CONSULTING FIRE ENGINEERS

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Fire Safety Strategy
29 Broadwater Road

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Report History

Issue	*Date*	*Notes*	*Prepared*	*Reviewed*
Draft 1	12 Dec 2019	Initial Draft for review	DS	MO
Issue 1	17 Dec 2019	Updated to incorporate new drawings from client	DS	MO

1. Introduction

This document outlines the fire strategy for the proposed new residential development at 29 Broadwater Road, Welwyn Garden City.

The purpose of this document is to provide a planning state assessment of the proposed development against the Building Regulations 2010, 'Fire Safety' Approved Document B, volume 1 – "dwellings" (2019 edition) and BS 9991: 2015 "Fire safety in the design and management and use of residential buildings – code of practice, prior to the commencement of construction".

The proposed development consists of 128 new residential flats over four floor levels, and 136 parking spaces at basement level. This document is intended to provide the scope of design regarding the fire safety aspect of the building.

2. Means of escape

Based on the recommendations of Approved Document B it is considered that the proposed development should be considered as fitting within Purpose Group: 1(a) Residential (Flats). The car park is considered to be Purpose Group 7(b) storage.

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2.1 Maximum Occupancy

The estimated occupancy of the building has been calculated in the table 2.1 below. This is based on the sleeping capacity of each block and an allowance for other period that may be in the building (e.g. visitors, guests, contactors, etc.

Table 2.1 –Estimated Occupancy of Each Block

Block Reference	Sleeping Capacity	Additional non-residents	Estimated Occupancy Leaving the upper floors
Block A	47	20	50
Block B	68	20	66
Block C	53	20	55
Block D	40	20	45
Block E	56	20	58
Block F	72	20	68
Block G	52	20	53
Basement Car park			*

Note: it is assumed that the car park does not have a static occupancy and is only used by residents and their guests and hence the occupancy of the car park is accounted for within the figures above in the table.

2.2 Escape Routes and Storey Exits

The escape route from each flat is via smoke vented corridors and into a single protected staircase. Occupants are considered to be in a place of relative safety when they leave their own flat, this place of safety is maintained until the occupants have reached the final exit.

2.3 Number of Escape Routes and Exits.

Table 2.3 – Minimum door widths along escape routes for each block of flats

Block Ref.	Min Door Width	Estimated Capacity
A	850	110
B	850	110
C	850	110
D	850	110
E	850	110
F	850	110
G	850	110

*Note *: values for the capacity have been determined based on the data set out in Table 2.3 in Approved Document B Volume 2 – 2019*

The smallest door width along the escape route of any block of flats is 850mm and therefore as the largest estimated number of people using a final exit door will be 81 they do not limit the escape capacity in any particular block and exceed the minimum door width requirement in BS9991 and Approved Document M – Volume 1.

2.4 Travel Distances

All travel distances measured on the drawings are within the maximum values of 7.5m in a shared corridor and 9m within the internal protected hallways in each flat excluding the shared corridor on the ground floor in Block F where the furthest travel distance in the corridor to the final exit is 16m.

It should be noted as there are only two flats in the block that are effected by the increased travel distance the case is made that the flats being at ground floor, the walls of the corridor will be 60 minutes fire resistant, the corridor is provide with a method of smoke venting to help maintain tenable conditions and the route leads directly to a final exit. The increased travel distance is not considered to detrimentally affect the safe evacuation of the residents in the flats. However, this will be confirmed with fire engineering calculations further along the design process of the building and will need to be agreed with Building Control.

2.5 Stair Width and Capacity

Table 2.5: Clear Width of Stairs Serving the First, Second and Third floor.

