair 2 is not lobby protected makes it susceptible to smoke intake. To be conservative the largest stair is discounted in 21 Southampton Row. Stairs 03 and 04 are lobby protected and therefore no discounting is required for Sicilian Avenue. On this basis, the total stair capacities are as follows:

Table 4: Stair Capacities

Building	21 Southampton Row		Sicilian Avenue	
	Stair *01*	Stair *02*	Stair *03*	*Stair 04*
Stair Width	1100mm	1000mm	1000mm	1000mm
Risk Profile	A2	A2	A2	A2
	Floor Levels Served			
6th floor	x	x		
5th floor	x	x	x	x
4th floor	x	x	x	x
3rd floor	x	x	x	x
2nd floor	x	x	x	x
1st floor	x	x	x	x
Ground floor	X*		x	x
Risk Profile A2 (mm/ person)	2.20mm/person	2.20mm/person	2.45mm/person	2.45mm/person
Allowable Capacity (people)	500 people	454 people	408 people	408 people
Anticipated occupancy	**358 people**		**351 people**	
Total achievable occupancy load	**454 people** (Largest stair is discounted)		**816 people**	

Note: *Within BS 9999, Table 13 allows merging flow to be calculated by adding an additional storey treating ground floor as a floor served by the stair.

Sicilian Avenue retail units are provided with direct final exits at basement level and therefore occupants are not required to use upward travel. Where the stair are existing it is deemed no less satisfactory than before subject to the escape scenario being no worse. Retail Unit 04 has been discussed in Section 3.2.2

For any new stairs providing upward travel, a 1200mm clear with stair is required as per BS 9999.

Southampton Row is served by Stair 01 and a cycle ramp stair which is part of the main stair but also separated as an independent escape route leading to the service yard. All stairs measure 1200mm clear width when excluding the handrail and satisfy the proposed 60 people.

3.4 Merging flows

Where a storey exit shares the final exit from the stair, the width of the final exit should be sufficiently sized to account for the additional congestion caused.

Within BS 9999, Table 13 allows merging flow to be calculated by adding an additional storey treating ground floor as a floor served by the stair. Therefore, the final exit should be as wide as the stair to prevent bottlenecking from occurring.

3.5 External Escape Stairs

Stair 2 at 21 Southampton Row is arranged as an external escape stair and therefore the following measures are to be incorporated.

a) All doors giving access to the external stair should be fire-resisting and self-closing.

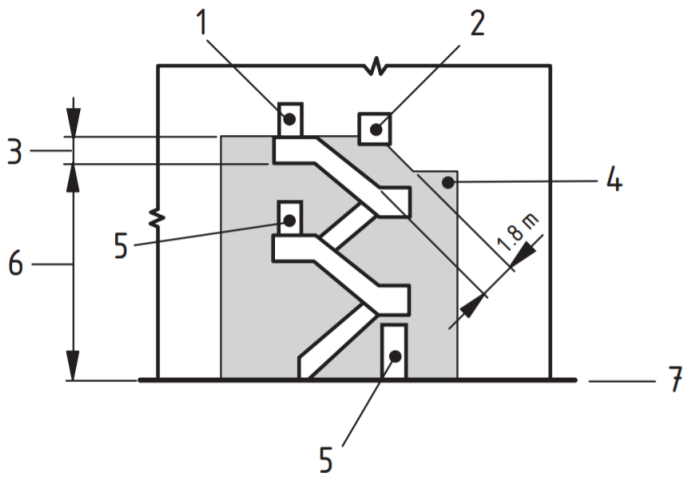
b) Any part of the external walls within 1800mm of (and 9m vertically below), the flights and landings of an external escape stair should be of fire-resisting construction, except that the 1800mm dimension may be reduced to 1100mm above the top level of the stair if it is not a stair up from a basement to ground level.

c) Any part of the building (including any doors) within 1800mm of the escape route from the stair to a place of relative or ultimate safety should be provided with protection by fire-resisting construction.

d) Glazing in areas of fire-resisting construction should also be fire-resisting to meet the criteria for both integrity and insulation, and should be fixed shut.

e) Where a stair is more than 6m in vertical extent it should be protected from the effects of adverse weather conditions.

NOTE: A full enclosure is not necessary. The extent of enclosure needed depends on the location of the stair and the degree of protection given to the stair by the building itself. Trace heating is acceptable but needs to be maintained throughout the life of the building and be treated to the same standard as emergency escape lighting and provided with thermostatic control to operate in cold weather.



Key

1 No fire resistance needed for door
2 Window with 30 min fire-resisting construction
3 1 100 mm zone above top landing
4 1 800 mm zone of fire-resisting construction at side of stair
5 Self-closing fire door with 30 min fire-resisting construction
6 6 m maximum height of stair without weather protection
7 Ground level or a roof or podium served by an independent stairway
8 9 m zone of fire-resisting construction below stair

Figure 6: Recommendations for the Protection of External Escape Stairs

3.6 Provision of Refuges

Wheelchair users will be provided with the standard refuge approach within the stair, on each upper level and associated communications devices. The refuge areas will be provided with a notional area of 900mm x 1400mm in order to allow for manoeuvring.

To facilitate the effective evacuation of people from refuges, an emergency voice communication (EVC) system will be provided. It is essential that the occupants of each refuge are able to alert other people that they are in need of assistance and for them to be reassured that this assistance will be forthcoming. The EVC system will conform to BS 5839-9:2011 and consist of Type B outstations and suitable signs will be provided for the disabled refuges.

