

Outline Fire Safety Strategy
St Clare Business Park, Hampton Hill
IFC Report FSS/23193/01A

Notting Hill Home Ownership Ltd



Partner
for
Progress

Confidence in Fire Safety
www.kiwa.co.uk

International Fire Consultants Ltd
Park Street Business Centre
20 Park Street
Princes Risborough
Buckinghamshire
HP27 9AH

+44 (0)1844 275500
uk.firesafety@kiwa.com

International Fire Consultants Ltd

International Fire Consultants is part of the **Kiwa UK Group**. The company is a specialist engineering consultancy delivering independent, honest and practical fire safety solutions to professionals across the built environment. The sought after fire safety advice protects life, preserves property and safeguards business continuity.

International Fire Consultants was established in 1985 to provide high quality and impartial technical expertise concerning fire safety. Since then the team of highly qualified Fire Engineers and Fire Safety Professionals have continued to deliver robust, innovative and cost-effective fire safety solutions, including Assessments, Designs and Inspections.

International Fire Consultants are able to lend their insight and practical expertise for: Fire Safety Engineering, Fire Risk Management, Product Evaluation, Fire Life Safety Systems, Expert Witness Testimony and Fire Protection Training, to developments of all sizes and complexities; from residential, education and healthcare structures to sporting venues, airports and iconic heritage buildings, such as historical royal palaces and stately homes.

Recognised internationally as the go-to professionals in all aspects of fire safety, International Fire Consultants is one of the world's leading fire engineering and solution providers, trusted by many of the most prestigious construction firms, architects and estate owners.

HEAD OFFICE/CORRESPONDENCE ADDRESS:

International Fire Consultants Limited
Park Street Business Centre
Park Street
Princes Risborough
Buckinghamshire
HP27 9AH

REGISTERED ADDRESS:

International Fire Consultants Limited
Kiwa House
Malvern View Business Park
Stella Way, Bishops Cleeve
Cheltenham
GL52 7DQ

+44 (0)1844 275500
uk.firesafety@kiwa.com

Registered No: 2194010

Private and Confidential

This report should not be manipulated, abridged or otherwise presented without the written consent of International Fire Consultants.

| | |
|---------------------------------|---------------------------------|
| Report: | Outline Fire Safety Strategy |
| Report Reference Number: | IFC Report FSS/23193/01A |
| Prepared on behalf of: | Notting Hill Home Ownership Ltd |
| Project: | St Clare Business Park |

Issue Record

| REV | DATE | AUTHOR | REVIEW | SECTION | AMENDMENTS |
|-----|------------|--------|--------|----------------------|--|
| - | 25/07/2022 | AA | TP, SK | - | First issue |
| A | 20/03/2023 | AA | SK | 1 | Table 1 updated |
| | | | | 2.1 | Text updated to take into account amendments to Approved Document B (ADB) |
| | | | | 2.4 | Paragraph added to introduce The Fire Safety (England) Regulations 2022 |
| | | | | 1; 4; 6.3.2; 8.2;9.2 | Text updated to reflect reduction in height of building B1 and B2 |
| | | | | 2.1;9.1 | Text updated to reflect the Building etc. (Amendment) England Regulations 2022 |
| | | | | 5 | Text updated to take into account LPBC requirements as the design progresses |
| | | | | 10.6 | Paragraph added to discuss provision of premises information box (PIB) following amendments to ADB |

Contents

| | |
|---|----|
| 1. Introduction | 6 |
| 2. Legislation and guidance documents | 8 |
| 2.1 Building Regulations 2010 (as amended) | 8 |
| 2.2 The London Plan | 9 |
| 2.3 Regulatory Reform (Fire Safety) Order 2005 (as amended) | 9 |
| 2.4 The Fire Safety (England) Regulations 2022 | 10 |
| 2.5 Construction (Design and Management) Regulations 2015 | 10 |
| 2.6 Employer's requirements | 10 |
| 3. Approach | 11 |
| 4. Overview of the buildings | 12 |
| 5. Automatic fire suppression system | 13 |
| 6. B1 – Means of warning and escape | 14 |
| 6.1 Evacuation strategy | 14 |
| 6.2 Means of detection and warnings | 14 |
| 6.3 Means of escape from Block B1 | 15 |
| 6.4 Means of escape from dwellinghouses | 18 |
| 6.5 Means of escape from Block B2 | 18 |
| 6.6 Means of escape for disabled persons | 19 |
| 6.7 Emergency lighting and signage | 20 |
| 7. B2 – Internal fire spread (Linings) | 21 |
| 8. B3 – Internal fire spread (Structure) | 22 |
| 8.1 Structural fire resistance | 22 |
| 8.2 Compartmentation | 22 |
| 8.3 Cavity barriers | 24 |
| 9. B4 and Regulation 7 – External fire spread | 25 |
| 9.1 Regulation 7(2) | 25 |
| 9.2 Unprotected areas | 26 |
| 9.3 External wall materials | 28 |
| 9.4 Roofs | 28 |
| 10. B5 – Access and facilities for the fire service | 29 |
| 10.1 Vehicle access | 29 |
| 10.2 Fire mains | 29 |
| 10.3 Fire hydrants | 29 |

| | | |
|------|-------------------------------|----|
| 10.4 | Smoke ventilation of car park | 29 |
| 10.5 | Wayfinding signage | 30 |
| 10.6 | Premises information box | 30 |
| 11. | Limitations | 31 |

1. Introduction

International Fire Consultants Ltd (IFC) has been commissioned by Notting Hill Home Ownership to advise on the fire safety strategy for the St Clare Business Park development.

St Clare Business Park consist of a mixed-use five-storey building plus basement (Block B1), a two-storey commercial building (Block B2), and three blocks of three-storey dwellinghouses as depicted in Figure 1.

This report is intended to describe the fire strategy for the St Clare Business Park development and has been produced at Notting Hill Genesis (NHG) Gateway 3 Pre-planning stage.

This report is based on compliance with the fire safety legislation listed in Section 2. The report outlines the statutory controls placed on the project in respect to fire safety and sets out the fire safety strategy for meeting those controls. It does not include for compliance with any other criteria, e.g. insurance, unless specifically described in this report.

The report has been based on drawings produced by AHR, as listed in Table 1. As the design of the project is an iterative process these drawings may not include all recommendations of this report.



