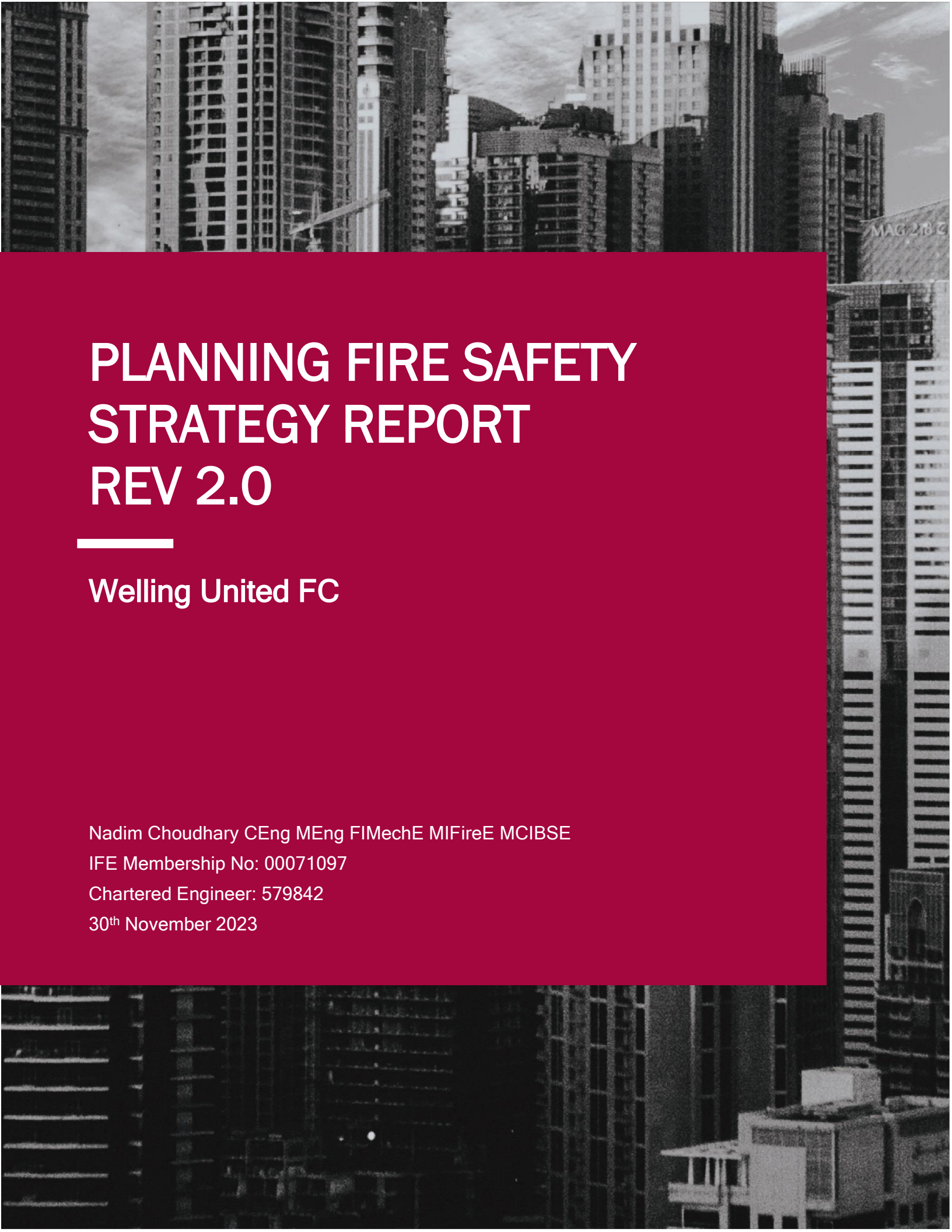

PLANNING FIRE SAFETY STRATEGY REPORT REV 2.0

Welling United FC

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30th November 2023

Author Credentials

Nadim has a first-class honors MEng in Aerospace Engineering, an international Diploma in Risk Management including having studied at Oxford University (Exploring the Universe) and Imperial College Business School (Business Economics.).

Nadim is ex Technical Director of Arcadis and ex Associate Director of Arup (both global engineering design firms) where he headed up the Safety Risk and Human Factors teams. Nadim is dual Chartered through the Institute of Mechanical Engineers (IMechE) and Chartered Institute of Building Service Engineers (CIBSE).

Nadim became a Chartered Engineer in an unprecedented three years and then followed this up by becoming one of IMechE's youngest Fellows. Nadim is a full member of the Institute of Fire Engineers (IFE) and has specialist experience in Safety, Reliability, Fire and Risk having worked in this field for over 15 years. His experience covers a range of industries including rail, nuclear, defence and the built environment. Nadim has established himself as a technical risk leader and has won numerous industry awards (4-won, 8 finalist positions) testifying to this including being nominated for the prestigious, Royal Academy of Engineering (RAE) Silver Medal Prize.

