Diorama

Stage 2 - Outline Fire Safety Strategy Report

The Diorama Estates Ltd

Job No:	1016745
Doc Ref:	1016745 -RPT-FE-01
Revision:	A
Revision Date:	14 February 2020

Project title	Diorama	Job Number
Report title	Stage 2 - Outline Fire Safety Strategy Report	1016745

Document Revision History

Revision Ref	Issue Date	Purpose of issue / description of revision
—	07 November 2019	Draft Issue for Stage 2
A	14 February 2020	Issued as Final for Stage 2

Document Validation (latest issue)

14/02/2020	14/02/2020	14/02/2020
X R.Bazigos	X E.Bazigos	X R.Bazigos
Principal author	Checked by	Verified by
Signed by: Bazigos, Russell	Signed by: Bazigos, Elias	Signed by: Bazigos, Russell

Executive Summary

The project comprises the proposed redevelopment of The Diorama building in London.

The height of the building is approximately 13m when measured to the finish floor level of the topmost occupied floor (third floor).

The main guidance document used for this development in order to achieve statutory approval under Part B of the Building Regulations 2010 is BS 9999: 2017.

Key observations from this report on areas of specific interest or requiring further consideration include:

- The height of the building does not exceed 18m, therefore, a firefighting shaft is not required or proposed.
- All elements of structure for the building should be provided with at least 60 minutes fire resistance.
- The building will operate under a simultaneous evacuation regime. This will include all areas including the basement.
- The building will be provided with a Category L2 fire detection and alarm system in accordance with BS 5839-1.
- All escape staircases should be enclosed in not less than 30 minutes fire resistance, with FD30S doors.
- Plantrooms should be enclosed in 60 minutes fire resistance unless they house equipment related to life safety in which case a 120 minutes fire resisting enclosure should be provided.
- Storerooms should be enclosed in 30 minutes fire resistance.
- Travel distances that apply within the office areas are 22m in single direction and 55m where more than one direction is available.
- As the building exceeds 11m in height and is less than 18m in height and is also an A risk profile building, there is a requirement under BS 9999 for an unventilated lobby with a dry rising main to be provided. However, as the building is existing and does not include for a dry rising main, it is considered acceptable not to provide this.
- The main reception space includes for a reception desk within the staircase discharge route. This is acceptable under BS 9999 as long as the desk area does not exceed 10m^2. Any furniture, other than the reception desk, that would be present within the reception space and or staircase would need to be constructed of non-combustible materials.
- It is currently proposed that a small tea/coffee point will be provided at ground floor level within the staircase enclosure. This is considered acceptable on the basis the fire load within the tea/coffee point is comparable to the fire load within the reception desk. In addition, in the unlikely event of a fire trained members of staff (reception staff) would be present and could utilise extinguishers for first aid firefighting.
- The staircase discharge route for the second escape stair is via a corridor which affords access to a number of ancillary rooms. In mitigation of this all ancillary rooms will be provided with lobby separation with the exception of the bike storage area, which will instead be provided with a 60 minute fire resisting enclosure with FD60S door in lieu of a lobby.
- On the basis that the building is existing and is not currently provided with compartment floors, it is considered acceptable for the building to maintain this arrangement.
- Fire Service access is considered acceptable on the basis that the building is existing and existing arrangements would be maintained.

Contents

1.0 Introduction

The project comprises the proposed redevelopment of Diorama Building in London.

The height of the building is approximately 13m when measured to the finish floor level of the topmost occupied floor (third floor). The building also affords access to a basement area which is generally comprised of ancillary accommodation (plant, showers etc) and three upper floors which comprise open plan offices.

The building is served by a total of two staircases, those being Stair A (Rotunda Stair) which serves all floors and Stair B, which serves all floors above ground.

The main guidance documents used for this development in order to achieve statutory approval under Part B of the Building Regulations 2010 is BS 9999: 2017.

When designing buildings to take account of safety in the event of a fire, it is assumed that fire is an accidental event and that there is a single seat of a fire. No account is taken of the potential for arson, which may typically be characterised by multiple seats of fire and the use of accelerants, and there is no reliance placed on the fire service for rescue from the building; the assumption being that people will be able to escape from the building using their own unaided efforts, and adequate staff will be available to help disabled occupants within each demise.