Figure 1 - Site plan

Table 1 - Drawings to be reviewed in conjunction with fire safety strategy

| DRAWING NUMBER | REVISION | DRAWING DESCRIPTION |
|----------------------|----------|----------------------------|
| SO-XX-DR-A-20-001-P1 | P02 | Proposed site layout |
| B1-B1-DR-A-20-010-P1 | P04 | Block B1 Basement Plan |
| B1-00-DR-A-20-011-P1 | P03 | Block B1 Ground Floor Plan |
| B1-01-DR-A-20-012-P1 | P02 | Block B1 First Floor Plan |
| B1-02-DR-A-20-013-P1 | P02 | Block B1 Second Floor Plan |
| B1-03-DR-A-20-014-P1 | P03 | Block B1 Third Floor Plan |
| B1-04-DR-A-20-015-P1 | P03 | Block B1 Fourth Floor Plan |

| | | |
|----------------------|-----|--|
| B1-R1-DR-A-20-016-P1 | P04 | Block B1 Roof Plan |
| B2-XX-DR-A-20-020-P1 | P02 | Block B2 Floor Plans |
| B3-00-DR-A-20-030-P1 | P01 | Houses Ground Floor Plans |
| B1-XX-DR-A-20-112-P1 | P04 | Block B1 East Elevation Section Looking West |
| B1-XX-DR-A-20-110-P1 | P04 | Block B1 North Elevation Section Looking South |
| B1-XX-DR-A-20-111-P1 | P04 | Block B1 South Elevation Section Looking North |
| B1-XX-DR-A-20-113-P1 | P04 | Block B1 West Elevation Section Looking East |
| B2-XX-DR-A-20-120-P1 | P02 | Block B2 Elevations |

2. Legislation and guidance documents

2.1 Building Regulations 2010 (as amended)

The building will be subject to approval under the Building Regulations 2010 as modified by the Building (Amendment) Regulations 2022.

That will require the design and construction to comply with the functional Requirements as shown below.

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

In order to demonstrate compliance with functional Requirements B1 to B5, it is conventional to base the design on standard fire safety design documents. Variations to the guidance given in those documents is permitted, as long as it can be demonstrated to have still met the functional Requirements shown above.

In addition, under changes introduced in the Building (Amendment) Regulations 2018, for buildings classified as “relevant buildings”, Regulation 7(2) (and other modified Regulations) applies additional criteria on the combustibility of materials within the external walls. The definition of a “relevant building” is a building with a storey that is 18 m or more above ground level (excluding roof-top plant areas and storeys consisting solely of plant rooms) and contains one or more dwellings, an institution or a room for residential purposes (excluding rooms in hostels, hotels or boarding houses).

None of the buildings in St Clare development meets the criteria above. As such, the additional requirements needed for “relevant buildings” under Regulation 7(2) are not applicable.

A further change to the Building Regulations has been introduced by the Building etc. (Amendment) (England) Regulations 2022. This latest amendment applies to works for which the initial application was made to Building Control after the 1st December 2022 and/or work on site commences after the 1st June 2023. Regulation 7(1A) will prohibit the introduction of composite panels made up of two or more layers of metal and one or more substantial layers which have a gross calorific value exceeding 35 MJ/kg. Regulation 7(1A) will apply to buildings of any height and any usage.

The fire safety strategy contained in this report uses Approved Document Part B (ADB)^{1,2} as the primary guidance document for the blocks of flats and the dwellinghouses. The fire safety strategy for the commercial areas and the car park will be based on BS 9999:2017³.

In situations where the buildings design varies from the guidance in those documents, that has been highlighted and justified in this report.

¹ *The Building Regulations 2010: Fire Safety. Approved Document B, Volume 1 – Dwellings, 2019 edition including 2020 and 2022 amendments*

² *The Building Regulations 2010: Fire Safety. Approved Document B, Volume 2 – Buildings other than dwellings, 2019 edition including 2020 and 2022 amendments*

³ BS 9999:2017. *Fire safety in the design, management and use of buildings. Code of practice*

This report describes the main fire safety issues relating to the buildings. In any areas that are not mentioned in this report, the design should comply with the guidance of the relevant guidance documents mentioned above.

2.2 The London Plan

The Greater London Authority published “The London Plan” in March 2021. The document provides a series of policies to ensure “Good Growth” for London. As part of the Plan, all proposals for major developments (as defined in the Town and Country Planning (Development Management Procedure) (England) Order 2015) should be submitted with a Fire Statement in line with the requirements of Policy D12(B).

In addition, for all developments where lifts are installed, at least one lift per core should be designed as an evacuation lift as per Policy D5(B5).

Whilst this report is not a Fire Statement, which has been submitted separately as part of the planning application for this project, the fire safety strategy includes the provision of evacuation lifts in Block B1 and B2.

2.3 Regulatory Reform (Fire Safety) Order 2005 (as amended)

The Regulatory Reform (Fire Safety) Order 2005 (referred to in the following as the Fire Safety Order, FSO) is the main statutory text controlling the management of fire safety in existing buildings. The Order generally applies to all workplaces; in blocks of flats it applies to the:

- structure;
- external walls;
- common and landlord-controlled areas; and
- front doors to flats.

The Fire Safety Order requires the Responsible Person for the building to ensure that

- a “suitable and sufficient” fire risk assessment is carried out by a competent person; and
- any fire precautions deemed necessary by that assessment are put in place.

The Responsible Person is also required to ensure that any facilities, equipment and devices provided for the safety of firefighters are maintained in good working order.

It should be noted that the word “person” in the judicial sense can refer to a corporation rather than necessarily an individual.

The FSO contains no explicit standards defining what safety precautions are required in any given building. Instead, the government has published a suite of guidance documents which set out benchmarks. For St Clare project the key ones are:

- *Fire safety in purpose-built blocks of flats*⁴; and
- *Fire safety risk assessment – offices and shops*⁵.

⁴ *Fire safety in purpose-built blocks of flats*, HM Government, London 2021

⁵ *Fire safety risk assessment – offices and shops*, Department for Communities and Local Government, HM Government, Wetherby, West Yorkshire, 2006

2.4 The Fire Safety (England) Regulations 2022

The Fire Safety (England) Regulations 2022 are being introduced under Article 24 of the Fire Safety Order and will come into force on 23 January 2023. These regulations create a number of duties for the responsible person for blocks of flats.

In all blocks of flats with shared escape routes responsible persons will be required to provide their residents with:

- fire safety instructions which set out how they should respond to a fire and a reminder of their building's existing evacuation strategy; and
- relevant fire safety instructions and information relating to which fire doors should be kept shut, and instructions not to tamper with self-closing devices and to report any faults or damage to fire doors.

These instructions will need to be re-issued to all residents every 12 months.

In addition, for residential buildings over 11 m above ground level, these regulations will require the responsible persons to undertake annual checks of flat entrance doors and quarterly checks of all fire doors in the common parts.

