Design Note No. DN02

Project **112a Great Russell Street**

Subject **Fire Safety Overview**

Date **16th April 2015**

fds consult

1.0 DOCUMENT CONTROL

Issue	Date	Description	Author	Reviewed
1	15/04/15	Preliminary Fire Safety Overview	MW	JP
2	16/04/15	Updated to latest design	MW	JP

2.0 INTRODUCTION

The following sections outline the key fire safety features that should be incorporated within the development. Some of the requirements may be negotiated down at a later date following discussions with the approving authorities. At this stage the following is based on Building Regulations.

This development consists of the implementation of a hotel accommodation into an existing building, which will be located on Basement Levels -4 and -5 and shall be provided with its own access from the ground floor that will be independent from the other accommodations of the building. As part of this design note the different accommodations will be reviewed to identify areas of non-compliance and provide general fire safety guidance.

3.0 FIRE SAFETY OVERVIEW

ITEM	REQUIREMENTS
Escape within the bedrooms	• The travel distances from the furthest point in the hotel bedroom to the entrance door should be limited to 9m and if cooking facilities are provided, they should be located remote from the escape route as to not impede the evacuation from the occupants. • For larger units with internal travel distances of more than 9m from the entrance doors to the most remote point, an internal 30 minute protected hallway with travel distances of not greater than 9m should be provided.
Escape within the common areas	• Within the common areas the travel distances should be limited to 9m where escape is only possible in a single direction of escape or 35m where occupants are provided with multiple directions of escape. • In this case, the hotel is provided with three staircases therefore the travel distances with the common corridor satisfy the recommendations given above. • In order to prevent a fire impeding two escape routes simultaneously cross-corridor separation should be introduced approximately midway between two corridor escape routes. This separation should be a minimum of 30 minutes fire resistance with FD20S double swing doors. If desired it is possible that these cross-corridor doors can be held open on electro-magnetic door holders interlinked to the fire alarm in everyday use and programmed to close on the activation of the fire alarm. • Since there are multiple basement levels the hotel will need to be provided with a fire fighting shaft. The fire fighting staircase should be at least 1100mm wide. It is expected that due to the size of the floor plate, it will be necessary to provide two firefighting shafts to ensure that adequate hose coverage is provided. At this stage, it is suggested that the staircases

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accessed from Great Russell Street and Adeline Place should be designed as a firefighting shaft, which would require for a firefighting lift to be incorporated by the staircase accessed from Adeline Place.
• Due to the fact that the staircases shall be designed for fire fighting, no service risers should be accessed from the staircase.
• As part of the firefighting shaft, it requires to be provided with smoke venting to the firefighting lobby. In this case, it is proposed that a mechanical smoke ventilation (MSVS) is provided in the firefighting shaft which will depressurise the firefighting lobby. The MSVS will have a free area of at least 0.5m² with a 0.5m² Automatically Opening Vent (AOV) into the smoke shaft from the firefighting lobby at every level which should operate in accordance with the SCA Guide and BS EN 12101 Part 6.

• The occupancy loads in individual rooms will vary throughout a day however any room with a single exit should have a maximum occupancy of 60 people. The exit from such rooms can have a minimum clear width of 750mm and also open into the room (open against the direction of escape).
• In the event that any room has an occupancy greater than 60 people then this room should be provided with at least two exits. Each exit will need to open in the direction of escape and have a minimum clear width as outlined in the table below.

<table>
<tr><th>Occupancy</th><th>Exit Width (mm)</th></tr>
<tr><td>61-110 people</td><td>850mm</td></tr>
<tr><td>111-220 people</td><td>1050mm</td></tr>
<tr><td>220+ people</td><td>5mm per person
(e.g. 360 people = 1800mm)</td></tr>
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• Assuming that each hotel bedroom will have a maximum of two people, on Basement Level -4 there are 76 rooms whilst on Basement Level -5 there are 90 rooms, therefore the expected occupancy load is for 152 and 180 occupants respectively.
• Taking into account that one exit may be impeded in the case of fire and that both levels are provided with three exits, each exit should be a minimum of 850mm clear in both basement levels.
• Both of the firefighting staircases need a minimum clear width between walls of 1100mm whilst the escape staircase needs a minimum clear width between walls of 1000mm for Approved Document B purposes with the final exit from the staircase being at least the same width as the staircase. It should be noted that for other Approved Documents issues the minimum stair width is likely to need increasing up to 1200mm.
• The staircase discharge routes at ground floor should be maintained unobstructed and free of fire load.

• In addition to the smoke venting arrangements, if the common corridors are to include an environmental cooling system the following operations should be incorporated into the environmental venting system design to ensure that a high level of fire safety is maintained.
  ○ In the event of smoke being detected in any common corridor within the building the environmental cooling system will be shut down and a 60 minute fire damper will close at each level to separate the vertical riser (where provided) from the corridor. These actions will be automatic based on the activation of a single smoke detector.
  ○ Once the environmental venting system has shut down the proposed smoke venting systems will operate as designed.
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<td>Escape within Ancillary Accommodation</td>
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• In the event that any special fire risk rooms are introduced (i.e. kitchens, store rooms, switch or boiler rooms etc.) in the back of house areas, the travel distances within these rooms should be reduced to 9m where escape is available in one direction and 18m where escape is possible in two directions.