The dimensions for escape routes, door widths etc. are the minimum required for the stated population. Wider doors may be required in order to satisfy other aspects of the Building Regulations, such as ADM which addresses disabled accessibility requirements, or for other functional reasons. It follows therefore that wider doors etc. will be able to accommodate larger numbers of people.

It is assumed that all works will comply with Regulation 7 of the Building Regulations with all materials, fittings and components used in the construction of the building being suitable for their purpose. Therefore, to ensure that the proposed fire safety systems detailed within this report achieve the appropriate fire performance, it is recommended that all products, components, materials or structures relating to the fire strategy are installed using competent companies/persons and, where applicable, subject to third-party UKAS organisations accreditation/certification.

Additional measures may be required for the purposes of property protection and business continuity, which are outside the scope of the Building Regulations. It is therefore recommended that the client with any other relevant parties consult their insurer together to determine any further measures that may be required outside the scope of Building Regulations requirement.

1.1 Sources of Information

All dimensions and information have been gained from drawings issued by MWA for Stage 2.

Note: *The figures within this report are only to illustrate the fire safety principles; for confirmation of layout or other details reference should be made to the current project drawings.*

The following figures show the basement, ground floor and typical upper floor for reference.

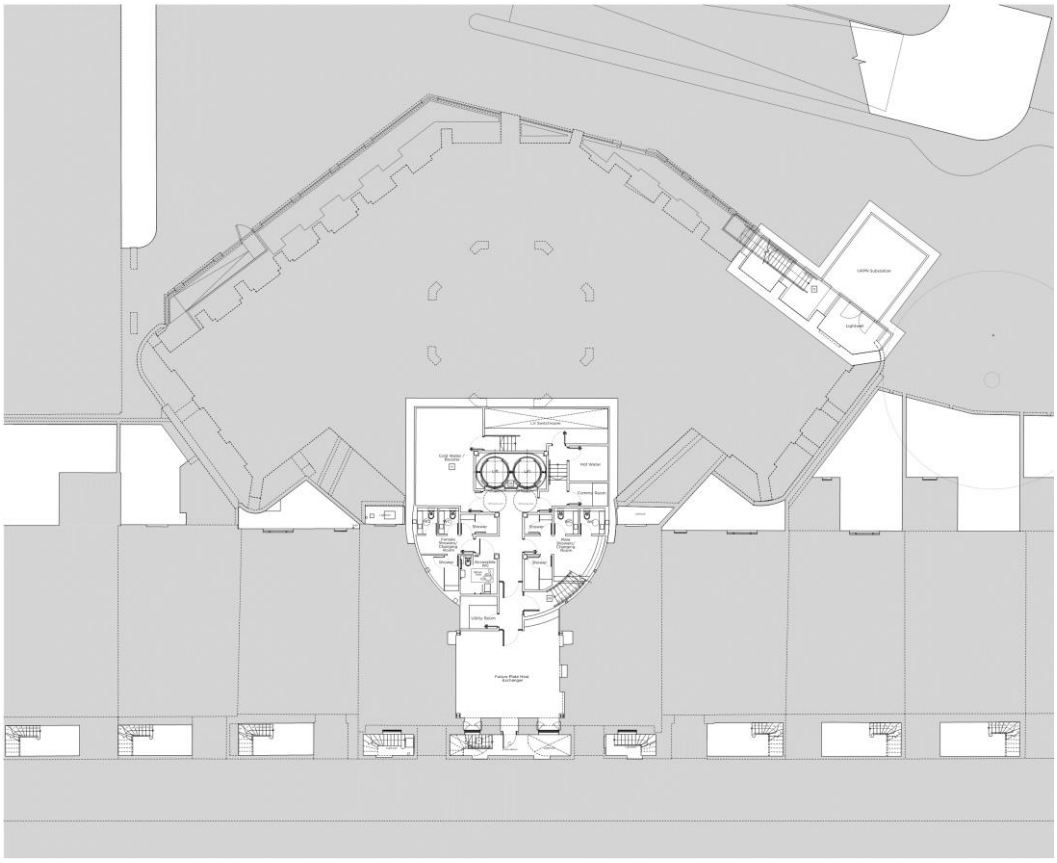

Figure 1: Basement level layout

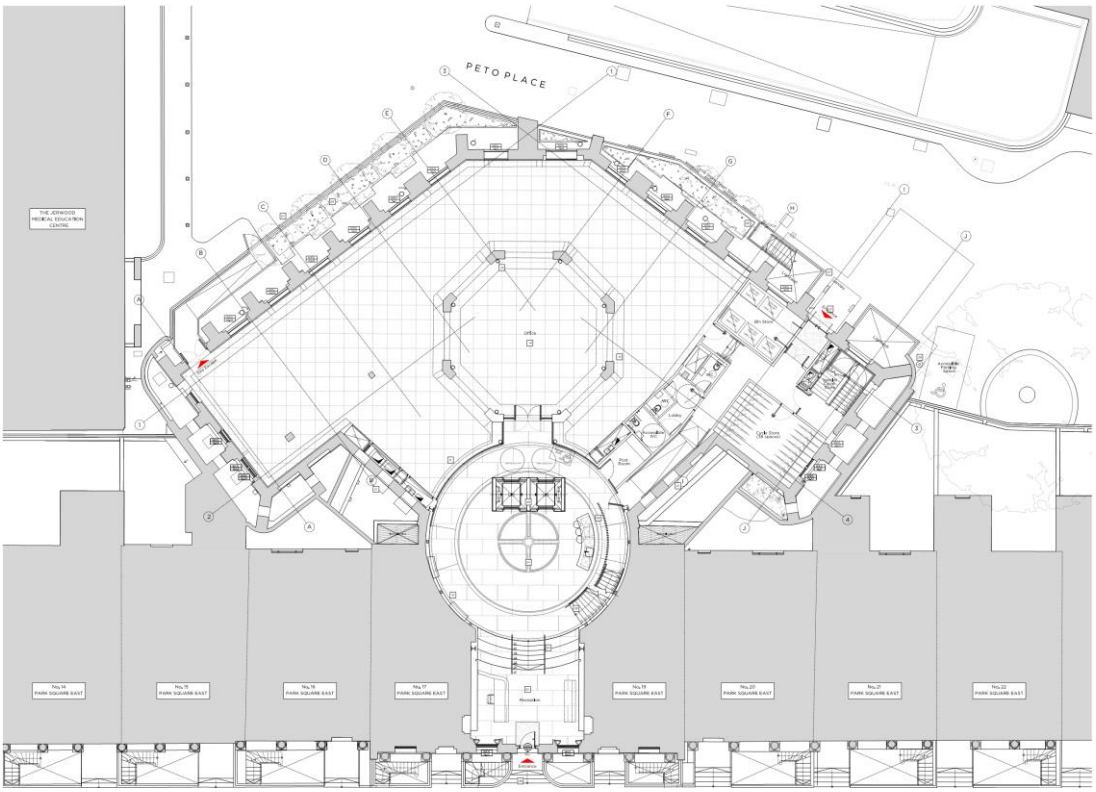

Figure 2: Ground floor layout

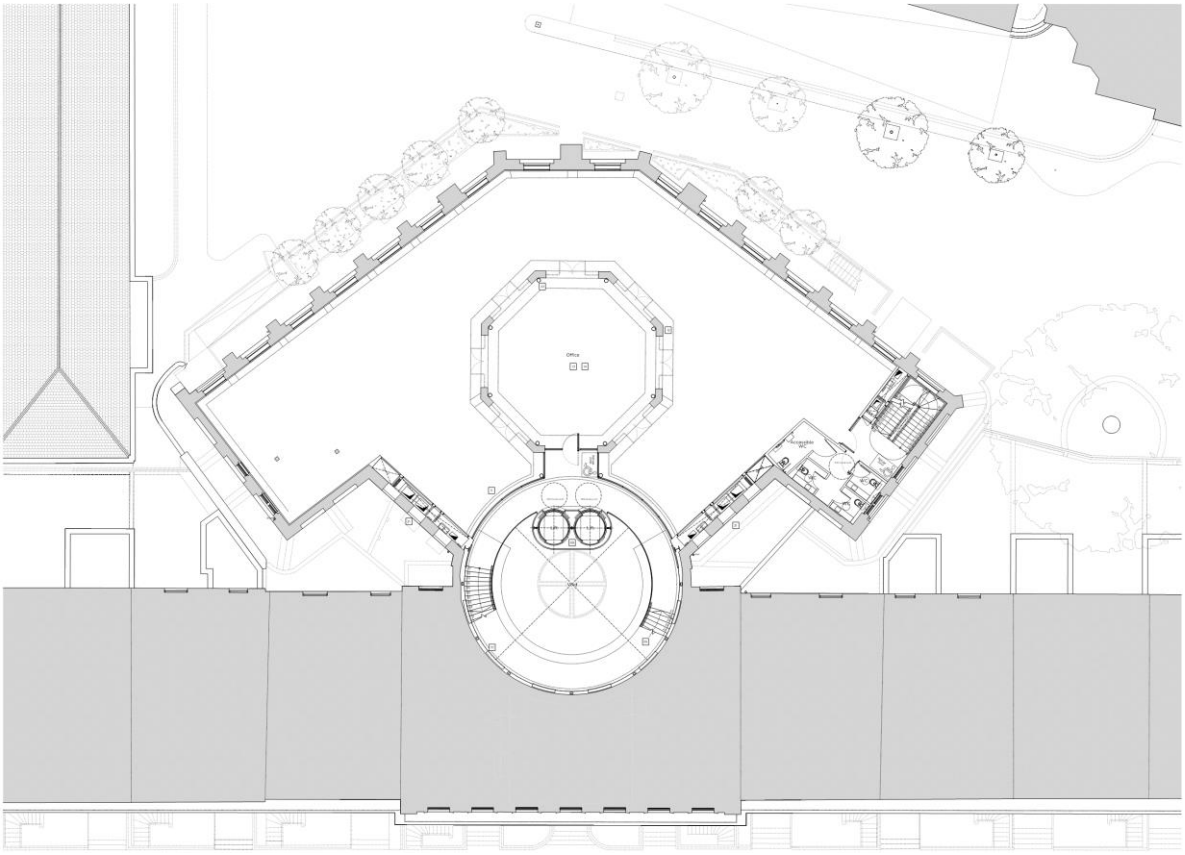

Figure 3: Typical upper floor layout

1.2 Purpose of this Report

The objective of this report is to develop a fire safety strategy, which satisfies the performance requirements of the Building Regulations 2010 whilst maintaining an acceptable level of life safety, protection of adjacent property and adequate provisions for fire service intervention.

This report details the fire safety strategy for the building and is intended to highlight the key design issues and the proposed solutions to meet the challenges of compliance with the Building Regulations 2010 (Section 2).

This initial fire strategy document has been developed to provide relevant information for the design team for RIBA Stage 2 and further details will be introduced at a later stage of the project development.

The main guidance documents used for this development in order to achieve statutory approval under Part B of the Building Regulations 2010 is BS 9999: 2017.

Where no specific provision is mentioned in this fire strategy regarding any particular aspect, reference should be made to BS 9999: 2017.

***Note:** Where reference is made to superseded or withdrawn documents in this report, the design team should adopt a subsequent revision or the latest equivalents standard.*

2.0 The Diorama

As discussed earlier in the report, the building is associated with an office use on all floors other than the basement, which comprises ancillary accommodation. The building has a single basement level, a ground floor and three upper floors.

2.1 Risk profiles

2.1.1 Introduction

The fire safety principles for the office areas of the project have been developed in line with the latest current standards, namely BS 9999 which is purely for life safety purposes although property protection measures are inherent in the design.

As per BS 9999, a risk profile is established to determine appropriate means of escape and the other relevant fire safety provisions for life safety. The risk profile is a function of the occupancy of the building and the fire growth rate.

2.1.2 Occupancy Characteristic

Predominately, the occupants of the office areas are awake and familiar with the layout of their surroundings. Therefore, a characteristic of A – awake and familiar applies.