2.5 Construction (Design and Management) Regulations 2015

The CDM Regulations require that the design of the building should ensure that it can be constructed and managed safely.

This report deals with the fire safety design of the building when completed and does not address fire safety during construction.

There are a number of standard guidance documents available giving guidance on managing fire safety within construction sites (such as HSG168 produced by the HSE) and so the relevant main contractor will need to ensure that the construction site complies with that guidance.

2.6 Employer's requirements

Complementary to the statutory requirements, the report incorporates the recommendations of *NHG fire safety design and specification requirements*⁶. This document includes design and specification standards relating to fire safety. The key fire safety items relevant to the project are listed below.

- For any building of any height containing residential accommodation, all materials becoming part of an "external wall" or "specified attachment" (as defined in Regulation 2(6) of the Building Regulations 2010, as amended by the Building (Amendment) Regulations 2018 but excluding the materials listed under Regulation 7(3)) must be of European Classification A2-s1,d0 or A1, classified in accordance with BS EN 13501-1:2007+A1:2009.
- The smoke/heat detection within each dwelling shall be to a Grade D1 Category LD1 standard.

⁶ *NHG fire safety design and specification requirements. For Development and Regeneration staff and for briefing consultants, K. Bickford, V2.0 - Dec 2018.*

3. Approach

As mentioned in Section 2.1, the fire safety strategy contained in this report uses Approved Document Part B (ADB) as the primary guidance document for the blocks of flats and the dwellinghouses. The fire safety strategy for the commercial areas and the car park will be based on BS 9999:2017.

Much of the guidance in BS 9999 is based on the “risk profile” of a building. For the purposes of this report, the following risk profiles have been assumed:

- a risk profile of A1 for the office spaces on the ground floor of Block B1: occupants awake and familiar with the premises, slow fire growth rate due to the provision of automatic fire suppression; and
- a risk profile of A2 for the commercial building, Block B2: occupants awake and familiar with the premises, medium fire growth rate; and
- a risk profile of A1 for the car park and associated service areas: occupants awake and familiar with the premises, slow fire growth rate due to the provision of automatic fire suppression.

The associated risk profiles are also tabulated in the table below.

Table 2 - Risk profile of different accommodation

| LOCATION | ACCOMODATION | RISK PROFILE |
|---------------------------------|------------------------------|--------------|
| Ground floor in Block B1 | Office spaces/workshop areas | A1 |
| Basement and ground floor in B1 | Car park | A1 |
| Block B2 | Office spaces/workshop areas | A2 |

This report describes the main fire safety issues relating to the building. In any areas that are not mentioned in this report, the design should comply with the relevant guidance documents mentioned above.

4. Overview of the buildings

The proposed redevelopment consists of a mixed-use building between three and five storeys plus basement (Block B1), a two-storey commercial building (Block B2), and three blocks of three-storey dwellinghouses. Block B1 will consist of four cores, i.e. Cores 1, 2, 3, and 4, with a top-storey height of 14.8 m. There will be a number of commercial units on the ground floor, as well as a car park and ancillary accommodation such as bin stores and bike stores. The car park extends down to the basement level which also contains bike stores and plant rooms. Only two of the four stair cores extend down to the basement. The two car park levels are connected only via the stairs; there is no connection via a vehicle ramp.

The residential units will extend from the first floor up to the fourth floor. Each core will have a single stair, which are connected on the first floor via podium.

Block B2 will consist of office spaces/workshop areas distributed along the two floors with a top-storey height of 3.9 m. The building will be served by two staircases positioned at either end of the building.

The houses will be grouped into three blocks – one block to the north and two blocks to the south of the development.

5. Automatic fire suppression system

The residential areas of Block B1, including communal corridors and stairs as well as residential ancillary accommodation at ground floor such as plant rooms, bike stores, and bin stores, will be provided with a Category 3 domestic sprinkler system designed, installed, and commissioned in accordance with BS 9251:2021⁷.

A dedicated sprinkler zone control set comprising a flow switch, zone valve, pressure gauge, and test and drain point should be provided on each floor of each core of Block B1.

The car parks, office spaces on the ground floor, and associated ancillary accommodation to the offices in Block B1 will be provided with a commercial sprinkler system designed, installed, and commissioned in accordance with BS EN 12845:2015⁸. IFC understand that an allowance for Ordinary Hazard Group 3 (OH3) has been included throughout in the design at this stage, although this may be changed at later stage as the design progresses.

NOTE: As the design progresses, insurer's requirements may need to be incorporated into the design such as LPBC and Technical Bulletin 202 which requires 325 m² for commercial sprinkler water tank.

It is not proposed to provide sprinklers in Block B2 and houses.

⁷ BS 9251:2021. *Fire sprinkler systems for domestic and residential occupancies. Code of practice.*

⁸ BS EN 12845:2015. *Fixed firefighting systems. Automatic sprinkler systems. Design, installation and maintenance.*

6. B1 – Means of warning and escape

6.1 Evacuation strategy

Each residential unit in Block B1 will operate on a “defend-in-place” basis. This includes each flat on Block B1 and each house. In the event of a fire in one of the units, only the affected flat evacuates. All other occupants within the building would remain in place and only evacuate on the instructions of the fire service.

Each residential ancillary unit, e.g. bin store and plant room, on the ground floor of Block B1 will operate on the basis of a simultaneous evacuation strategy, whereby upon detection of fire in an ancillary accommodation, all occupants in that room will evacuate.

Each commercial unit on the ground floor of Block B1 will form a separate evacuation zone. Only the affected zone would evacuate in the event of a fire. As there are several commercial units on the ground floor, the evacuation zones will be designed at a later stage as the design progresses.

The basement of Block B1 will be treated as a single evacuation zone, whereby upon detection of fire in any room in the basement, the entire basement will evacuate.

The ground floor car park and associated ancillary accommodation will be treated as a single evacuation zone, whereby upon detection of fire in the zone, the entire zone will evacuate.

Block B2 will operate on the basis of a simultaneous evacuation strategy, whereby upon detection of fire in any room, the entire building will evacuate.

6.2 Means of detection and warnings

6.2.1 Flats

In accordance with the *Employer’s requirements* (Section 2.6), each flat will be provided with a Grade D1 Category LD1 automatic fire detection and warning system designed, installed, and commissioned in accordance with BS 5839-6:2019⁹.

All flats are provided with private balconies. The fire alarm system within each dwelling should provide at least 65 dB on its balcony.

6.2.2 Dwellinghouses

In accordance with the *Employer’s requirements* (Section 2.6), each house will be provided with a Grade D1 Category LD1 automatic fire detection and warning system designed, installed, and commissioned in accordance with BS 5839-6:2019.