Stair Ref.	Clear Width	Estimated Capacity
ST-A	1100	300
ST-B	1100	300
ST-C	1100	300
ST-D	1100	300
ST-E	1100	300
ST-F	1100	300
ST-G	1100	300

The stairs in each block are the only means of access for the fire and rescue service and meet the minimum width requirements for firefighting stairs in Section 6 of BS9991 which is 1100mm. It is estimated that the highest number of people evacuating any the staircases will be 68 people, so the capacity of the stair is sufficient the occupancy of each block.

Table 2.6: Clear Width of Stairs Serving the Basement

Stair Ref.	Clear Width	Estimated Capacity
ST-A	1100	220
ST-C	1100	220
ST-E	1100	220
ST-H	1100	220

In the scenario where one exit is blocked by a fire the maximum escape capacity from the basement would be 660 people. The total estimated occupancy of the building, including guests, is 528 people therefore the escape capacity of the car park is considered to be sufficient for all occupants to escape.

3. External Fire Spread

3.1 Cladding materials

The height of the building is less then 18m, there is not a class requirement of insulation and cladding materials that form the external wall. However, the use of combustible insulation has been discussed and only non-combustible materials will be used in the build-up of the external walls.

Cavity barriers will be provided in line with the compartmentation of the building to restrict the spread of flame.

External balconies will be constructed so that they are separated of other enclosed balconies with compartmentation and fire-resisting structure. It has been stated that the use of timber cladding will not be used on the balconies.

3.2 Unprotected Areas

The assessment of external fire spread, and the required amount of fire retarding construction required on the external walls has been calculated using the guidance in BR 187 for compliance with Building Regulations.

Each flat was assessed using a 3 x 9m enclosing rectangle and the distance from the closest relevant boundary was used to find the allowable unprotected area.

Figure 2 of the Appendix illustrates the acceptable unprotected percentage area of the external walls. The external walls can be 100% unprotected.

4. Facilities for the Fire and Rescue Service

4.1 Access within the Building

As the basement is only 1.8m below external ground level it is not considered necessary to provide a firefighting shaft to serve the basement.

Due to the size (area) of the basement carpark dry falling mains will be provided in each of the stairwells that serve the basement. Sprinklers will also be provided to protect the car park. This allows an increasing to the minimum hose distance within the basement from 45m to 60m.

The maximum estimated distance for laying hose from the entrance into a block of flats to the furthest room located on the third floor is 42m. The building is less then 11m tall therefore it is not necessary to provide a fire fighting shaft to serve the upper floors. However dry rising mains will be provided in order to enhance the fire safety of the building by providing greater hose coverage through the building in order to aid the fire and rescue service conduct firefighting as well as search and rescue operations.

Dry rising mains have also been provided to add additional hose coverage throughout the occupied residential areas of the buildings, the dry risers have been provided in the stairwell of each block of flats as the estimated hose distance is already within the 45m requirement is seen as an additional fire protection measure.

4.2 Access to the Building

External doors providing access for the fire service have a clear width of 850mm exceeding the minimum requirements of 750mm. There will be suitable hard standing / footpaths leading to the entrance of each block of flats.

Where dry rising and falling mains have been provided, these will have access for a pumping appliance within 18m of the inlet connection point. There are fire hydrant within 90m of the entry points. The fire mains and hydrant locations have been illustrated in figure 1 of the Appendix.

Where there is limited space for a firefighting appliance to turn around on Broad Court a turning head has been provided to ensure that a fire fighting appliance can turn around as well as providing a hard-standing surface suitable for the pumping appliance to park whilst in use.

Hertfordshire Fire and Rescue Service have been consulted in regard to access to the building. The concern was that the on foot travel distance between appliance parking locations and the building entrances could cause increased physiological demand prior to commencing search and rescue operations within the building.

The mthodlogy set out in "*The Physiological Assessment of Firefighting, Search and Rescue in the Built Envriomen*t" have been applied. The document gives examples of how long it takes for firefighters to reach a critical core temperature of 39°C when fighting a fire which is between 25-35 minutes of fire fighting and search and rescue operations. The document provided an assessment of the mean time for a lead team to reach each floor. To reach the fourth storey it would take approximately two minutes. With the additional time to connect the hoses from the fire hydrant to the dry riser inlets the fire and rescue service is left with a reasonable amount to time to conduct fire fighting and search and rescue operations before reaching a critical core temperature.