The key to the disabled evacuation will be the management and it is not considered acceptable to rely on the Fire service to evacuate persons from the building. A management plan will ensure that the persons of reduced mobility (PRM's) in the building are aware of the facilities provided (by reference to general and personal emergency evacuation plans) and that staff and facilities are available and adequately trained to evacuate occupants as required down staircases with the use of measures such as evacuation chairs or similar facilities.

Where applicable if the final exits are provided with stepped access and without a ramp then a refuge is required with emergency voice communication (EVC) to identify further assistance is required.

3.7 Emergency Lighting and Escape Signage

Where applicable; emergency lighting should be provided in accordance with BS 5266-1 and include coverage in the following areas:

Table 5: Emergency Lighting and Escape Signage

Building Type	Emergency Lighting and Escape Signage Requirements
Office/Retail	• Underground or windowless accommodation; • Stairs (internal and external); • Internal corridors more than 30m long; • Open plan areas greater than 60m^2; • All sanitary accommodation with a floor area over 8m^2; • Windowless sanitary accommodation with a floor area less than 8m^2; • Electricity and generator rooms; • Switch room/battery rooms for emergency lighting systems; • Emergency control rooms (where provided). • Areas directly outside the final exits.

Every escape route should be adequately signed in accordance with BS 5499-4.

4. B2 - Internal Fire Spread (Linings)

Schedule 1 of the Building Regulations provides the following functional requirement in relation to B2, Internal Fire Spread (Linings):

> *(1) To inhibit the spread of fire within the building the internal linings shall-*
>
> *(a) Adequately resist the spread of flame over their surfaces; and*
>
> *(b) Have, if ignited, a rate of heat release which is reasonable in the circumstances.*
>
> *(2) In this paragraph 'internal linings' means the materials lining any partition, wall, ceiling or other internal structure.*

Internal linings are required to be provided in accordance with Table 33 in BS 9999 as follows:

Table 5: Classification of Linings

Location	*Classification*
Small rooms of maximum internal floor area of 30m^2	D-s3, d2
Other rooms	C-s3, d2
Other circulation spaces (including staircases, lobbies etc)	B-s3, d2(1)

NOTE:

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

The class of linings recommended in the table above can be downgraded (but not less than Class 3 or D-s3, d2) in walls of rooms providing the total area of those parts in any one room does not exceed one half of the floor area of the room and subject to a maximum of 60m^2

5. B3 - Internal Fire Spread (Structure)

Schedule 1 of the Building Regulations provides the following functional requirement in relation to B3, Internal Fire Spread (Structure):

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

5.1 Loadbearing Elements of Structure

The elements of structure are based on an A2 risk profile and having a top occupied floor height measured from ground access level. The existing elements of structure will be reviewed on-site to confirm that the appropriate periods of fire resistance are afforded to elements of structure (beams, columns and load bearing walls) including floors.

Existing elements that are deemed to be below the required level of fire resistance will be assessed with regards to their failure and the subsequent impact on the overall stability of the building, in order that they can remain as it is considered no less satisfactory than before. Any new pieces of structure defined as loadbearing will be upgraded inline with current guidance.

The guidance from Part B requires a 90 minute fire resistance to buildings with a topmost storey over 18m in height and no floor greater than 30m above ground.

Any elements which only support themselves, provided for wind loading and/or a roof can be non-fire rated.

5.2 Compartmentation

5.2.1 Size of Compartments

With an A2 risk profile there is no maximum size of compartment for a multistorey building.

With a B2 risk profile over 18m in height to the topmost storey, the size of the compartment is limited to 8,000m^2.

From inspection of the plans, no additional floor levels have been provided and therefore the unprotected area has not changed, therefore no requirement to subdivide the building into further compartments.

5.2.2 Compartmentalisation

21 Southampton Row has an uppermost storey height that is greater than 18m, but less than 30m above ground level with no sleeping risk. Therefore, it does not need to provided compartment floors at every floor level.

For 21 Southampton Row having a basement storey, the ground floor should be a compartment floor. As this is an existing building and the condition is made no worse it is proposed to maintain the current standard and where remedial works are undertaken ensure that the compartment floor is suitable and not defective.

Sicilian Avenue having a basement storey is treated differently given the stair is open within the ground floor plate of the retail units and therefore is unable to achieve sufficient compartmentation at ground floor but will introduce this at first floor. This creates a 2-storey compartment (Retail Unit) whilst having a compartment floor at 1st floor level. Any remedial works which are undertaken should ensure that the compartment floor is suitable and not defective.

The two buildings will be separated via a party wall, this is defined as a separation line and is to achieve no less than the elements of structure fire rating. The existing fire resistance is deemed acceptable however any new construction will need to achieve 90 minutes fire resistance.

Existing walls that are reviewed on site with any obvious damage (such as large cracks etc) should undergo remediation during the site works to ensure building integrity.

Any penetrating shafts/service riser which pass through the floor will be constructed as a continuous vertical protected shaft which shall achieve no less than 90 minutes fire resistance given it breaches the compartment

line. No smoke seals or self-closers are needed however the riser doors should be kept locked shut and labelled kept locked shut.

The following fire and smoke curtains are proposed within 21 Southampton Row to maintain compartmentation. The fire and smoke curtain will need to be designed and installed in accordance with BS 8524 Part 1 and Part 2, activated by the fire and smoke detection system. This is an engineered solution and therefore will require approval from the approving authority.