The southern terraced houses are provided with back gardens. Unit H11 does not have alternative means of escape from the garden. Therefore, the fire alarm system should provide 65 dB within the garden.

6.2.3 Common residential areas

Smoke detectors will be provided in the common corridors, stair lobbies and stairs of Block B1 to activate smoke control systems or ventilation systems within common lobby/corridor areas.

⁹ BS 5839-6:2019. *Fire detection and fire alarm systems for buildings. Code of practice for design, installation, commissioning and maintenance of systems in domestic premises*

A Category L5 automatic fire detection and alarm system will be provided complying to BS 5839-1:2017¹⁰. This system will include detectors with no sounders, and is for activating mechanical smoke control systems, automatically opening vents (AOVs) and release mechanism for fire doors where provided (see Sections 6.3.2 and for details of the smoke ventilation arrangements).

6.2.4 Ancillary areas and basement car park

Ancillary areas on the ground floor, the basement car park, and associated ancillary areas will be provided with a Category L3 automatic fire detection and alarm system in accordance with BS 5839-1:2017.

6.2.5 Commercial areas

Each commercial unit on the ground floor of Block B1 and Block B2 will be provided with a minimum Category M system designed, installed, and commissioned in accordance with BS 5839-1:2017; however, upper category may need to be considered if actuation of release mechanism is required, which is to be designed and discussed at later stage.

6.2.6 Podium

On the podium, visual and audible alarms will be provided. The visual and audible alarms should be activated upon detection of smoke in communal areas on first floor in either core.

6.3 Means of escape from Block B1

6.3.1 Flats

All flats appear to have a conventional layout with protected hallway. Travel distances within the hallway should be within 9 m. However, since a Category LD1 automatic fire detection and alarm system is provided as well as sprinklers, this would permit an alternative approach whereby total travel distances from the furthest points in the flats to the front door be up to 20 m. Where this limit cannot be achieved, the internal hallway should be enclosed with 30-minute fire resisting construction and each door of internal rooms should be FD 30. Based on the current design, no flats appear to exceed this limit.

All flats are provided with private balconies. These balconies should be treated as inner rooms off living areas.

An inner room is allowed if the following conditions are met:

- the inner room is entered directly off the access room;
- for private balconies, cooking facilities in the access room is remote from the balcony and positioned in such a way that it does not prejudice the escape route through the access room;
- the access room within each dwelling is provided with automatic fire detection and alarm system (Section 6.2.1); and
- the escape route from the inner room do not pass through more than one access room.

¹¹ BS 5839-9:2011. Fire detection and fire alarm systems for buildings. Code of practice for the design, installation, commissioning and maintenance of emergency voice communication systems

6.3.2 Common circulation areas

Communal corridors, lobbies, and stairs

In accordance with Diagram 3.7 of ADB, the maximum travel distance within common corridors is 7.5 m for single direction escape and 30 m for multiple direction escape.

Where the maximum travel distance in the common corridor is less than 7.5 m, smoke control system should be provided within the stair lobby in one of the following methods:

- a single natural smoke shaft (with sectional cross area of 1.5 m²);
- a single mechanical smoke shaft (typically with sectional cross area of 0.8 m²) with make-up air provided via an AOV at the top of the stair; or
- an AOV on the external wall with a free area of at least 1.5 m².

Where the travel distance in the common corridor exceeds this limit, two mechanical smoke shafts should be provided (typically with sectional cross area of 0.8 m²) enabling push-pull mechanical smoke extract system.

An AOV with a minimum free area of 1.0 m² should be provided at the top of each stair. It should be actuated upon detection of smoke in any common corridor or lobby.

Each core discharges via protected entrance lobbies. Any protected exit corridor or lobbies should have the same standard of fire resistance and lobby protection as the stair it serves. The entrance lobbies used as final exit routes should be a sterile space. Post boxes may be provided within these entrance lobbies. This can be considered acceptable, providing the post boxes are constructed of metal.

Each core will be provided with at least one evacuation lift in accordance with the London Plan Policy D5(B5). An evacuation lift lobby will also be provided.

Shared access balconies

Some flats in Core 3 are accessed by an external common balcony on the third floor. There are no limitations in respect to travel distance from the flat entrance door to the stair lobby. However, the external balcony should meet the following recommendations.

- The structure including the balcony floor should be protected by 30-minute fire resisting construction (integrity and insulation).
- The walking surface should be imperforate.
- The sectional profile should be such that any fire plume breaking out of a flat is directed outwards and upwards, and should be arranged such that smoke does not leak laterally along the soffit. In particular, where the width of the balcony is more than 2 m, there should be down-stands placed in the soffit at 90° to the face of the building. Down-stands should project 0.3 m to 0.6 m below any other beam or down-stand parallel to the face of the building.
- At least 50% of the vertical section should be open and the area of opening should be uniformly spread around the surface.
- The opening should be at least between the top of the balustrade at 1.1 m and the soffit to the balcony above.

As the external balcony provides a single direction of escape, further recommendations should be followed.

- The face of the building excluding window openings should provide at least 30-minute fire resistance.

- Doors opening onto the balcony should be FD 30 self-closing doors.
- Windows openings should not extend below a height of 1.1 m above the deck level.
- The external balustrade should be imperforate.
- Surface materials of the facing wall, balcony soffit, and balustrade should be of a Class 0 rating.

6.3.3 Residential ancillary areas and car park

It is unlikely that there will be more than a handful of people in the car park at any one time. However, the fire safety strategy allows for an occupancy of two persons per car. Accordingly, 58 persons at ground floor and 92 persons at basement are expected.

The occupancies of store rooms, plant rooms and other ancillary accommodation is expected to remain in single figures for each room.

Travel distances from all points in the ancillary accommodation to the nearest storey or final exit should be within the recommended limits, i.e. 18 m where travel is possible in one direction only and 45 m where travel is possible in more than one direction.

Travel distances within the car park should be within 26 m where travel is possible in one direction only and 65 m where travel is possible in more than one direction, based on an A1 risk profile.

Access to the basement level is provided via one of the two staircases. The basement stair is split at ground level. Fire fighter can access the basement via the first stair which goes down as depicted below.