• Any inner rooms introduced as the design develops should be acceptable providing the following conditions are adopted:
  ○ The occupant capacity of the inner room should not exceed 60 people.
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The inner room should be accessed directly off the access room and not via an intermediate corridor.
The escape route from the inner room should not pass through more than one access room.
The travel distance from any point in the inner room to the exit from the access room should not exceed 12m.
The access room should not be a place of special fire risk (e.g. Transformer Rooms, Switch Gear Rooms, Boiler Rooms, Kitchens, Store Rooms and Plant Rooms)
The door between the inner room and the access room should include a vision panel with an area not less than 0.1m² or,
The access room and inner room should include automatic smoke detection and alarms to provide early warning in the event of a fire.
Any dead end sections of corridor, longer than 4.5m, should be constructed as protected corridors with a minimum fire resistance of 30minutes and FD30S doors.

Additionally in order to prevent a fire impeding two escape routes simultaneously cross-corridor separation should be introduced approximately midway between two corridor escape routes. This separation should be a minimum of 30 minutes fire resistance with FD20S double swing doors. If desired it is possible that these cross-corridor doors can be held open on electro-magnetic door holders interlinked to the fire alarm in everyday use and programmed to close on the activation of the fire alarm.

In the event that any room has an occupancy greater than 60 people then this room should be provided with at least two exits. Each exit will need to open in the direction of escape and have a minimum clear width as outlined in the table below.

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<tr><td>Escape within the plant areas</td><td>

Travel distances in the ancillary stores, plant and refuse rooms should be limited to 9m where escape is in a single direction and 18m where escape is possible in more than one direction.
Where the travel distance within these rooms are extended, it is proposed that either the door is re-located to reduce the travel distances or a secondary exit should be provided.

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<tr><td>Disabled Evacuation</td><td>

The evacuation of disabled occupants plays an important role in the overall evacuation of the commercial buildings. Where the escape is not direct to outside from the commercial buildings, provisions are required for disabled occupants to reach a place of refuge before being fully evacuated by staff.
The hotel operates on the levels below the ground floor from where direct escape is not provided directly to outside and therefore disable refuges will be required.
At present it is not intended that the lifts within the building be used as part of the means of escape for disabled occupants. Where possible, the exits should be arranged so that escape is either direct to outside at ground floor or into a refuge on the basement levels. The refuges will comprise a notional area, 1400mm x 900mm located out of the escape route within the stair enclosure. In accordance with BS9999:2008, the refuges should contain a means for occupants to communicate to the building management that they are in need of assistance. This should be provided within the refuge with an indication at a suitable management area e.g. within a protected stair enclosure at ground floor level (it is recommended that this is discussed with the building management team to determine the best location for the management communication point.
The building management forms an integral part of the design and on-going functionality of the building after occupation. The building will have a management team whose responsibilities will include ensuring the fire safety strategy is adopted and enforced. One of the responsibilities of this team will be to develop a management strategy for the building. This strategy will incorporate details of how the building satisfies the requirements of the

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	Equality Act 2010. The management strategy should include information on staff training, how disabled occupants will be evacuated in the event of a fire and identify key roles in ensuring they are assisted in a fire situation.
Fire alarm and detection system	• The fire alarm and smoke detection within the hotel accommodation should be designed in accordance with BS5839 Part 1 and be at least of type L2. • It is proposed that the hotel shall undertake a simultaneous evacuation strategy. It may be possible to incorporate an investigation period in order to minimise the risk of false alarms however this should be agreed with the hotel operator and approving authorities. • As mechanical smoke shafts are proposed within the firefighting lobbies, manual controls will be provided from the ground floor status panel at the entrance lobby to allow the Fire Service to control the system
Sprinklers	• Even though in accordance with Approved Document B it may not be necessary to provide sprinklers in the hotel accommodation, consideration should be given to whether sprinklers would be required for insurance purposes.
Emergency Lighting	• This should be installed in accordance with BS5266 Part 1.
Escape signage	• This should be installed in accordance with BS5499 Part 1.
Elements of Structure	• Where elements of structure support a building above they should be provided with the structural fire resistance to at least that required for the building they support.
Compartmentation	• All hotel bedrooms should have 30 minute fire resistant compartment walls with FD30S self closing front doors • Internal hallways within hotel rooms (if provided) should be fire rated to 30 minutes with FD20 doors (self closers and smoke seals are not required). • All floors should be compartment floors with a fire resistance equal to the structure. • The hotel accommodation will be provided with firefighting shafts. The firefighting shaft (incorporating the firefighting staircase, firefighting lift and firefighting lobby) will be enclosed in 120 minutes fire resisting construction with FD60S self-closing doors. Internally the firefighting staircase and firefighting lift can be separated from the firefighting lobby be 60 minutes fire resisting construction and FD30S self-closing doors for the staircase and FD30 doors for the lifts. • The other staircase can be provided with the same level of fire resistance as the elements of structure, with fire doors achieving at least half of the fire resistance of the staircase it serves. • Openings in compartment walls should be limited to the passage of service ducts and access doors fitted with smoke seals. Where service ducts pass through compartment walls these will be provided with a fire barrier. All openings will be provided with a similar period of fire resistance to the wall they are provided within and the fire doors are to be locked closed. • In order to protect the final exit routes from the building all wall construction within 1.8m of the final exit points will be fire rated to 30 minutes. In general most final exits are acceptable providing there are two directions of discharge from the exit, however where escape is only possible in a single direction and the exit route in the open air is within 1.8m of the building then any glazing present should be fire rated glazing to 30 minutes (integrity only).
Special Fire Risk Areas	• Plant and refuse rooms should achieve 30 minutes fire resistance with FD30S self closing doors. • Any electrical sub-stations should be fully separated from the adjacent accommodation spaces by at least 30 minutes fire resisting construction, although these requirements are likely to be superseded by the electricity supplier's requirements, which are typical based on 4 hours fire separation. • Refuse rooms accessed internally should be approached via a protected lobby which is provided with 0.2m² of natural ventilation direct to outside. • Cleaner cupboards, stores and utility rooms should be enclosed in 30 minutes fire resistance