- The ground floor reception area of 21 Southampton Row will need a fire and smoke curtain which will act as a separation line between the reception and flexible office space from the firefighting access route leading to Stair 01. The fire curtain will achieve 120 minutes integrity to maintain compartmentation of the core. No insulation or radiation values are required as MOE is via the service yard and FF intervention will assume a fire on a different floor plate, otherwise intervention is from the exterior.
- The wellness centre is for employees only and is used as a snug area having an open-feel to the reception space, hence the door from the reception space has been omitted and replaced with a fire shutter. It is proposed to provide a 120 minute fire shutter to maintain the level of compartmentation of the Stair 01. (The proposed fire shutter achieves 180 minutes integrity with 90 minutes radiation which is deemed acceptable on this basis given the stair is not a compliant firefighting shaft)

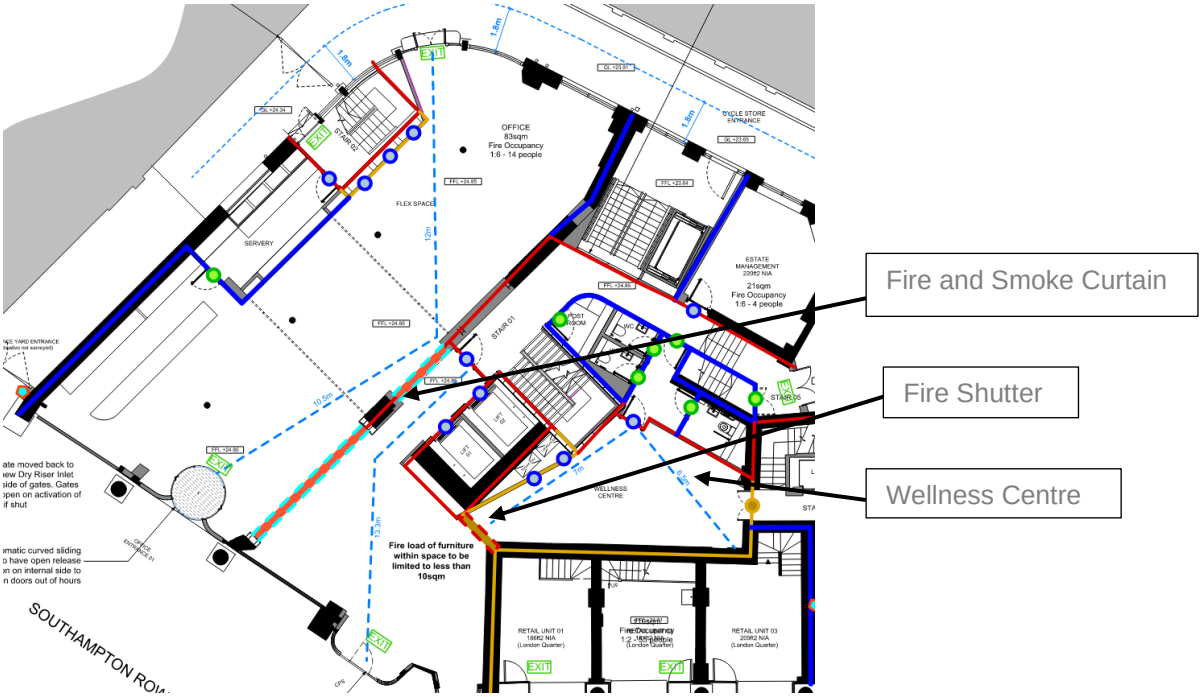


Figure 7: Reception Fire Curtain

- The cycle store at basement is provided with a fire and smoke curtain as part of a engineered approach to prevent smoke spillage affecting the upper floor levels given the ground floor is unable to separate basement from upper floor levels. This is achieved within the basement and therefore due to space constraints a fire and smoke curtain is used to maintain compartmentation. This will provide two-door-protection rather than a traditional lobby arrangement. This fire curtain will have a retractable setting to allow entry by the fire service. The fire and smoke curtain will achieve 60 minutes integrity + 60 minutes insulation to maintain compartmentation of the core.

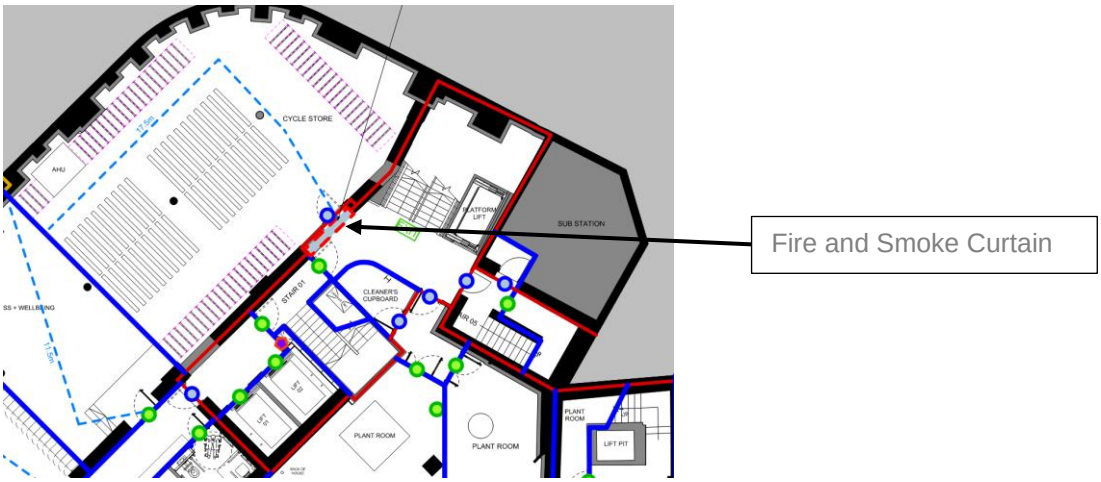


Figure 8: Basement Fire Curtain

- Within the Sicilian Avenue office, Stairs 3 and 4 are provided with a fire and smoke curtain to protect the stair due to the omission of the lobby. Both fire and smoke curtains will have 30 minutes fire resistance with an insulation and integrity value to match the omitted lobby. The stair remains lobby protected with a small toilet adjoining which has been discussed and agreed with Sweco Building Control as being acceptable.