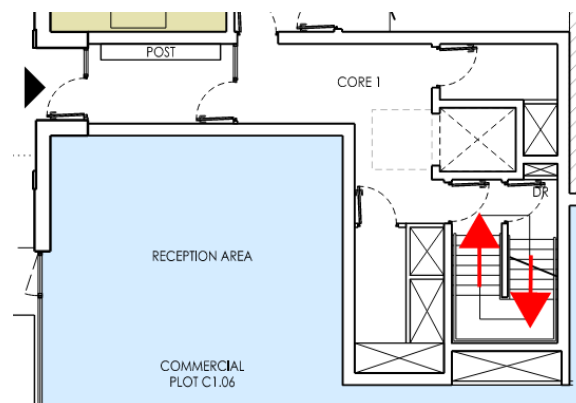


Figure 2 – Ground floor stair's arrangement

The proposal is considered acceptable on the basis that:

- the stair serving the residential levels is protected by a fire door while fire-fighters tackle fire in the basement;
- stair cores are connected at podium level; and
- both stair lobbies on the basement level will be smoke ventilated. The nature of the system will be agreed as the design progresses.

Travel distances within plant rooms will be limited to 9 m where travel is possible in one direction only and 18 m where travel is possible in more than one direction.

Note: where the internal layout of a space is not known, the travel distance will be measured on a direct route assessed on the basis of 2/3rds the recommended travel distance limits.

Any room serving less than 60 occupants can be served by a single exit providing the width of that exit is not less than 800 mm, this being the minimum recommendation in ADB and BS 9999, however, where

access is available to wheelchair users, egress doors from these areas should not be less than 850 mm wide.

Each stair is 1,100 mm wide providing capacity for 220 people, and, therefore provides sufficient capacity for the maximum expected occupancy in the basement discussed above.

Where an ancillary area is connected to a single stair, notably the car park on the ground floor, it will be separated from the stair by a protected lobby with a minimum 0.4 m² of permanent ventilation or be protected from the ingress of smoke by a mechanical smoke control system.

6.3.4 Podium and roof areas

An accessible podium is provided on the first floor. Occupants will be able to escape via one of the four cores.

Travel distances within the podium to the nearest storey should be within the recommended limits, i.e. 18 m where travel is possible in one direction only and 45 m where travel is possible in more than one direction.

6.3.5 Commercial units on the ground floor

The ground floor will house commercial spaces distributed along the perimeter.

The design of the internal layouts of all units will progress at later stage; however, the layout will respect the limitations set out in BS 9999:2017. In particular:

- travel distance within each commercial unit should be within the recommended limits, i.e. 26 m where travel is possible in one direction only and 65 m where travel is possible in more than one direction based on an A1 risk profile.
- Every space with only one means of escape will have a maximum occupancy of 60 persons.

6.4 Means of escape from dwellinghouses

The height of the topmost storey for each of the three-storey houses is over 4.5 m in height above ground level.

Each dwellinghouse will be provided with an internal protected stairway in accordance with ADB.

Plot H11 of the southern terraces is provided with a private back garden without direct exit to outside. Therefore, that space should be treated as inner rooms off living areas.

An inner room is allowed if the following conditions are met:

- the inner room is entered directly off the access room;
- cooking facilities in the access room are remote from the back gardens and positioned in such a way that they do not prejudice the escape route through the access room;
- the access room within each dwelling is provided with automatic fire detection and alarm system (Section 6.2.2); and
- the escape route from the inner room do not pass through more than one access room.

6.5 Means of escape from Block B2

The design of the internal layouts of each floor will progress at later stage; however, the layout will respect the limitations set out in the guidance as described below.

The maximum travel distances are:

- 22 m for one-way travel; and
- 55 m for two-way travel.

Note: where the internal layout of a space is not known (prior to fit out), the travel distances will be measured on a direct route assess on the basis of 2/3rds the recommended travel distance limits i.e. the values in the brackets.

The expected population for Block B2 has been assumed based on a floor space factor of 6 m² for an office use space as per recommendation in BS 9999.

Table 3 – Calculated population per room and floor of Block B2

| Floor | Plot | Approximate floor area (m ²) | Floor space factor (m ² /person) | No. of occupants based on FSF |
|-------------------------------------|-----------|--|---|-------------------------------|
| Ground | Reception | 24.95 | 6 | 5 |
| | C2.01 | 176.68 | 6 | 30 |
| | | | Total/floor | 35 |
| First | C2.02 | 190.86 | 6 | 32 |
| | | 24.95 | 6 | 5 |
| | | | Total/floor | 37 |
| Estimated building occupancy | | | | 72 |

BS 9999:2017 recommends a minimum door width per person in millimetres subject to the room risk profile. In any case, the clear exit width from any room or storey should be at least 800 mm regardless of risk profile, and 850 mm where unassisted wheelchair access is necessary.

For door narrower than 1,050 mm, in accordance with BS 9999 the number of people safely accommodated by an exit is calculated using the following equation:

- $n = 500/m$

where:

- n is the number of persons safely accommodated by the door width;
- m is the minimum door width per person, which is 3.6 mm per person (based on a risk profile A2).

Therefore, each door less than 1,050 mm wide, can accommodate 138 persons. Considering that two means of escape are provided on each floor, and even if one is discounted, the expected occupancy on each floor is less than the exit capacity.

Each stair will be at least 1,100 mm wide providing capacity for 289 persons (based on an exit width factor of 3.8 mm per person). Therefore, even if one exit is discounted, the stair capacity is a lot greater than the anticipated occupancy.

The width of the stair should be no less than the widths of any exits affording access to it, and should not reduce at any point on the way to a final exit.

6.6 Means of escape for disabled persons

In accordance with the London Plan Policy D5(B5), an evacuation lift will be provided in each core within Block B1 and B2. Such lift will serve all floors that are served by the stair. The evacuation lifts in all cores discharge at ground floor level into a protected lobby, from which occupants can further escape to open air outside.

However, there are currently no published standards for evacuation lifts. Based on the guidance currently available, evacuation lifts can only be operated by trained staff designated to operate the lift

in an emergency. Therefore, a holistic approach has been taken in accordance with available guidance such as BS 9991 and BS 9999. It is the client's intention that more detailed design of evacuation lifts and the operation will be carried out at later stages once standards such as BS 81-76, new BS 9991 (which includes guidance on providing evacuation lifts) are published.

On residential floors, the evacuation lift lobby will be fitted with an Emergency Voice Communication Systems (EVC) system that will be designed, installed, and commissioned in accordance with BS 5839-9:2011¹¹ so that disabled occupants can wait for assistance in safe area. On the commercial building B2, a refuge will be provided within the stair enclosures. The refuge will have an area accessible to a wheel-chair user of at least 900 mm x 1400 mm and will be provided by an EVC.

6.7 Emergency lighting and signage

Emergency lighting will be provided in the areas indicated in:

- common corridors and stairs;
- open-plan areas exceeding 60 m²;
- all windowless accommodation; and
- toilets which exceed 8 m².