Nadim has served time as a Non-Executive Director on 2 separate Risk and Audit boards, written numerous technical publications and has frequently spoken at international conferences including being invited on to expert panels. Nadim currently sits on the Institute of Fire Engineers working group for fires in electric vehicles.

Revisions

Revision	Date	Prepared By	Comments	Signature
1.0	13.11.2023	Nadim Choudhary	Issued for Comment and Acceptance	
2.0	30.11.2023	Nadim Choudhary	Issued for Comment and Acceptance	

This report has been prepared for the sole benefit, use and information of the client named in this report only and the liability of Rockland Safety Services Ltd, its directors, and Employees in respect of the information contained in the report will not extend to any third party.

This report is formulated based on information and experience available at the time of preparation. It is applicable to the above-mentioned project only in accordance with the client's instructions. It is only valid provided no other modifications are made other than those for which a formal opinion has been sought and given by Rockland Safety Services Ltd.

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1. Purpose of Document

1.1. Scope

Fire Safety Services trading under Rockland Safety Services Ltd have been instructed in the development of a Planning Fire Safety Strategy (this document) for the redevelopment of Welling United FC.

This report does not represent a detailed fire safety strategy. Therefore, this report should be further reviewed and updated as part of further design development at detailed design stage.

This building should also receive a formal safety certificate from the Local Authority and Sports Grounds Safety Authority prior to occupation in support of the sports grounds forming part of Welling United FC.

This report covers the entire building in the finished building condition. This report also does not represent a construction phase fire safety strategy, which is the responsibility of the Contractor. Phased or temporary arrangements fall beyond the scope of this report.

This report is subject to review and agreement with the Building Control Body, Building Safety Regulator, London Fire Brigade, Local Authority and Sports Ground Safety Authority.

1.2. Legislation

The main fire legislation applicable to this building includes The Building Regulations 2010 (as amended to date), The Regulatory Reform (Fire Safety) Order 2005, the Fire Safety Order 2021, the Building Safety Act 2022, Safety and Fire Safety and Safety of Places of Sport Act 1987.

This document forms a concept approach for fire matters, the design team must ensure the contents of this report are incorporated in the building. This concept will not prevent a fire occurring and good housekeeping will be encouraged to reduce the risk. This strategy is mainly concerned with getting occupants out of the building safely and providing measures, where necessary, to assist the fire fighters in their operations.

The concept is only valid where the systems are designed correctly and maintained in an operating condition. If there is a failure in the management approach and a fire occurs, this concept will not reduce the impact on contents and building damage.

Following occupation, the developer / management of the premises are required under current legislation to carry out a fire risk assessment.

1.2.1. Building Regulations 2010 (as amended to date)

The construction or modification of any building in England & Wales needs to comply with the statutory requirements of the Building Regulations. These regulations deal with the minimum

standards of design and building work for the construction of residential, assembly, commercial, and industrial buildings. The Building Regulations contain a list of requirements, referred to as Schedules, which are designed to ensure the health and safety of people in and around buildings. There are 14 Parts, which cover subjects such as structure, fire safety, ventilation, drainage, etc.

In the case of fire, the regulations are dealt with under the functional requirements B1 to B5 of Schedule 1 of the Building Regulations.

- 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 the Fire Service.

There are several prescriptive documents, which can be adopted to show compliance with the Schedules. These include Approved Document B Volume 1 (ADB) and BS 9991 which are considered as adequate to provide general guidance for residential buildings. Similarly, Approved Document B Volume 2 (ADB) and BS 9999 are considered as adequate to provide general guidance for non-residential buildings. Furthermore, the Green Guide 2018 is considered adequate to provide general guidance for sports grounds.

1.2.2. Regulatory Reform (Fire Safety) Order 2005 and Fire Safety Order 2021

In this development, the Regulatory Reform (Fire Safety) Order 2005 and the Fire Safety Order 2021 will apply once the building works are completed, and the building is occupied. The responsible person must ensure a fire risk assessment is carried out which focuses on the safety of all relevant persons in the event of a fire. It is vital that this includes the consideration of external wall systems, fire doors as well as occupants with different needs (such as people with disabilities) to ensure that the fire safety measures adopted are easily and readily accessible for all.

The fire risk assessment must include consideration of any dangerous substances likely to be on the premises and identify risks that can be removed or reduced. This informs the nature and extent of the general fire precautions that need to be taken to protect all relevant persons against the fire risks that remain.

The building management team will be responsible for the appropriate management of the fire safety provisions, and that they are to be maintained and tested over the whole life of the building.

This report assumes that the building will be managed effectively and in accordance with the requirements of the Regulatory Reform Fire Safety Order 2005.