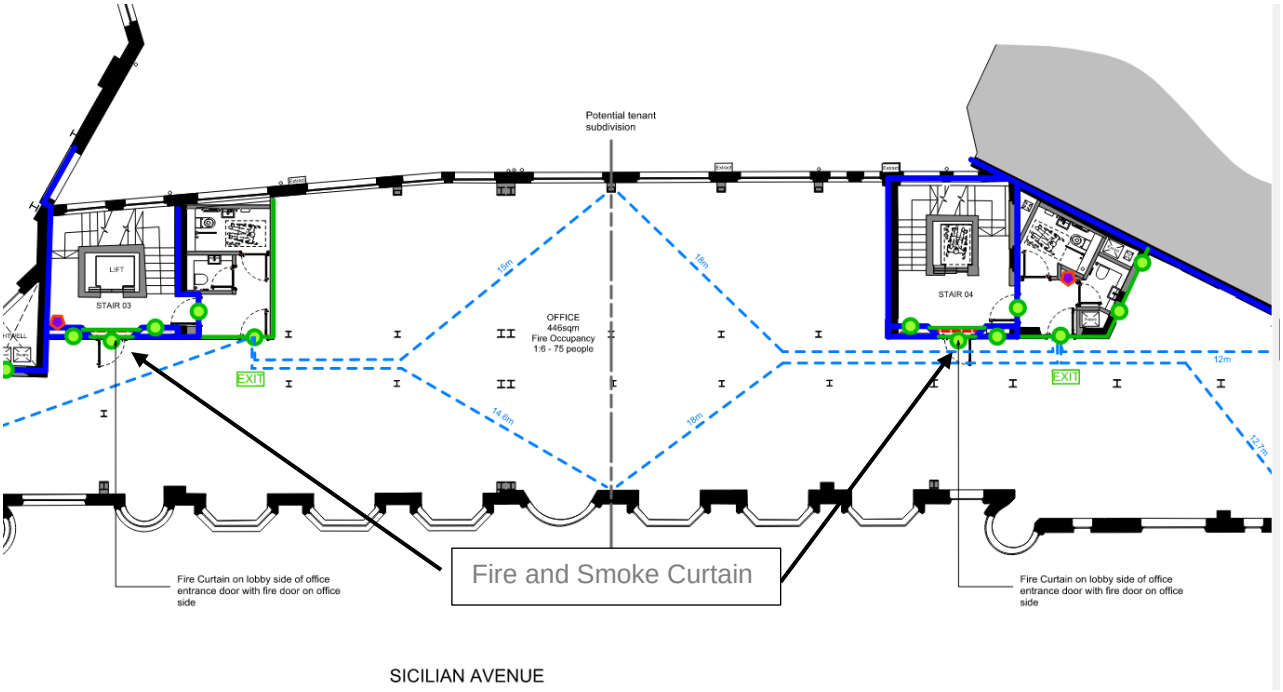


Figure 9: Sicilian Avenue Office Floor Plate

The external stair (Stair 02) at 21 Southampton Row is to be protected for a zone of 1800mm, therefore any openings within the zone needs to be fixed shut and achieve 30 minutes fire resistance.

Stair 01 is to be provided with a safe passageway for both entry and egress from the building at ground floor. This is regarded as an extension (part of) the stair enclosure leading from the stair to a final exit. Whilst the stair is not a compliant firefighting shaft, it will be protected with 120 minutes fire resistance along with the protected corridor.

Ancillary rooms are required to be fire separated as given in Table 1(in accordance with BS 9999:2017 Table 29).

5.3 Places of Special Fire Risk

Where appliable; the following table will provide guidance on the required fire resistance provisions and fire door requirement for a given risk and floor area.

Table 6: Fire Protection to Areas of Ancillary Accommodation

Area of Ancillary Accommodation	Type of construction needs to separate ancillary accommodation from other parts of the building
Storage areas greater than 1m^2 in area but not greater than 450m^2. Repair and maintenance workshops where flammable or highly flammable liquids are not used or stored. Kitchens (separate or in conjunction with an associated staff restaurant or canteen). Transformer, switchgear and battery rooms for low-voltage or extra low voltage equipment. Engineering services installation rooms other than refuge storage area, storage greater than 450m^2 and rooms housing internal combustion engines. Dressing rooms or changing rooms	Robust construction having a minimum fire resistance of 30 minutes.
Storage areas greater than 450m^2 (other than refuse storage) Places classified as high fire risk areas Repair and maintenance workshops where flammable or highly flammable liquids are used or stored Refuse storage areas Boiler rooms Fuel storage spaces Transformer and switchgear rooms for equipment above low voltage Rooms housing fixed internal combustion engine(s)	Robust construction having a minimum fire resistance of 60 minutes.
Any electrical substation or enclosure containing any distribution board, generator, powered smoke control plant, pressurization plant, communication equipment, and any other equipment associated with life safety and fire protection systems	Robust construction having a minimum fire resistance of 120 minutes.

Note: Any openings in the required construction should be protected by doors having a similar standard of fire resistance.

5.4 Fire Doors

It is a requirement that the manufacturers are to have their fire doors assessed by subjecting them to a test procedure as specified in BS 476 Part 22:1987 or BS EN 1634 Part 1:2014. Tests are made on complete door assemblies: i.e. the fire door and doorframe with all the requisite hardware (e.g. locks, latches, hinges, etc). The assembly, or door set, as it is also known, is fixed in a wall representing its use in practice.