The system will be designed, installed and commissioned in accordance with the recommendations given in BS 5266-1:2016¹² and BS 5499-4:2013¹³.

Every escape route, other than those in ordinary use, will be distinctively and conspicuously marked by emergency exit signs of adequate size and complying with BS EN ISO 7010:2012¹⁴ and BS 5499-4:2013¹⁵.

¹¹ BS 5839-9:2011. Fire detection and fire alarm systems for buildings. Code of practice for the design, installation, commissioning and maintenance of emergency voice communication systems

¹² BS 5266-1:2016. *Emergency lighting. Code of practice for the emergency lighting of premises.*

¹³ BS 5499-4:2013. *Safety signs. Code of practice for escape route signing*

¹⁴ BS EN ISO 7010:2012+A6:2016. Graphical symbols. Safety colours and safety signs

¹⁵ BS 5499-4:2013. *Safety signs. Code of practice for escape route signing*

7. B2 – Internal fire spread (Linings)

All linings of internal walls and ceilings should comply with recommendations within ADB and BS 9999:2017.

8. B3 – Internal fire spread (Structure)

8.1 Structural fire resistance

It is important that the structure and key construction elements of a building remain fully functional for a reasonable period of time during a fire. It is obviously beneficial if these elements remain in a serviceable condition after the fire for ease of reinstatement. In addition, a fire should be contained by fire resisting elements of the building to prevent it spreading to other parts of the building. This containment should include voids and cavities that could provide a path for fire.

As the highest occupied floor level in Block B1 is less than 18 m above ground level, the structural fire resistance requirement for load bearing elements is 60-minute.

Houses will have a top storey height of 5 m, therefore, 30-minute standard of fire resistance will be required.

The appropriate degree of structural fire resistance for the commercial building is dependent on the risk profile of the building in accordance with Table 23 of BS 9999. The minimum period of structural fire resistance for Block B2 is 30-minute assuming an A2 risk profile for an office.

Structure that only supports a roof does not need any specific fire resistance unless it also supports a fire resisting wall or rooftop plant.

8.2 Compartmentation

The fire resistance performance of compartment walls and floors (or any other parts of the building which are required to prevent fire spread) should be not less than that specified below when tested in accordance with the relevant part of BS 476: Parts 20 to 24 or classified in accordance with BS EN 13501 Parts 2, 3 or 4.

This applies to:

- a. load-bearing walls, for load-bearing capacity, integrity and insulation from either side;
- b. non-load-bearing walls and partitions, for integrity and insulation from either side;
- c. fire doors for integrity from either side, with the exception of doors to lift wells where performance is in respect of exposure of the landing side only;
- d. floors, for load-bearing capacity, integrity and insulation with respect to exposure of the underside only.

Each floor on Block B1 should be a compartment floor, as well as each floor on Block B2 to satisfy building separation distances (see Section 9.2).

Every wall separating the flats on Block B1 should be constructed as a compartment wall achieving a minimum fire resistance period of 60 minutes.

Every wall separating each house should be constructed as a compartment wall achieving a minimum fire resistance period of 30 minutes.

Every wall and floor separating different occupancies on the ground floor should be constructed as a compartment wall achieving a minimum fire resistance period of 60 minutes.

The main elements of compartmentation and the relevant fire performance is summarised below. Any items not described below would be in accordance with Table B3 of ADB.

Table 4 – Fire resistance requirements for Block B1

| ELEMENT | FIRE RESISTANCE |
|--|--|
| Floors | 60-minute standard |
| Walls separating flats from adjacent areas | 60-minute standard (doors to be FD30S) |
| Walls separating each flat | 30-minute standard |
| Walls separating the car park from adjacent areas | 60-minute standard (doors to be FD30S) |
| Walls separating different occupancies on the ground floor | 60-minute standard (doors to be FD30S) |
| Enclosure of stairs | 60-minute standard (doors to be FD30S) |
| Enclosure of evacuation lifts | 60-minute standard (doors to be FD30) |
| Enclosure of risers | 60-minute standard (doors to be FD30S) |
| Enclosure of: <ul style="list-style-type: none"> - plant rooms - bin store - cycle stores - low voltage switchrooms - electrical substations - life safety plant room (including generator room and sprinkler pump room) | 60-minute standard (doors to be FD30S) 30-minute standard (doors to be FD30S) 30-minute standard (doors to be FD30S) 30-minute standard (doors to be FD30S) 240-minute standard 120-minute standard (doors to be FD60S) |
| External walls | See Section 9.2 of this report |

Table 5 – Fire resistance requirements for Block B2

| ELEMENT | FIRE RESISTANCE |
|--|--|
| Floors | 30-minute standard |
| Walls separating different occupancies | 30-minute standard (doors to be FD30S) |
| Enclosure of stairs | 30-minute standard (doors to be FD30S) |
| Enclosure of evacuation lift | 30-minute standard (doors to be FD30) |
| Enclosure of risers | 30-minute standard (doors to be FD30S) |
| External walls | See Section 9.2 of this report |

Table 6 – Fire resistance requirements for dwellinghouses

| ELEMENT | FIRE RESISTANCE |
|-----------------------------|--|
| Enclosure of internal stair | 30-minute standard (doors to be FD30S) |
| External walls | See Section 9.2 of this report |

8.2.1 Fire doors

Fire doors should be capable of demonstrating compliance with the relevant standard (as shown above) when tested as a complete installed assembly.

Any fire doors should be fitted with self-closing fire doors so they return to the closed position, except for internal doors within dwellings, cupboards and doors into service risers which are kept locked shut.

Magnetic hold-open devices should be employed to doors in common areas where such doors are expected to be rendered ineffective by occupants – i.e. chocked open or continued overuse. These should be linked to the fire alarm system / local automatic smoke detection so that the doors are released to the closed position in the event of a fire.

8.2.2 Fire stopping

All pipes, ductwork and services passing through fire-resisting barriers should be penetration sealed with an appropriate sealing system and/or fire/smoke damper which has been shown by an appropriate test or assessment to maintain the period of the fire resistance of the barrier.

Where uPVC ducts are used and the associated final termination of the ductwork crosses the external wall in Block B1 and the houses, these should be made of materials complying with Regulation 7(2) as per *NHG Employer's Requirements* (see Section 2.6).

8.3 Cavity barriers

Cavity barriers should be provided in all areas in accordance with Approved Document B and BS 9999:2017 as appropriate.

9. B4 and Regulation 7 – External fire spread

9.1 Regulation 7(2)

Regulation 7(2) of the Building (Amendment) Regulations 2018 introduces strict restrictions on the combustibility of materials that are contained within (or attached to) external walls of “relevant buildings”.