Fire Risk Profiles

Occupancy Characteristic	Fire Growth Rate	Risk profile
A - Occupants who are awake and familiar with the building **B - Occupants who are awake and unfamiliar with the building**	1 Slow 2 Medium 3 Fast 4 Ultra-fast	A1 A2 A3 A4

The fire growth rate of the office is classified as Medium (Category 2),

Given the foregoing definitions, the risk profile of the building is classed as A2, i.e. occupants are awake and familiar with their surroundings with a medium fire growth rate.

2.2 Automatic Water Fire Suppression Systems (AWFSS)

As the building does not exceed 30m in height, there is no requirement to provide an AWFSS system and as such the current proposal does not include for any such system.

It should also be noted that other stakeholders, such as the insurers should be consulted on this matter as the fire safety strategy report only take a life safety approach and does not look at e.g. additional property protection measures.

2.3 Fire detection and alarm system

The building is associated with that of an office use, with open plan offices forming the typical upper floors.

Based on the above, it is proposed that a category L2 fire detection and alarm system, designed and installed in accordance with BS 5839-1, should be provided.

The proposed evacuation regime for the whole building is that of a simultaneous evacuation upon activation of the fire detection and alarm system.

At this stage no investigation period has been assumed to be present within the fire detection and alarm system operation. Therefore, the fire alarm system will enter its evacuation mode upon operation of a single smoke/heat detector or the activation of a manual call point.

2.4 Means of escape

For the purposes of the fire strategy, and based on the above section, the proposed evacuation regime for the whole building is that of a simultaneous evacuation, with all areas evacuating upon sounding of the fire alarm.

2.4.1 Travel distance

In accordance with BS9999, the below travel distances are applicable for the office areas:

A2 risk profile – 22m in single direction and 55m where more than one direction is available.

The above travel distances are do not appear to be exceeded anywhere in the office areas.

With respect to the plant areas in the basement, travel distances should be within 18m where single direction is available and 45m where more than one direction is available. This is based on an A3 risk profile in accordance with BS 9999.

2.4.2 Occupancy

The maximum anticipated occupancy numbers for the office areas are detailed in the table below

Floor number	Floor Area (m^2)	Floor space factor (m^2/person)	Anticipated occupancy numbers
G	742	6	123
1	686	6	114
2	640	6	106
3	593	6	99
TOTAL on upper floors			319

Based on the above table, the total anticipated occupancy numbers for the office areas on the upper floors is 319 people.

The building will also be provided with access to the roof in the form of a roof terrace. Occupancy numbers for the roof terrace should be limited to 60 people due to the fact that there is a single means of escape available.

With respect to the basement areas, based on the proposed use, the anticipated occupancy numbers are circa 40 people.

2.4.3 Exit capacity (Horizontal and Vertical)

The doors to the escape routes from the office areas should not be less than 850mm clear width.

This is based on two available exits (and discounting one due to the effects of fire) and a 3.6mm/person horizontal escape width factor.

Any room with a single exit should be limited to 60 people and should be provided with a door having a clear width of not less than 850mm.

Merging flows occur at ground floor level between occupants escaping from the ground floor office accommodation and merge with the flow of people escaping via the secondary protected escape stair (Figure 4 below). In accordance with BS 9999 figure 6, the final exit route should have a clear width of not less than 1,000mm. Currently, the exit corridor and final exit doors are sized at 1,350mm and as such the proposal is considered acceptable.