	with FD30 self-closing doors.
Cavity Barriers, Fire Stopping and Linings	• Fire stopping and cavity barriers should be provided as recommended in ADB. • All linings within the apartments should have a minimum Class 1 surface spread of flame. • All linings within the protected staircase and common areas should be Class 0. • Any room in the ancillary accommodation with an area less than 30m² should have a Class 3 surface lining. All linings in spaces with an area greater than this should have a Class 1 lining. All linings on escape routes should Class 0.
Fire Service 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. • As the hotel operates on multiple basement levels, it is necessary to incorporate internal fire fighting access via a firefighting shafts. In this case the fire fighting shaft should serve every floor level and be designed in accordance with BS9999:2008. • The fire fighting shaft should be provided with a firefighting stair, a firefighting lobby, a firefighting lift, dual power supplies, suitable smoke clearance and a dry rising water main. • All parts of the floor plates should be covered within 60m (when measured along a route suitable for laying hose) from a dry riser outlet provided within the fire fighting shaft. • All dry riser inlets should ideally be adjacent to the building entrances and be visible from the fire appliance (plus accessible within 18m of the fire appliance parking location). • Fire hydrants are required to within 90m of the dry riser inlet points on the site. • Any access / security measures in and around the site (especially any bollards preventing vehicle access) should be bypass-able by the fire service. The details of the bypass arrangements should be developed and agreed with the fire service as applicable.
Smoke Clearance	• The smoke venting requirements for the residential areas are discussed in detail as part of the common areas means of escape section earlier. No further provisions beyond this are needed for fire fighting. • The firefighting shafts in the hotel accommodations will require to be ventilated in accordance with the SCA Guide and BS EN 12101 Part 6 and it is expected to comprise of a mechanical smoke extraction system. • Because the hotel is located on basement levels and it contains floors over 200m², it is necessary to incorporate ventilation to the floor plate. This could either be done naturally by providing vents equating to 2.5% of the floor plate or mechanically by providing at least 10 air changes per hour. • Generally, when a mechanical ventilation system is proposed, ADB would recommend that the accommodation should be sprinklered, however in this instance since the fire would take place in the hotel rooms or the rooms within the back of house areas and this ventilation would be proposed to serve the common corridors that are deemed to be sterile spaces, it would be considered acceptable to provide a mechanical ventilation system without having the incorporate a sprinkler system.

4.0 CONCLUSIONS & RECOMMENDATIONS

This report outlines the fire safety strategy proposals for the new development at 112a Great Russell Street and seeks to demonstrate compliance with the Building Regulations (generally in the form of the recommendations of Approved Document B).

The design of the hotel accommodation, such as travel distances etc., are within the recommendations of the Approved Document (ADB).

The hotel accommodation is proposed to be provided with an automatic fire alarm and detection system designed in accordance with BS5839 Part 1 to an L2 standard.

Disabled refuge spaces will be provided for the hotel providing a place where disabled occupants can take refuge prior to being evacuated. It is proposed that these are provided with communication to management for evacuation purposes. A management plan will be developed by the building management.

As the hotel operates on multiple basement levels it will be provided with firefighting shafts. Each shaft will incorporate a firefighting stair, smoke clearance and a dry main. A fire fighting lift will also be provided as appropriate for each firefighting shaft concerned.

Based upon the above proposals it is considered that adequate measures are provided to meet the functional requirements of the Building Regulations.