No buildings within this development fall into the definition of “relevant buildings”. However, the restrictions will be met to satisfy the employer’s requirement as discussed in Section 2.6. Therefore, those restrictions will apply to all parts of Block B1 and houses.

All materials which become part of an external wall or specified attachment of a relevant building must be of European Class A2-s1,d0 or Class A1. The definition of an “external wall” includes all materials contained within the wall, from the external surface all the way through to the inner surface within the room although decorations and finishes to the internal surface are excluded. This therefore includes all materials used within any part of the external wall construction as well as any materials which pass through the external wall, such as ducts or pipes (Section 2.6).

A further change was introduced by the Building etc. (Amendment) England Regulations 2022 prohibiting the incorporation of “relevant metal composite materials” – essentially thin laminated panels made of layers of metal and combustible materials – into the external walls of any building.

A “specified attachment” is defined as:

- a. a balcony attached to an external wall;
- b. a solar shading device (excluding a solar shading device attached to the wall at height of no more than 4.5 metres above ground level);; or
- c. a solar panel attached to an external wall.

The following materials are exempt from the requirements shown above. This is a specific list of exceptions and if a particular material is not included in the list below, it would need to comply with the combustibility restrictions shown above.

- cavity trays when used between two leaves of masonry;
- any part of a roof (other than any part of a roof that falls within paragraph (iv) of Regulation 2(6)) if that part of the roof is connected to an external wall;
- door frames and doors;
- electrical installations;
- fibre optic cables;
- insulation and water proofing materials used below ground level or up to 300 mm above that level;
- intumescent and fire stopping materials where the inclusion of the materials is needed to meet the requirements of ADB;
- membranes (see note below);
- seals, gaskets, fixings, sealants and backer rods;
- components associated with a solar shading device excluding components whose primary function is to provide shade or deflect sunlight such as the awning curtain or slats;

- thermal break materials where the inclusion of the materials is needed to meet the thermal bridging requirements of Part L of Schedule 1 of the Building Regulations;
- window frames and glass; or
- materials which form the top horizontal floor layer of a balcony which are of European Classification A1fl or A2fl-sl (classified in accordance with the reaction to fire classification) provided that the entire layer has an impermeate substrate under it.

Note: *Whilst membranes are in the list of excluded items, there would still be a recommendation for membranes within external walls, e.g. breather membrane, vapour barrier, etc., to achieve at least a European Class B-s3,d0 performance.*

The Class A2-s1,d0 and A1 performance is a relatively strict standard. In practice, materials that contain any significant amount of organic material, e.g. plastic or wood products, are unlikely to achieve that rating.

9.2 Unprotected areas

When a building is on fire, heat will radiate through non fire-resisting openings in the external walls. This heat can be intense enough to set fire to adjoining buildings. In order to reduce the chance of this occurring, the Building Regulations place limits on the area of external elevation with no fire resistance. This area is known as the 'unprotected area' and is affected by such factors as distance from the boundary, use of the building and compartment size.

BRE Report BR187 *External fire spread: building separation and boundary distances* has been applied as a suitable method for calculating minimum boundary distances or maximum unprotected areas, as referenced in ADB. This approach assumes that:

- a fire has spread throughout the full extent of any fire compartment (i.e. full flashover fire throughout the compartment);
- any non-fire rated parts of the external wall have failed; and
- the heat and flames are radiating from the entire façade.

Boundary locations are taken as the centre of a public highway, the boundary of the site or a notional boundary mid-way between buildings on the same site.

The boundary distances of the proposed site are shown in Figure 3.

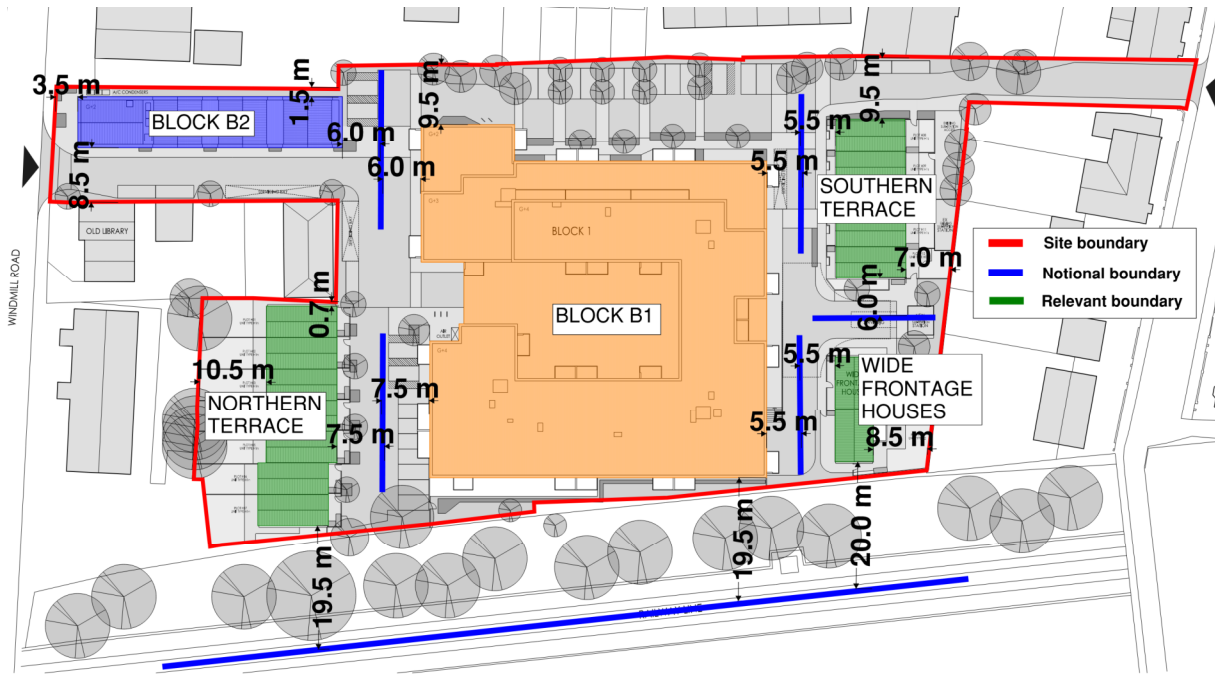


Figure 3 – Indicative site boundaries

External walls that are less than 1 m from the boundary such as the east elevation of the northern block of houses will be provided with building structure achieving a fire resistance of at least 30 minutes (REI30) from both sides separately, which will require the only unprotected openings permitted on this elevation to be a maximum of 1 m².