1.2.3. Regulation 7

Regulation 7 has been recently amended in 2018 and 2022 to identify buildings with a floor in excess of 18 as being a 'relevant building'. 'Relevant buildings' are allowed to include only specific low risk materials as part of the external wall system.

This building is assumed to include a floor in excess of 18m, therefore it is classed as a 'relevant building' and it must comply with the requirements of Regulation 7 for 'relevant buildings'.

This is also in accordance with the amendment to ADB Volume 1 dated June 2022, reducing the top floor height threshold from 18m to 11m for external wall materials to achieve Class A2-s1, d0 or better.

Additionally, Regulation 7(1A) has been introduced to prohibit the use of relevant metal composite materials forming part of the external wall systems or specified attachments of all buildings. Relevant metal composite materials are defined as any panel or sheet, having a thickness of no more than 10mm which is composed of a number of layers two or more of which are made of metal, alloy or metal compound and one or more of which is a substantial layer made of a material having a gross calorific value of more than 35MJ/kg when tested in accordance with BS EN ISO 1716:2018. A substantial layer is defined as a layer which is at least 1mm thick or has a mass per unit area of at least 1kg/m^2.

1.2.4. Regulation 38

Regulation 38 of the Building Regulations states that it is necessary that the fire safety information for the building shall be given to the responsible person at the completion of the project and before the building is occupied.

The information will facilitate the production of fire risk assessment which is a requirement of the Regulatory Reform (Fire Safety) Order. The fire safety information in this strategy may be used to supplement the information required to be given to the responsible person. As a minimum it will be necessary for the occupiers of the building to be given the detailed fire strategy document and all as built fire safety plans.

1.2.5. Building Safety Act 2022

The Building Safety Act 2022 describes specific requirements applicable to high-risk residential buildings. Additionally, the design, construction and occupation process for such buildings is controlled by the Building Safety Regulator. This building classifies as a high-risk residential building, and a building safety case report will be required prior to occupation.

1.2.6. Fire Safety and Safety of Places of Sports Act 1987

The Fire Safety and Safety of Places of Sports Act 1987 places powers of control to the Local Authority to ensure the safety of occupants within sports grounds is maintained.

1.3. Fire Safety Objectives

The primary objective of this report is to help provide a design that meets the functional requirements of the Building Regulations (see Section 1.2).

To achieve this, the design aims to:

- Provide suitable means of warning (Requirement B1)
- Provide suitable means of escape (Requirement B1)
- Provide means to limit internal fire spread (Requirements B2 and B3)
- Provide means to limit the risk of external fire spread (Requirement B4)
- Provide suitable access and facilities for the Fire Service (Requirement B5)

1.4. Property Protection

The guidance and recommendations herein are primarily concerned with the protection of life and preventing conflagration. However, the life safety objectives of this fire safety strategy will also aid in protecting the property by minimizing damage to the building and contents caused by heat, smoke, and firefighting.

The provision of fire safety systems for life safety does not necessarily give adequate protection to property or to the continuity of the business carried out in the building. It is therefore recommended that if the potential for property and business loss is considered important, an additional assessment should be undertaken, so that the risks are understood and addressed.

2. Type of Property

2.1. Description

The project represents the redevelopment of the current Welling United FC. The existing site adjoins Park View Road at the North, Bexleyheath Cricket Club at the East, Danson Park at the South and Rose acre Road as well as other residential properties at the West.

The finished project will include the new Welling United FC stadium including capacity for up to approx. 4000 spectators, as well as a block of flats consisting of up to four cores. The building will include various commercial units and ancillary areas (covered car park, plantrooms, refuse stores, bike stores, changing areas) at ground floor. Additional ancillary areas (bike stores) are proposed at basement level. The sports ground (including associated Club Bar, Shop and Ticket areas) will be completely separated from the residential and other commercial areas.

The building will include a total of nine storeys (B, G+7). The building will include a top occupied floor (seventh floor) of up to 22.6m above ground.

All occupants are assumed to be able to evacuate independently at all material times. Within the sports ground areas, occupants with a disability are expected to be assisted at all times by a suitably trained member of staff.

The design team should immediately inform Rockland Safety Services Ltd if the understanding of the project, or any assumptions within this report are not accurate.

2.2. Design Approach

Within the residential areas, it is proposed to use BS 9991:2015 to develop this fire strategy report, as it is also in in support of extended travel distances within common corridors. It is noted that ADB Volume 1 has recently been updated in 2019, 2020 and 2022. It is proposed to supplement BS 9991 by incorporating the recent ADB updates in accordance with contemporary industry standards.

Within the commercial and ancillary areas, it is proposed to use BS 9999:2017 to develop this fire strategy report, as it provides a risk-based approach for each area separately, allowing for flexibility in design.

Within the sports ground's areas, it is proposed to use the Guide to Safety at Sports Grounds (Sixth edition):2018 (referred to herein as the Green Guide), as it is required in order to receive a safety certificate by the Sports Grounds Safety Authority prior to occupation.