5. Other fire safety systems

5.1 Smoke Venting / Extraction

5.1.1 Basement Car Park and Plant Areas

The basement car park will have natural smoke venting which can achieve least 5% of the floor area equally distributed to achieve cross ventilation.

5.1.2 Common Escape Stairs and Circulations Routes

In the smaller common corridors where travel distance is less than 4.5m there is no need to ventilate the corridor or stair lobby as the building is less than 11m to the top floor and is therefore considered a 'small building'. The smoke venting can be provided to the stair provided the top floor remains less than 11m above external ground level.

Longer corridors require smoke ventilation to create ventilated lobbies to enhance the allowable travel distance from 4.5m to 7.5m.

In this case the compartmentation and smoke ventilation system create a fire sterile lobby that is an effective place of safety. Furthermore, as the corridor is on the ground floor and leads directly to the final exit of the block reasonable provisions have been made to aid the safety of occupants escaping. This will be confirmed with a fire engineering simulation at a later stage of the development.

5.2 Basement Car Park Sprinkler System

Although not required by the guidance in Approved Document B, a sprinkler system is a planned addition to the design in the basement level car park in order to increase the fire protection in the building. The sprinkler system should be designed to the requirements of BS EN 1845 or BS 9251.

6. Conclusions

The purpose of this report is to show that the proposed scheme meets the recommendations of the current Building Regulations and to outline the key fire safety measures required within the detailed design of the building to provide a reasonable standard of safety to the occupants.

Where the design has deviated from the guidance with regards to travel distances and single sets of stairs additional fire protection measures have been used to improve to fire safety of the building and justify the deviations. The addition of smoke ventilated protected lobbies, dry riser mains in each staircase, lack of combustible materials on the external and internal facades and the basement carpark sprinkler system have been put in place to increase the fire safety of the building. These additional measures effectively increase the safety of occupants in the event of a fire by;

a. Providing a smoke free escape route for occupants to use when evacuating the building directly from the front door to their flat to the final exit on ground level.
b. Providing the fire and rescue service the means to quickly enter the building to begin firefighting as well as search and rescue operations.
c. Reducing the probability of the spread of flame internally and externally by using building materials of limited combustibility.

In the event of a fire inside one of the flats the building has been designed so that the fire remains contained to the effected flat for a reasonable duration and to vent smoke from the common areas should it escape form the flat.

Prepared by	Reviewed by
David Smith BSc Engineer	Miles Owarish Principle Consultant
For and on behalf of M10 Fire Consultancy Ltd	For and on behalf of M10 Fire Consultancy Ltd
Signed	**Signed**
Date of issue 17 December 2019	Date of issue 12 December 2019

References:

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14. Approved Document M "Access to and use of buildings Volume 2 – Buildings other than dwellings"
15. BS476 Fire tests on building materials and structures.
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17. BS 5839 Part 1 " Fire detection and alarm systems for buildings"
18. BS 5266 Part 1 2016 " Emergency lighting " Code of practice

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19. BS EN 1838:2013 "Lighting Applications"
20. BS 5499 Part 1:2002 "Graphical signs and symbols, Safety Signs, including fire safety signs"

21. Health and Safety (Safety signs and signals) Regulations 1996

22. BS 5306-9: 2015 "Fire extinguishing installations and equipment on premises."

23. BS 7273 Part 4: 2015 "Code of practice for the operation of fire protection measures – Part 4: Actuation of release mechanisms for doors." BSi London.