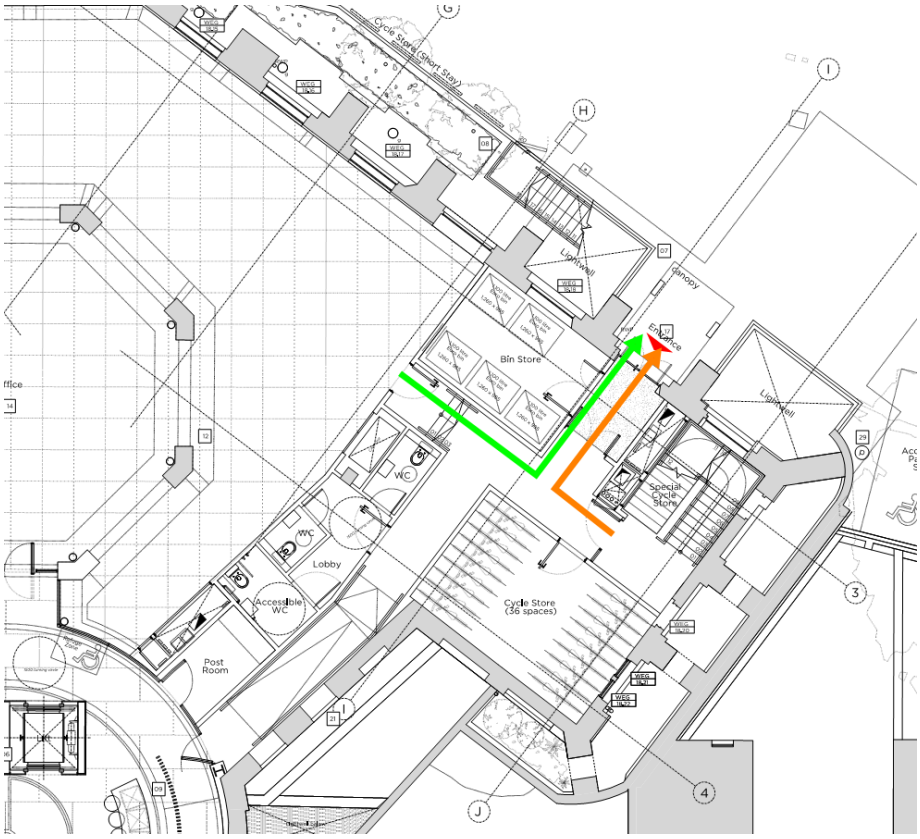

Figure 4: Merging of flows at ground floor level

In accordance with BS 9999 and an A2 risk profile the vertical means of escape factor for a staircase serving 3 upper floors is 3.25mm/person. However, as the minimum requirement for fire detection and alarm system is for a Type M system and the proposal includes for a category L2 system, in accordance with BS 9999 it is acceptable to reduce the vertical escape factor by 15%. Therefore, the vertical escape factor that applies is 2.76 mm/person.

BS 9999 also requires the largest staircase to be discounted, when no lobby protection is provided to the staircases. As such, Stair A (1,500mm in width) is discounted for the purposes of the Vertical means of escape calculations and therefore the entire occupancy of the upper floors should be able to escape from Stair B (proposed 1,000mm clear width)

Based on the above and the anticipated occupancy of 319 people on the upper floors each escape stair should have a minimum width of 1,000mm.

It should be noted that for basement escape, escape staircase should measure not less than 1,200mm in width.

All staircase final exits should have a width that is at least the width of the staircase or larger where merging flows have been identify.

2.5 Protected Escape Stairs

As the building exceeds 11m in height, the proposal includes for two protected escape staircases that serve the upper floors.

In accordance with BS 9999, it is only acceptable for one staircase to serve levels above and below ground and as such Stair B terminates at ground floor level, with Stair A serving all floors including the basement.

The main reception space includes for a reception desk within the staircase discharge route of Stair A. This is acceptable under BS 9999 as long as the desk area does not exceed 10m^2. Any furniture, other than the reception desk, that would be present within the reception space and or staircase would need to be constructed of non-combustible materials.

It is currently also proposed that a small tea/coffee point will be provided at ground floor level within the staircase enclosure. This is considered acceptable on the basis the fire load within the tea/coffee point is comparable to the fire load within the reception desk. In addition, in the unlikely event of a fire trained members of staff (reception staff) would be present and could utilise extinguishers for first aid firefighting.

With respect to Stair B any rooms opening directly onto the staircase discharge route should be separated from this discharge route via a protected lobby providing not less than 30 minutes fire resistance. Currently, a protected lobby is provided to all areas apart from the cycle and refuse stores. It is considered acceptable in this instance for the cycle storage area to not be provided with lobby protection on the basis that BS 9999 would typically require 30 minutes fire resistance to a cycle storage area and the current proposal includes for a 60 minute fire rated enclosure with FD60S door. However, a protected, permanently ventilated lobby, should be added to the refuse storage area at ground floor level to separate the refuse area from Stair B discharge route.