It is acceptable to provide doors on electromagnetic door hold open devices which release on the operation of the fire alarm and detection system and power failure.

Where the anticipated occupancy numbers do not exceed 60 people then there is no requirement that the storey exit doors are to swing in the direction of escape.

All doors necessary for escape which are provided with access controls will be provided with a suitable override facility that is acceptable to the approving authorities. Any electronic locks or hold open devices on escape doors will be failsafe, have break glass and manual release button and be linked to the fire alarm to BS 7273-4:2015.

Fire doors will be provided in the building as follows:

- Within the Stair 01 – FD60S, Self closing
- Within the Stair 03 & 04 – FD30S, Self closing
- Within Stair lobbies – FD30S, Self closing
- Within service riser, lift shaft – FD60 (21 Southampton Row)
- Within service riser, lift shaft – FD30 (Sicilian Avenue)
- Within plant rooms – FD60, Self closing.
- Within a party wall – FD90, Self closing.

Doors forming part of the means of escape from or within the building should:

a. Be fitted only with simple fastenings that can be operated from the escape side of the door without the use of a key.

b. Be hung clear of any change of floor level.

c. Be hung so that they do not reduce the effective width of any escape route across a landing.

d. If opening into a corridor, be recessed to the full width of the door.

e. Where hung to swing both ways (double swing), or subdividing corridors, be provided with a minimum of a vision panel.

f. Open to an angle not less than 90°.

As part of the Sicilian Avenue office entrances/final exits of Stair 03 and 04, these will have the existing timber doors which as listed and to be retained and also a new glazed entrance door. The management of the building will open to timber doors and pin in the hold-open position during normal working hours and the new glazed door, whilst not in the direction of escape will automatically open upon activation of the fire alarm and therefore will not prohibit escape flow.

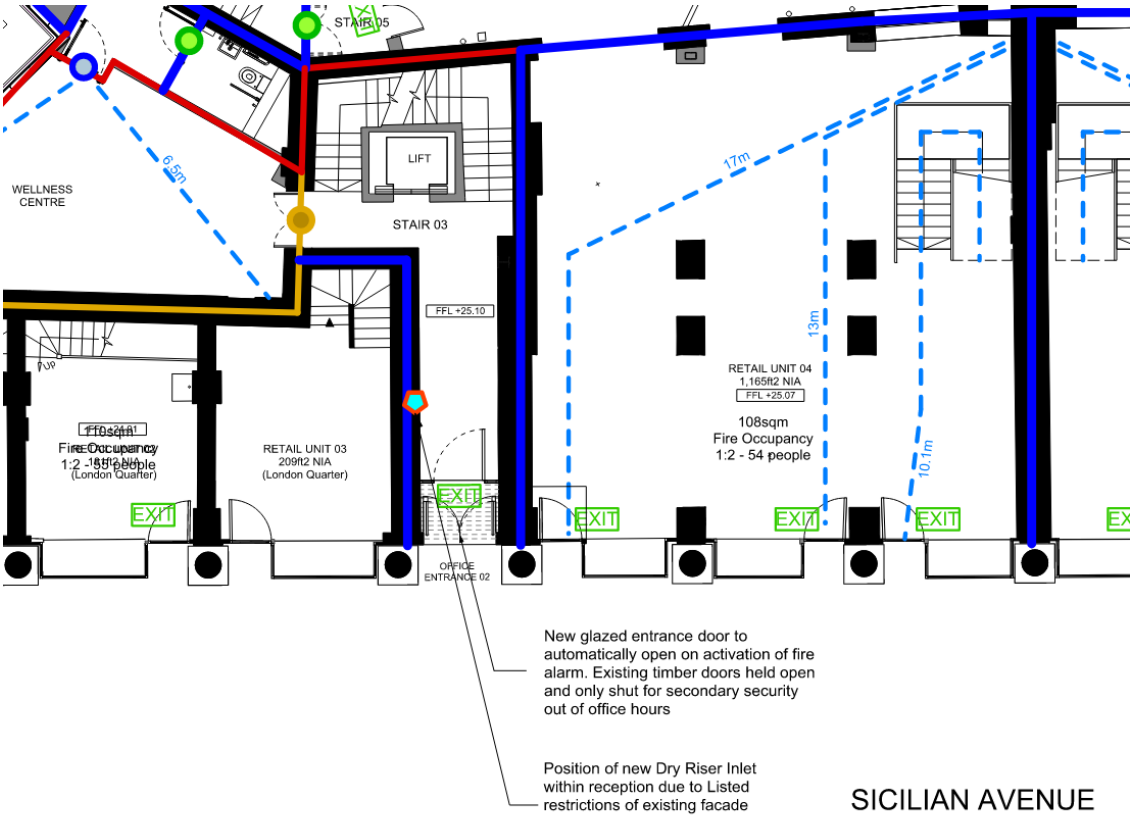


Figure 10: Stair 03 (+ Stair 04) Final Exit Arrangement

5.5 Sprinkler Protection

The existing buildings are not sprinkler protected and as the buildings are less than 30m to highest occupied floor levels, current guidance does not require the building to be sprinkler protected.

The building is given further consideration as to any significant risks or areas of deviation from current guidance. As the existing provisions are deemed as satisfactory to meet the functional requirements of the Building Regulations and works to the buildings will result in being no less satisfactory than before the work was carried out then provision of sprinkler protection is not deemed necessary.