Each façade of the other buildings will be more than 1 m from the relevant boundary. On this basis, only sections of the external wall that fall outside the permitted unprotected area will need to be designed to achieve 30- (for the houses and Block B2) or 60-minute (for Blocks B1) integrity and 15 minutes insulation from the inside of the building with regards to external fire spread.

The worst-case has been assessed for each building based on the Method of Enclosing Rectangles described in the BRE report BR 187. On this basis, it can be assumed that if the worst case complies then the remaining areas on the elevation are acceptable.

For Block B1, the north elevation of the ground floor has been taken as worst case, which can be enclosed in a 60 m by 6 m rectangle. 100% unprotected area is allowed based on the building separation distance of 6 m.

Each elevation of Block B2 has been assessed with the assumption that each floor be a compartment floor. The calculation has shown that:

- 45% of unprotected areas is permitted on the north elevation (based on an enclosed rectangle of 9 m by 9 m and a relevant boundary of 3.5 m);
- 15% of unprotected areas is permitted on the east elevation (based on an enclosed rectangle of 30 m by 9 m and a relevant boundary of 1.5 m);
- 75% of unprotected areas is permitted on the west elevation (based on an enclosed rectangle of 30 m by 9 m and a relevant boundary of 8.5 m); and
- 100% of unprotected areas is permitted on the south elevation.

For the houses, the southern-east terraces have been taken as the worst case. The calculation has shown that:

- 60% of unprotected areas is permitted on the west elevation (based on an enclosed rectangle of 12 m by 12 m and a relevant boundary of 6 m); and
- 100% of unprotected areas is permitted on the other elevations.

9.3 External wall materials

Block B2 is an office building; therefore, it is not subject to Regulation 7.

For buildings under 18 m in height BS 9999:2017 does not give any recommendations restricting the combustibility of materials used within external walls (other than in relation to surface spread of flame as mentioned in Section 9.2 earlier).

Irrespective of that, IFC would recommend against using materials that have a combustible core protected by a thin layer of protective material which might be breached in a fire. For example, aluminium composite materials (ACM) panels should only be used if the core material is of limited combustibility or better.

9.4 Roofs

All materials that form part of the roof coverings (including rooflights) should be constructed of materials achieving:

- a Class B_{Roof}(t4) as defined in BS EN 13501-5:2016¹⁶ in line with the guidance in ADB and BS 9999 for buildings which are less than 6 m from the relevant boundary; and
- a Class C_{Roof}(t4) as defined in BS EN 13501-5:2016 in line with the guidance in ADB and BS 9999 for buildings which are at least 6 m from the relevant boundary.

¹⁶ BS EN 13501-5:2016. *Fire classification of construction products and building elements. Classification using data from external fire exposure to roofs tests*

10. B5 – Access and facilities for the fire service

In order to extinguish a fire within this building it is important that the fire service can gain access to the premises, and from there, into the building. This section deals with the various facilities intended to aid the fire service access to the building and in fighting a fire in the building.

10.1 Vehicle access

The primary fire access to all blocks will be provided via Windmill Road and Holly Road. Fire access to each core of Block B1 will be provided via means of internal roadways. Internal roadways will be provided also for the houses and Block B2.

Fire access for Block B2 and the commercial spaces on the ground floor of Block B1 will rely on the perimeter access which is more than the 15 % of the perimeter in accordance with BS 9999:2017.

Site access roadway should be suitable for access by a pumping appliance as follows:

- minimum width of road between kerbs: 3.7 m;
- minimum width between gateways: 3.1 m;
- minimum turning circle between kerbs: 16.8 m;
- minimum turning circle between walls: 19.2 m;
- minimum clearance height: 3.7 m; and
- minimum carrying capacity: 14.0 tonnes¹⁷.

In addition, fire and rescue service vehicle should not have to reverse more than 20 m from the end of an access road.

10.2 Fire mains

A dry fire main should be provided on each core of Block B1 in accordance with BS 9990:2015¹⁸.

Fire appliance access should be provided within 18 m of the fire main inlet. The inlet should be located typically on the face of the building close to the entrance to each core.

Fire main outlets should be provided within the stair enclosure on each level. All points in each level will be within 60 m of an outlet.

10.3 Fire hydrants

The buildings entry point should be within 90 m of a fire hydrant. Where this limit cannot be reached, new fire hydrant will be provided to ensure that limit is met.

10.4 Smoke ventilation of car park

The car parks in Block B1 will be provided with smoke ventilation. This will be in the form of mechanical smoke ventilation of 10 air changes per hour, providing adequate coverage to the rooms that accessed of the car park in these areas. It will meet following requirements:

- capable of handling gas temperatures of 300°C for a continuous period of not less than 60 minutes; and

¹⁷ London Fire Brigade. Fire Safety Guidance Note: *Access for Fire Appliances*. (GN29)

¹⁸ BS 9990:2015. *Non automatic fire-fighting systems in buildings. Code of practice*

- operate automatically on activation of the sprinkler system.

10.5 Wayfinding signage

Wayfinding signage for the fire service in Block B1 will be provided in accordance with paragraphs 15.13 and 15.14 of ADB.

10.6 Premises information box

A premises information box (PIB) for the fire service should be provided in each residential core. Ideally it should be sited at the entrance of each core.

The contents of the PIB should contain relevant information that could include, but not limited to:

- floor plans and generic layout;
- fire strategy plans and elevations;
- list of vulnerable people, locations and evacuation plans;
- evacuation strategy for the building;
- risks present, including construction materials and external wall systems (EWS);
- access and facilities for firefighting;
- active and passive measures present.

11. Limitations

Our advice is strictly limited to the scope of our current brief, i.e. to advise on the fire safety strategy for the St Clare Business Park development.

International Fire Consultants Ltd have not reviewed any other issues within the project other than those identified in our report. We offer no comment on the adequacy or otherwise of any other aspects of the development (whether related to fire safety or any other issue) and any absence of comment on such issues should not be regarded as any form of approval. The advice should not be used for buildings other than that named in the title.

Prepared by:



Alessandra Aguinagalde
Meng BEng AIFireE

Fire Safety Engineer

International Fire Consultants Ltd.

(part of the Kiwa UK Group)

Reviewed by:



Tony Pearson
PhD, Dipl. Masch.-Ing., AIFireE, AIMEchE

Associate Director

International Fire Consultants Ltd.

(part of the Kiwa UK Group)



Sunghan Koo
PhD MSc BEng AIFireE

Associate Director

International Fire Consultants Ltd.

(part of the Kiwa UK Group)