This report is not exhaustive in nature. Therefore, where not specifically stated, all fire safety provisions should be in accordance with BS 9991, BS 9999 or the Green Guide, and the documents referenced therein, as appropriate.

2.3. Risk Profile

In accordance with Table 1 of BS 9991, the residential units proposed within the development are expected to be mainstream housing (single level and duplex flats). Risk profiles are not relevant to the fire safety provisions within the residential floors but are presented below only for completion of information.

Following the guidance of Section 6 in BS 9999, a risk profile has been established for each area within the building to inform the appropriate means of escape and design features for life safety. Such risk profiles are determined by the occupancy characteristics and fire growth rate expected within the building. These are presented below in Table 1.

The following risk profiles have been assembled using Tables 2 and 3 of BS 9999. The occupancy characteristic has been selected depending if the occupants are awake and familiar with the building, whilst fire growth rates have been selected based on the expected type, quantity, and distribution of combustibles within those areas. The fire growth rates have been reduced by one unit as automatic fire suppression will be provided throughout the building (see Section 3.3).

Table 1 - Risk Profiles

Area	Occupancy Characteristic	Fire Growth Rate	Risk Profile
Residential areas			
Residential units	Ci	2	Ci2
Residential ancillary areas	A	2	A2
Sports grounds / commercial areas			
Spectator areas	B	1	B1
Club Office / First aid	A	1	A1
Kitchen	A	2	A2
Hospitality / Club VIP	B	1	B1
Sanitary accommodation	B	1	B1
Changing areas	B	2	B2
Car park	B	2	B2
Plantrooms	A	2	A2
Commercial units	B	2	B2

Therefore, the governing risk profile for the entire building has been conservatively employed as B2, considering the provision of automatic fire suppression throughout and a low-risk classification for the stands within the sports ground areas (see Section 3.12).

It is noted that areas employing different risk profiles will be separated from each other using compartment walls / compartment floors / fire resisting construction as indicated in BS 9999.

2.4. Occupancy Numbers

Within residential areas occupants are assumed to be able to live and evacuate independently.

Within the sports grounds and commercial areas, it is assumed that occupants will not include any dependency level. However, suitable training and procedures should be in place so that members of staff can effectively assist all occupants (i.e., disabled occupants) that may need assistance in a fire scenario.

The maximum occupancy numbers for the building are presented below in Table 2, subject to detailed design development. The design team should confirm these maximum occupancy numbers are satisfactory in coordination with the Client. Residential units areas are not presented below as these do not dictate fire safety provisions.

The ancillary areas within the sports ground are limited by the exit provisions presented in this report (see Sections 3.10 and 3.12).

Plantrooms, bike stores, refuse stores, sanitary accommodation, etc. are not presented as these include a transient occupancy only.

The building management organization should conduct an effective fire risk assessment for any proposed event in order to ensure the sports grounds are fit for purpose for such an event.

Table 2 - Maximum Occupancy Numbers

Floor	Area	Maximum Occupancy Numbers
Seventh	East communal terrace	60
Sixth	West communal terrace	60
First	Private amenity	60
	Club office	10
	Kitchen	5
	Hospitality x3	34 x3
	Club VIP	100
Ground	West commercial unit	60
	Club Bar	180
	Shop & Tickets	120
	East commercial unit	60
	Club office	10
	Changing room x2	30 x2
	Officials room x2	10 x2
	Physiotherapy	10
Spectator areas		
Ground / First	East stand	2,635
	West stand	636
Ground	North stand	464
	South stand	200
Total for the entire building		4,852

3. Requirement B1: Means of Warning and Escape

"The building shall be designed and constructed so that there are appropriate provisions for the early warning of fire, and appropriate means of escape in case of fire from the building to a place of safety outside the building capable of being safely and effectively used at all material times." – Part B of Schedule 1 of the Building Regulations 2010."

3.1. Evacuation Strategy

Residential Areas

All residential units should employ a 'defend-in-place strategy', whereby only the residential unit of fire origin should evacuate immediately upon activation of the fire detection and alarm system therein. Occupants from other residential units should be able to evacuate if they wish to do so or if prompted by the Fire Service, however the other residential units will not receive an automated evacuation signal.

All residential ancillary areas (communal terraces, bike stores, refuse stores, plantrooms) will employ a simultaneous evacuation strategy, whereby all residential ancillary areas should evacuate immediately upon activation of the fire alarm anywhere in the basement level.

Commercial Units

Each commercial unit should employ a simultaneous evacuation strategy, separately, whereby only the entire commercial unit of fire origin should evacuate immediately upon activation of the fire detection and alarm system therein.