5.6 Protection of Openings and Firestopping

Any ductwork passing through compartment/fire resistant walls will maintain integrity of those elements by either:

- Be contained within fire resisting construction.
- Containment by using fire resistant ductwork.
- Protection by installing fire dampers.

Ventilation ducts supplying or extracting air directly to or from a protected stairway should not serve any other areas. Ductwork serving other areas and passing through a stair enclosure should be protected by fire and smoke rated dampers linked to the fire alarm or separated by a fire-resistant enclosure.

Ductwork serving both escape routes and accommodation will be provided with fire and smoke dampers (ES Rated) that are activated automatically on the activation of the building fire alarm and detection system. Dampers to be fully in accordance with BS 9999.

Ductwork passing through fire rated walls separating fire compartments could be provided with fusible link fire dampers in accordance with BS 9999 Section 32.5.

All dampers are to be mechanically fixed to the structure so they are self-supporting and be fitted within the fire line in accordance with the manufacturer's installation guidelines.

Any openings for pipes with a restricted diameter (as given in Table 8) breaching compartment walls are required to be fire stopped (unless protected along its entire length with fire resisting material), keeping the

opening as small as possible, in accordance with BS 9999. All other pipes (of any diameter) should be provided with a proprietary seal, tested in accordance with BS EN 1366-3:2015.

Table 7: Maximum nominal interior diameter of pipes passing through a compartment wall/floor

Situation	*Maximum nominal internal diameter (mm)*		
	a) High melting point metal(1)	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)*	160	110	40
2. *Compartment wall or compartment floor between flats*	160	160 (stack pipe) (3) 110 (branch pipe) (3)	
3. *Any other situation*	160	40	40

NOTES:

1. Any metal (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 that comply with either BS 4514 or BS 5255.

3. These diameters are only in relation to pipes that form part of an above-ground drainage system and are enclosed as shown in BS 9999 Figure 34. In other cases, the maximum diameters given for situation 3 apply.

Stair 01 will have air ventilation services breaching the stair and lobbies on every floor level and is required to be enclosed in fire rated ductwork so not to be a fire risk to the stair.

5.7 Provisions for Cavities

The unseen spread of fire and smoke will be controlled by the provision of cavity barriers. Cavity barriers will be provided to close cavities and openings in the following locations:

- At the edges of cavities, including around openings such as doors and windows.
- At the junction between an internal cavity wall and every compartment floor, compartment wall or other wall or door assembly forming a fire resisting barrier.

In addition to the above locations cavity barriers are also proposed in any newly created cavities (including ceiling voids and under floor service voids) where the cavity exceeds 20m (i.e. at 20m centres).

The cavity barriers will provide a 30 minute fire rating (i.e. 30 minutes integrity and 15 minutes insulation). Any penetrations through the cavity barriers will be either:

- Fitted with a proprietary sealing system.
- Pipes of limited diameters that are sealed with fire-stopping, or sealed with sleeving of non-combustible pipe material.
- Dampers are required to ductwork.

This is detailed in Figure 35 in BS 9999 as reproduced below.

Figure 24 Provisions for cavity barriers

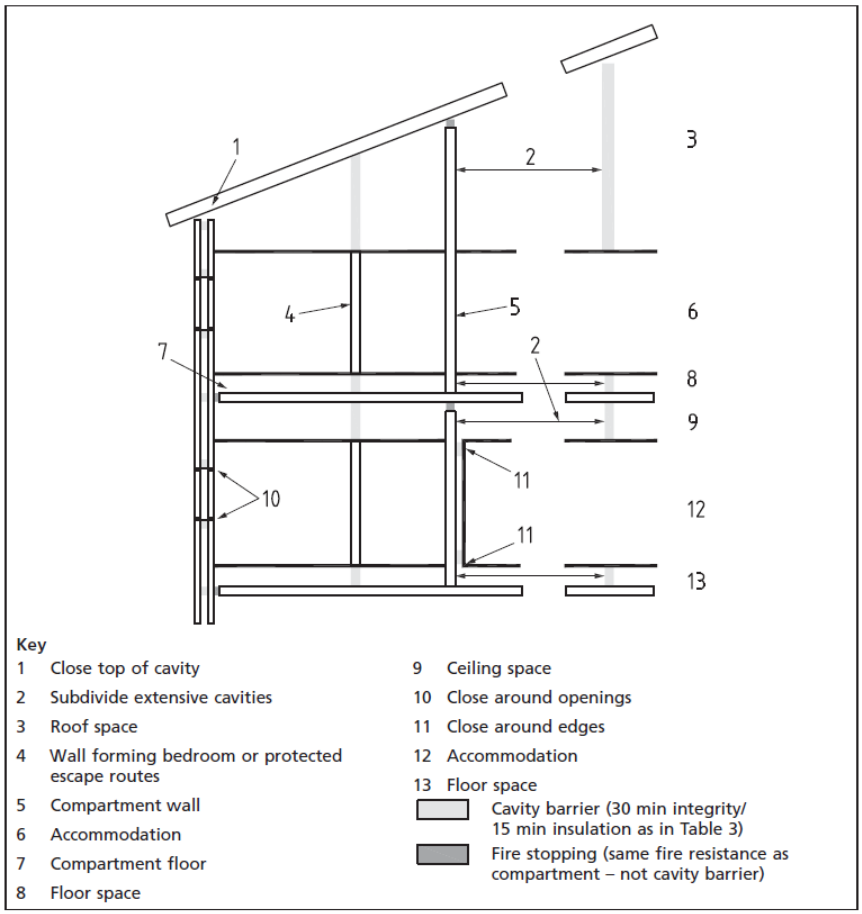


Figure 11: Provision of Cavity Barriers

6. B4 - External Fire Spread

Schedule 1 of the Building Regulations provides the following functional requirement in relation to B4, External Fire Spread:

> *(1) 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 building.*
>
> *(2) The roof of the building shall adequately resist the spread of fire over the roof and from one building to another, having regard to the use and position of the building.*

6.1 Overview

New buildings are required to be assessed for external fire spread, as this is an existing building without a façade/unprotected area change there is no need to undertake an assessment.