Appendix

Figure 1 Fire hydrant locations with distances to inlets

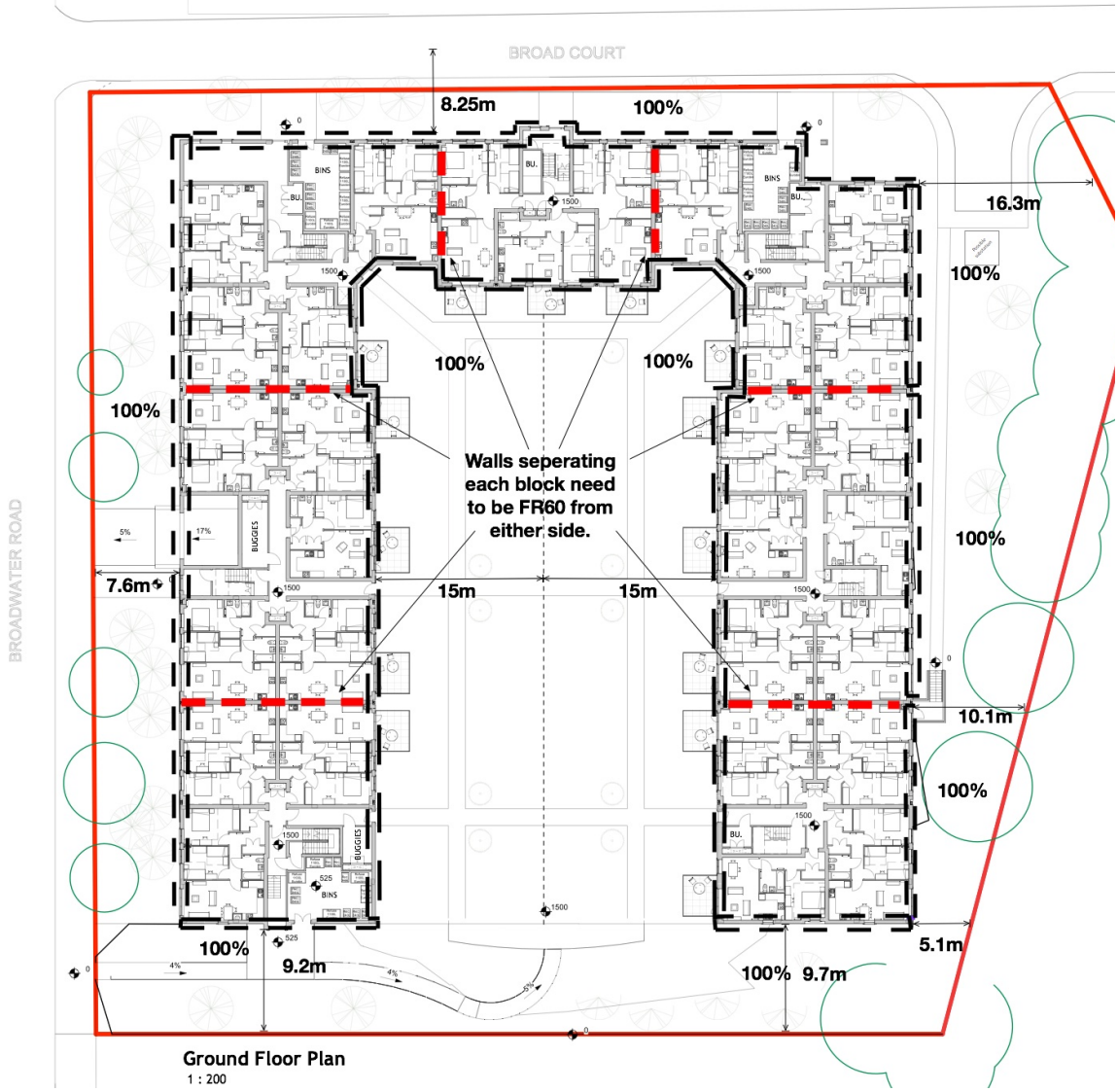

Figure 2 Allowable unprotected areas