Sports Grounds

All spectator areas and sports grounds ancillary areas should evacuate simultaneously upon activation of the fire alarm system within the sports grounds areas. It is acknowledged however that bespoke evacuation procedures are expected therein in accordance with the Green Guide, depending on the day:

- Event days: a double knock evacuation strategy should be employed, implemented by trained members of staff, depending on the planned event.
- Non-event days: a single knock evacuation strategy should be employed.

3.2. Fire Detection

Residential Areas

Each residential unit should include a Grade D1 Category LD1 fire detection and alarm system designed, installed and maintained in accordance with BS 5839-6. These should include smoke detection in all rooms and all areas and heat detection in the kitchen.

The common residential parts of each core should be covered by a standalone Category L5 fire detection and alarm system designed, installed and maintained in accordance with BS 5839-1. This system should be employed to trigger the smoke ventilation systems (see Section 3.9), and also evacuate the residential ancillary areas.

Each communal system should include smoke detection in the communal staircases, common corridors and residential ancillary areas. The fire alarm panel for each core should be located near the main entrance of each residential staircase on the ground floor.

Commercial Units

Each commercial unit should include a standalone Category L2 fire detection and alarm system designed, installed and maintained in accordance with BS 5839-1.

Sports Grounds

All spectator areas and sports grounds ancillary areas should include a standalone Category L5 fire detection and alarm system designed, installed and maintained in accordance with BS 5839-1. The fire detection and alarm system should also be in accordance with Section 15.20 of the Green Guide with coverage subject to detailed design development.

General

The residential, commercial and sports grounds fire detection and alarm system should be interlinked with each other in order to provide a notification signal to the other systems, upon activation of any system in any area. Even if an alarm is not required in areas covered by other systems, a notification signal is required in order to enable the building management organization or occupier be aware of a fire incident in the wider building.

The fire detection and alarm engineer should ensure the cause-and-effect is fit-for-purpose for all parts of the building. On completion of commissioning, a separate certificate must be issued with the recommendations of the fire detection and fire alarm systems.

3.3. Automatic Fire Suppression

As the building includes a floor in excess of 11m above the ground and automatic fire suppression should be provided throughout the building. For clarity, automatic fire suppression is proposed throughout the building, including residential, ancillary, commercial and relevant sports grounds areas.

Within residential units, it is proposed to employ a Category 4 residential grade suppression system designed, installed and maintained in accordance with BS 9251, as the top occupied floor is in excess of 18m above ground.

Within all commercial, ancillary (i.e., car park, plantrooms, refuse stores, cycle stores, changing areas, offices, club areas, etc.) and sports grounds areas, it is proposed to employ a

commercial grade suppression system designed, installed and maintained in accordance with BS EN 12845. Considering the onerous water storage and pump requirements, it is expected that a large plantroom will be provided in support of this system.

Attention is drawn to the proposed Electric Vehicles (EVs) in the covered car park area, including EV charging points. This is likely to result in the suppression system classification being High Hazard, subject to detailed design by a suppression specialist.

3.4. Escape Signage

Escape signage should be designed and installed in accordance with BS ISO 3864-1, BS EN ISO 7010, and BS 5499-4. It is expected that escape signage should be provided to the residential staircases, common residential corridors, ancillary areas, commercial areas and all sports grounds areas.

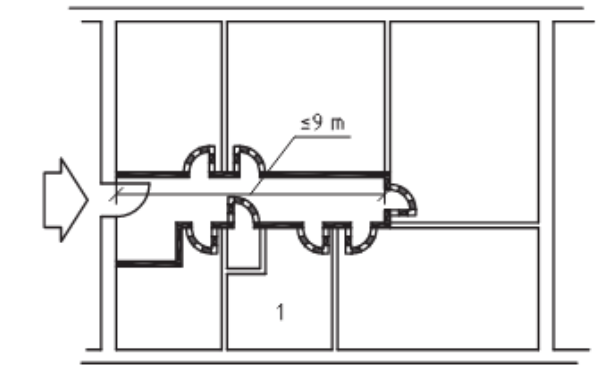
3.5. Emergency Lighting

Emergency lighting should be designed and installed in accordance with the recommendations of BS 5266-1 and BS EN 1838. It is expected that emergency lighting should be provided to the residential staircases, common residential corridors, ancillary areas, commercial areas and all sports grounds areas.

3.6. Escape within Flats

Each single level flats should employ a protected entrance hallway in accordance with Section 9.4.2.b) of BS 9991, as extracted below. All rooms within the flat should be served by a protected entrance hallway including a minimum of 30 minutes fire resistance and FD30 fire doors. The maximum travel distance within protected entrance hallways should be 9m, as measured from the furthest room to the flat entrance door.

It is noted that some flats do not achieve this currently, and design adjustment is expected going forward.