6.2 Space Separation

On the basis that the existing building provisions are no less satisfactory with no changes it is deemed acceptable.

This means that the external wall build up has not been changed, nor has any additional openings been introduced, nor has the available boundary distances changed.

6.3 Surface Spread of Flame Requirements

On the basis that the existing building provisions are no less satisfactory with no changes it is deemed acceptable. The façade is generally brick and stone achieving A1 rating.

6.4 Combustibility of Insulation and other Components in the External Walls

As the office building is isolated from the surrounding buildings and are not considered as a “Relevant Building” that contains;

- One or more dwellings,
- An institution,
- A room for residential purposes such as student accommodation, sheltered housing, hospitals and boarding schools excluding hotels, hostels and boarding houses.

Then Regulation 7(2) does not apply; therefore, no limitation on insulation (and other products) used in the external walls.

7. B5 - Access and Facilities for the Fire Service

Schedule 1 of the Building Regulations provides the following functional requirement in relation to B5, Access and Facilities for the Fire Service:

> *(1) The building shall be designed and constructed so as to provide reasonable facilities to assist fire fighters in the protection of life.*
>
> *(2) Reasonable provisions shall be made within the site of the building to enable fire appliances to gain access to the building.*

7.1 Access to the Building for Firefighting

The buildings will be accessed via public roadways which need to be suitable to withstand a fire tender in the event of a fire. The following parameters will need to be achieved.

Table 8: Pump appliance access route requirements

Appliance Type	*Min. width of road between kerbs*	*Min. width of gateways*	*Min. turning circle between kerbs*	*Min. turning circle between walls*	*Min. clearance height*	*Min. carrying capacity*
Pump	3.7	3.1	16.8	19.2	3.7	12.5*
High Reach	3.7	3.1	26.0	29.0	4.0	17.0*

Note: * The minimum carrying capacity should be checked with the local fire brigade.

21 Southampton Road having a floor greater than 18m above ground does not have a firefighting shaft including firefighting lift. Whilst acknowledging the buildings listed nature, the existing arrangements (height and footprint), the space constraints it is noted that whilst the Stair 01 is being re-built and should achieve full compliance as a firefighting shaft, this is not practically possible and the following limitations apply.

1. A firefighting lift will not be provided as secondary back-up power supplies can not be achieved onsite and therefore the lift would not be acceptable for firefighting. The fire service would exit the lift on the floor below the fire, and assuming the top storey is on fire, the floor below measures 17m above ground access level and therefore under 18m.
2. Whilst the stair is being rebuilt, the building height and footprint has not changed, and therefore a ventilated firefighting lobby is not provided as this is not practical given the space constraints on the floor plate.
3. A firefighting lift is not practically possible to achieve due to the limitations in achieving adequate secondary power supplies to the development. The design team have reviewed this and due to space and costs of battery backups, it has been decided to deviate from guidance but provide an uplift from the prior refurbishment conditions.

As noted in Section 7.1 Stair 01 in 21 Southampton Road is to be to be re-built providing 120 minutes fire resistance.

The existing building 21 Southampton Row has an existing top occupied floor level that is greater than 18m in height (20.3m above ground) and is not provided with a firefighting shaft in accordance with current guidance. Due to listed constraints it is not practically possible to arrange Stair 01 as a fully compliant firefighting shaft. Given the floor plate and building height have not changed, then it is deemed that conditions are not being made any worse. Building space constraints and listed status means it unpractical to introduce ventilated lobbies or a firefighting lift, so the proposed improvements to Stair 01 are as:

- Increased fire resistance of 120minutes from outside the shaft to inside.
- Introduction of a dry rising mains with an outlet at each level.
- Introduction of a 2m^2 AOV at the highest point of the stair enclosure.

These enhancements to the existing building are deemed as satisfactory as the fire load or risk profile has not changed with escape made better and firefighting provisions increased.

The top floor of Sicilian Avenue has an existing top occupied floor level that is less than 18m in height and will be supported with dry risers within each stair. Further details are available in Section 5.2.2 and 7.3.

The dry riser inlet position is to be within 18m of the parked fire tender positioning and have an allowable hose coverage of 45m measured from outlet to most remote position on that storey served. The dry riser will have an outlet on each floor and will satisfy the hose coverage limitations. It is not proposed to increase the hose coverage given the firefighting shaft is not fully compliant.

Due to the listed nature of the building and mostly glazed façade at ground floor level, the dry riser inlet point will be located on a solid wall to the south of reception in the entrance to the passageway. This will require clear signage to assist with wayfinding and therefore a fire action plan/dry riser location map to each building entrance is recommended.

The retail units will adopt 45m hose coverage serving ground and basement from the fire tender without the use of a dry riser given the rapid response and easy access from the street.

Turning facilities should be provided in any dead-end access route that is more than 20m long. This can be by a hammer-head or turning circle.

Any gates that the fire and rescue service vehicle must pass are required to be provided with a fire brigade lock only (no other padlocks or locking devices are permitted).