In accordance with BS 9999 an A risk profile building with a height that exceeds 11m, but which is less than 18m should be provided with a dry rising main located within an unvented lobby to one of the staircases. However, in this instance it is considered acceptable not to make this provision on the following basis:

- The building is existing and does include for a fire main.
- The proposal includes for an L2 fire detection and alarm system, which will allow for early detection and warning of fire.
- The building has considerable amount of perimeter access available for the Fire Service vehicle via both the front and the rear.

2.6 Compartmentation and Fire Resistance

The height of the topmost occupied floor does not exceed 18m. Therefore, the elements of the structure should be provided with not less than 60 minutes fire resistance in terms of loadbearing capacity.

With regards to the depth of the basement, as this does not exceed 10m in depth, elements of structure within the basement should be provided with not less than 60 minutes fire resistance.

The above fire resistance ratings in terms of REI.

- ***R - Loadbearing capacity;*** the ability of the element to continue to support an imposed load when subject to a fire;
- ***E – Integrity;*** the ability of the element to withstand the formation of holes, cracks etc. through which hot gases and flames can pass; and
- ***I – Insulation;*** the ability of the element to resist the transfer of heat from the exposed face across the thickness of the element to the unexposed face.

As the building is existing and is currently not provided with compartment floors, it is considered acceptable for this arrangement to be maintained. However, the ground floor should form a compartment floor in order to separate above and below ground accommodation.

On the basis that there is no requirement for compartment floors both staircases are proposed to be provided with 30 minutes fire resistance and FD30S doors. Therefore, the glazing that forms part of Stair A should be provided with 30 minutes fire resistance in terms of integrity and insulation.

As the lift shafts are located within the protected enclosure of Stair A, there is no requirement for them to form a protected shaft. However, fire curtains with a fire resistance rating of 30 minutes should be provided in front of the lift landing doors at basement level and third floor in order to mitigate the fact that at these levels they do not open directly within the staircase enclosure.

Although compartment floors are not necessary, it is recommended that any service risers are constructed as protected shafts offering not less than 30 minutes fire resistance.

All plantrooms that do not have life safety function, should be provided with 60 minutes fire resistance with FD60S doors, with plantroom having a life safety function requiring a 120 minute fire resisting enclosure with FD60S doors.

All storerooms and changing rooms should be provided with a 30 minute fire resisting enclosure with FD30S doors. The only exception to this is the cycle storage area at ground floor, which will be provided with 60 minutes fire resistance and FD60S doors.

The refuse store should be enclosed with 60 minutes fire resistance and FD60S doors.

2.7 Cavities, Protection of Openings and Fire Stopping

Details of cavity barriers, openings in compartmentation and fire stopping will be provided in a comprehensive fire strategy report.

2.8 Separation Distances

As the building is existing and no works are proposed that would impact on the external fire spread arrangements to the building, it is considered acceptable to maintain the existing arrangements.

It should be noted that the existing building is provided with an atrium that is currently proposed to be infilled and as such this would also demonstrate that the proposal is actually improving on the existing arrangements.

2.9 Basement Smoke Ventilation

As part of the proposed works to the building, the basement floor is being extended. The basement is deeper than 3m and larger than 200m^2 in area (currently measures 226m^2) , and therefore there is a requirement in accordance with BS 9999 to provide a means to ventilate heat and smoke.

The existing arrangement for basement smoke clearance is via the lightwell to the front of the building. However, as the basement area is being increased the proposal will also include for an additional vent from the rear plantroom that will connect directly to outside.

The exact details and arrangement for the new natural vent will be confirmed as the design progresses. However, the approach is considered acceptable on the basis that the existing smoke clearance arrangement is maintained and an additional means of achieving cross ventilation is being proposed.

2.10 Fire Service Access

The building is existing and no part of the proposed arrangements will impact on Fire Service access provisions. As such, as long as the existing arrangements are maintained, the proposal is considered acceptable.

Cundall Johnston & Partners LLP
One Carter Lane London EC4V 5ER
United Kingdom Tel:+44 (0)20 7438 1600
Asia Australia Europe MENA UK and Ireland
www.cundall.com

ONE PLANET LIVING | An initiative by Bioregional