Key

1 Bathroom

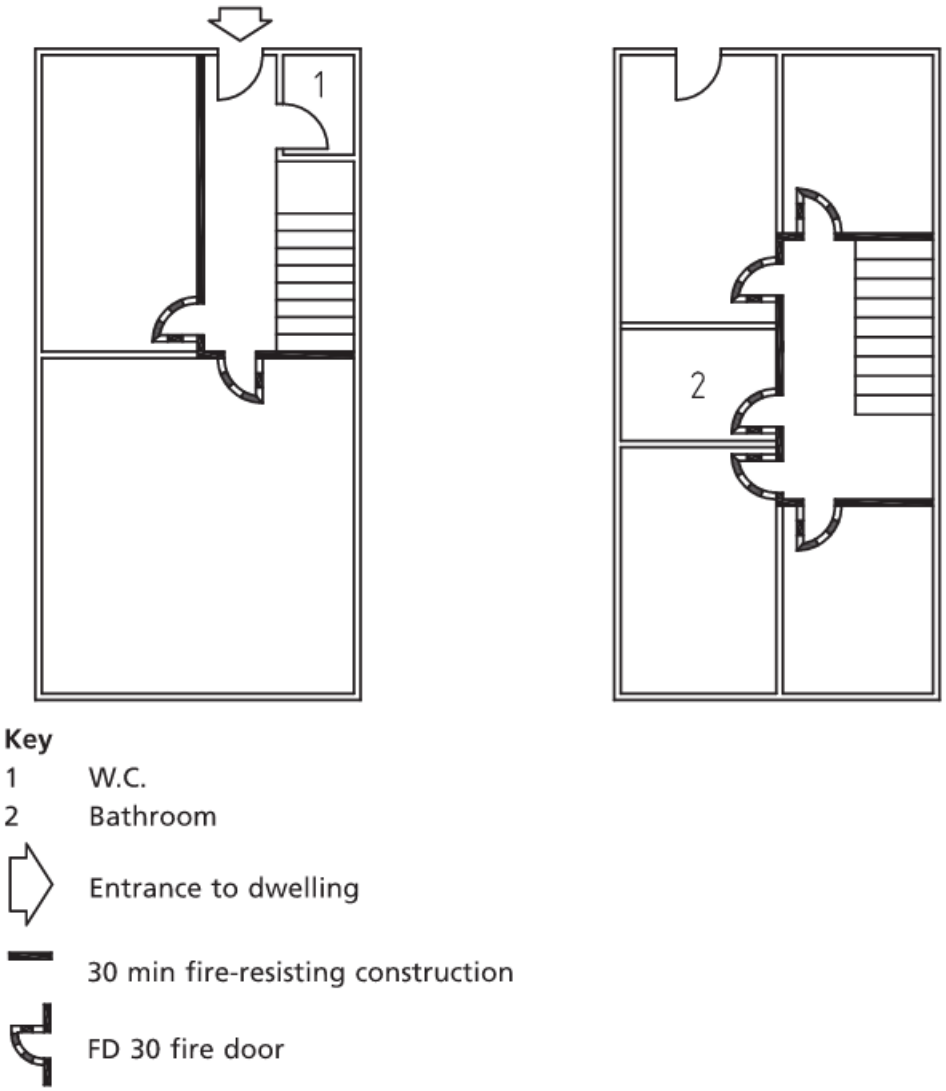
30 min fire-resisting construction

FD 30 fire door

Entrance to dwelling

Each duplex flat should employ a protected internal staircase in accordance with Section 9.5.2.c) of BS 9991, as extracted below. All rooms within the flat should be served by a protected internal staircase including a minimum of 30 minutes fire resistance and FD30 fire doors. The maximum travel distance within the landings of the protected internal staircase should be 9m, as measured from the furthest room to the flat entrance door.

It is noted that some flats do not achieve this currently, and design adjustment is expected going forward.



3.7. Inner Rooms

Inner rooms are rooms accessed only via another room, called an access room. Bedrooms and living rooms are permitted as inner rooms. The only other rooms permitted to be inner rooms should be:

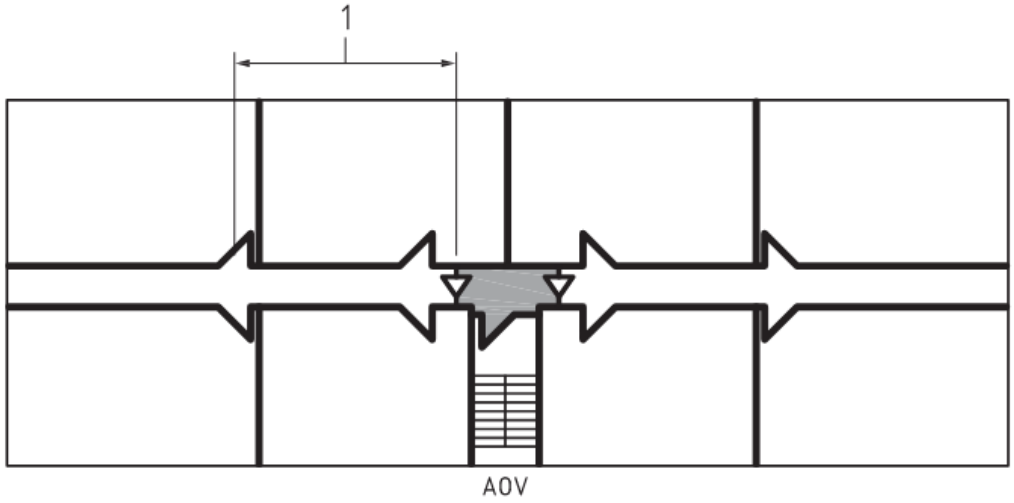
- A kitchen.
- A laundry or utility room.
- A dressing room.
- A bathroom, WC or shower room.