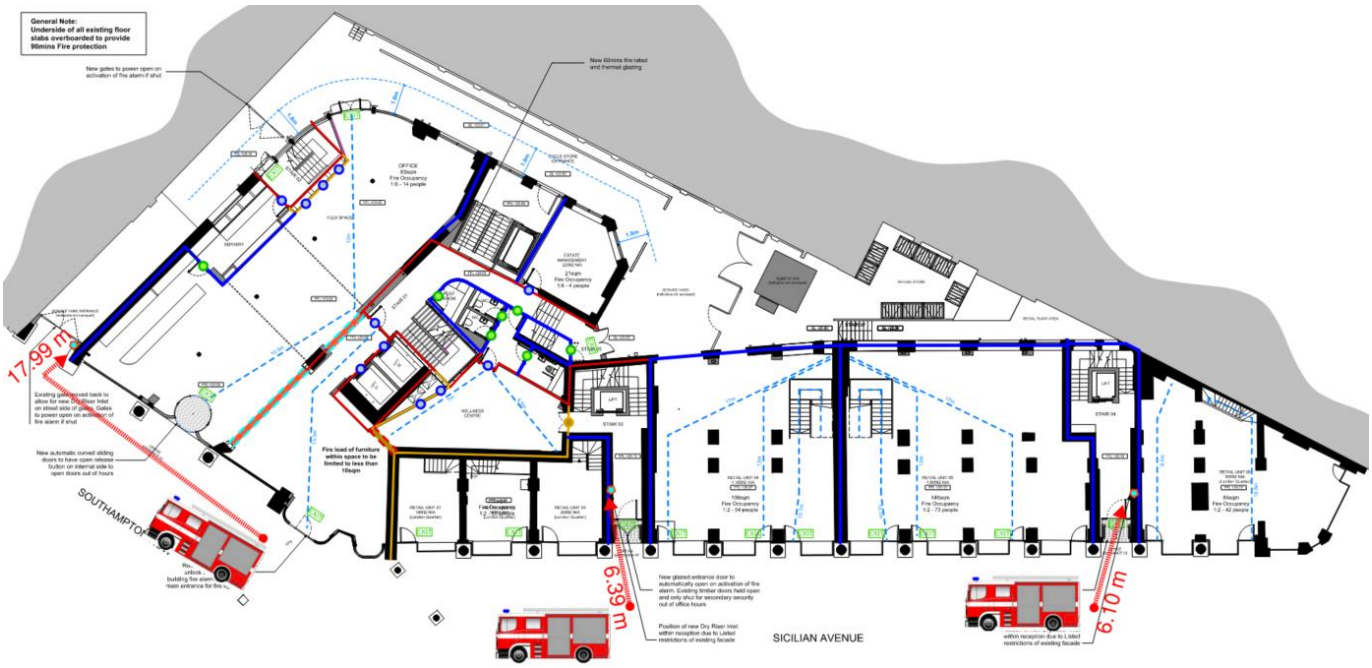


Figure 12: Indicative Fire Tender Locations and Fire Main Positions

7.2 Provision of Fire Hydrants

On the basis that the existing building provisions are no less satisfactory with no changes it is deemed acceptable.

7.3 Smoke Ventilation

To support the strategy to make an improvement to the existing provisions where possible it is proposed to install 2m^2 automatic openable vent at the head of the stair of Stair 01 to allow hot smoke and gases to escape to atmosphere. Therefore, the existing floor levels are deemed no less satisfactory.

Stair 02 is external to atmosphere and Stairs 03 & 04 are not required to have any smoke ventilation.

7.4 Basement Smoke Control

Where a basement is larger than 200m^2 in floor area as well as having a depth greater than 3m measured from access level, a smoke and heat ventilation system is required. It is not proposed to change the existing basement size, depth, ventilation strategy and therefore no ventilate is achieved. This is considered no less satisfactory than before.

Whilst no direct venting is provided which is a departure much of the floor plate is plant rooms, cycle store, showers & changing rooms and stair cores.

For retail units with direct exits to the service yard they can be manually vented directly to atmosphere.

Retail units which are landlocked will maintain their existing condition and are deemed no less satisfactory than before refurbishment works.

7.5 Emergency Power Supplies

In the event of a failure of the mains power supply a secondary backup power supply will be provided to feed all life safety systems that require electricity to function as intended. The secondary supply will be appropriate for the life safety system concerned. The following life safety systems will include a backup power supply:

- Emergency lighting.
- Automatic fire alarm and detection systems and EVC systems;
- All fire alarm interlinked fire/smoke dampers (where present);
- Fire and Smoke Curtains

It should be ensured that all power and control cabling required for life safety equipment within the building is specified and installed in accordance with BS 8519.

8. References

i. BS 9999 – 2017, Fire safety in the design, management and use of buildings – Code of practice

ii. BS 5839-1:2017, Fire detection and fire alarm systems for buildings. Code of practice for system design, installation, commissioning and maintenance.

iii. BS 5266-1:2016, Emergency lighting. Code of practice for the emergency lighting of premises.

iv. BS EN 1838:2013, Lighting applications. Emergency lighting.

v. BS 5499-4:2013, Code of practice for escape route signing.

vi. BS ISO 3864-1:2011, Graphical symbols. Safety colours and safety signs. Design principles for safety signs and safety markings.

vii. BS 9990:2015, Non automatic fire-fighting systems in buildings. Code of practice.

viii. BS 476 series: 1987, Fire tests on building materials.

ix. BS EN 1366-3:2009, Fire resistance tests for service installations. Penetration seals.

x. BS 8519:2020, Selection and installation of fire-resistance power and control cable systems for life safety and fire-fighting applications. Code of practice.

xi. BR 187: 2014 External Fire Spread Building Separation and Boundary Distances.

xii. BS 8524 Part 1 and Part 2, Fire and Smoke Curtain barrier assemblies.