3.8. Escape in Common Residential Areas

The common residential areas within the East and West residential cores at either end of the building should be designed as a single stair building design in accordance with Figure 6.a) of BS 9991, as extracted below. The following requirements should be adhered to:

- The maximum single direction travel distance within an unventilated common corridor should be 7.5m, measured from a flat entrance door up to the ventilated lift/staircase lobby door.
- The maximum single direction travel distance within a ventilated lift/staircase lobby should be 7.5m.
- This would result in a maximum travel distance of up to 15m from any flat entrance door to the staircase door (having to travel first through an unventilated corridor, and then through a ventilated lift/staircase lobby).
- No flats should open directly into the ventilated lift/staircase lobby.
- The lift/staircase lobby (directly in front of the lift and staircase) should include smoke ventilation in accordance with Section 3.9 (i.e., 1.5m2 natural smoke shafts).
- Each staircase should include smoke ventilation in accordance with Section 3.9 (i.e., 1.0m^2 AOV).
- The ancillary areas should not connect to residential stair cores, except for the common terraces on Levels 6 and 7 (see Section 3.10).
- All service risers should be separated from the staircases and lifts (including any discharge route from the staircases) by a ventilated lift/staircase lobby.
- At the ground floor, each staircase should discharge directly to the outside.

It is noted that the design does not meet some of these requirements currently, and design adjustment is expected going forward.



a) Dwellings with corridor access

Key

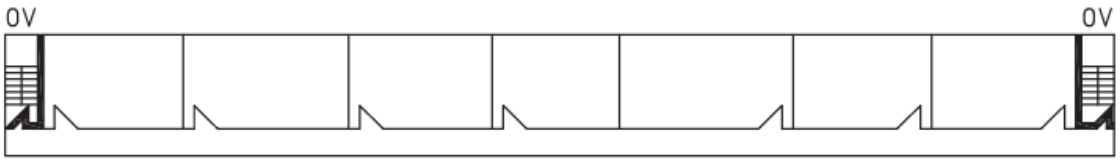
1	Maximum travel distance 7.5 m
AOV	Automatic opening vent (1.0 m² minimum)
	Fire-resisting construction
	Self-closing FD 30S fire door (double swing)
	Self-closing FD 30S fire door
	Area requiring a smoke control system

The common residential areas connecting to the central residential cores at the middle of the building should be designed as a balcony or deck approach design in accordance with Figures 5.a) and 5.b) of BS 9991, as extracted below. The following requirements should be adhered to:

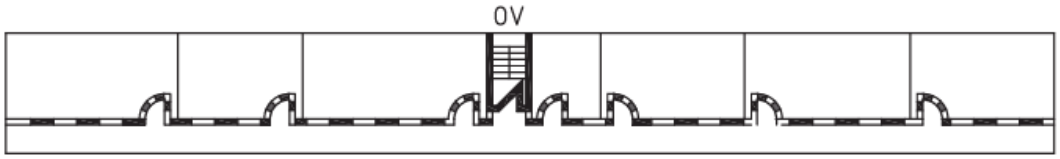
- Travel distances are not restricted within common balcony / deck approach designs, but the hose laying distances should still be met (see Section 7).
- Each common balcony / deck should include an imperforate surface without any voids or lightwells. The ceiling should direct smoke outwards not along the balcony. The balconies / decks should not be more than 2m wide.
- At least 50% of the vertical section of each common balcony / deck should be permanently opened. The opening should be at least from the top of the balustrade at 1.1m above the balcony / deck to the soffit of the balcony above.
- Where escape is possible in two directions towards different residential escape staircases, the façade does not have to be protected along the face of the common balcony / deck.
- Where escape is possible in one direction only along a common balcony / deck, the adjoining building façade should be protected up to 1.1m above the finished floor level of the balcony / deck, including 30 minutes fire resistance and FD30 fire doors. Windows should not extend below 1.1m above the finished floor level of the balcony / deck.

- The service risers open into the lift lobbies; therefore, the lift lobbies should be provided with smoke ventilation. This is proposed as 1.5m^2 AOVs into the building façade at high level above the lift lobby door (above the common balcony / deck areas).
- Each staircase should include smoke ventilation in accordance with Section 3.9 (i.e., 1.0m^2 AOV).
- The ancillary areas should not connect to residential stair cores, except for the private amenity space on Level 1 (see Section 3.10).
- All service risers should be separated from the staircases and lifts (including any discharge route from the staircases) by an open balcony / deck.
- At the ground floor, each staircase should discharge directly to the outside.

It is noted that the design does not meet some of these requirements currently, and design adjustment is expected going forward.



a) Multi-stair building



b) Single-stair building

Key

OV Openable vent for fire and rescue service use from the top storey (1.0 m^2 minimum)

Fire-resisting construction

Fire-resisting construction up to a height of 1.1 m above deck level

Self-closing FD 30 fire door

Self-closing FD 30S fire door

All doors with glazing that breach the 1.1 m high fire-resisting separation should be self-closing FD 30 fire doors with appropriate fire-resisting glass.

3.9. Smoke Ventilation

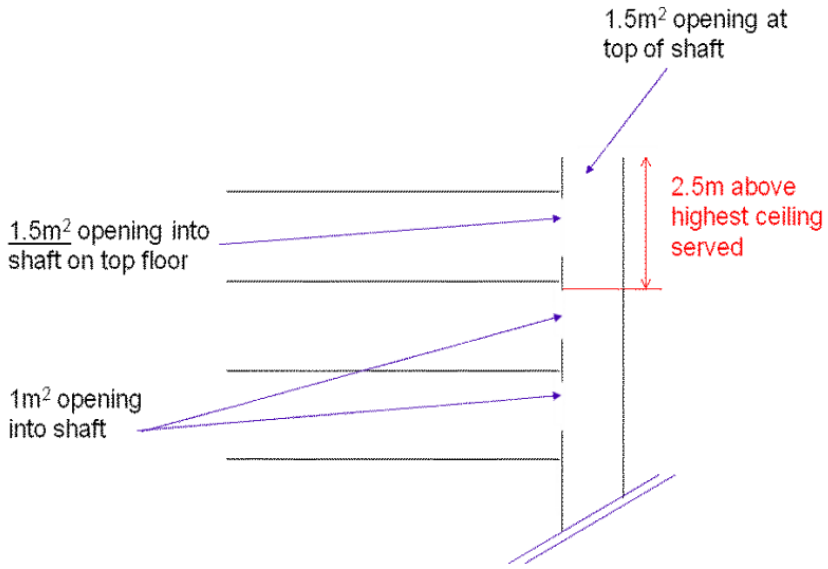
As discussed in Section 3.8, smoke ventilation protection is a critical requirement for the communal residential staircases and all common corridors or common balcony / deck areas.

Lift/staircase lobbies for the East and West cores

Common corridors serving flats for the East and West cores, do not require smoke ventilation. However, the lift/staircase lobbies (directly in front of the lifts and staircases) should be provided with smoke ventilation, even if no flats open directly into these lobbies.

Each common lift/staircase lobby for the East and West cores should include smoke ventilation via a natural smoke shaft in accordance with Section 14.2.3.2 of BS 9991. The minimum cross-sectional area of the shaft should be 1.5m^2, with a minimum dimension of 0.85m in any direction. At roof level, the top of the shaft should extend a minimum of 0.5m above any other object in a 2m radius. The top of the shaft should also extend 2.5m above the sixth-floor ceiling. However, the following alternative solution is proposed below, in order to limit the visual impact of smoke shafts at roof level.

Automatically openable vents (AOVs) into the natural smoke shafts should be 1.5m^2. This is a variation in accordance with Technical Guidance Note 8, issued by the Building Control Association, as extracted below.



Residential staircases

In accordance with BS 9991, an AOV, achieving a minimum free area of 1.0m^2, should be provided at high level above each residential staircase. The AOV should be designed, installed and maintained in accordance with BS EN 12101-2.

Common balconies / decks for the central cores

All common balcony/deck areas connecting to the central cores at the middle of the building should be permanently open to include permanent smoke ventilation. At least 50% of the vertical section of each common balcony / deck should be permanently opened. The opening should be at least from the top of the balustrade at 1.1m above the balcony / deck to the soffit of the balcony above.

Firefighting lift lobbies for central cores

For the central cores, the service risers open into the lift lobbies; therefore, the lift lobbies should be provided with smoke ventilation. This is proposed as 1.5m^2 AOVs into the building façade

at high level above the lift lobby door (above the common balcony / deck areas). The AOV should be designed, installed and maintained in accordance with BS EN 12101-2.

Car Park

The covered car park should include mechanical smoke ventilation, in accordance with Clause 8 of BS 7346. At this stage, mechanical smoke ventilation is proposed for the car park, noting that it already includes BS EN 12845 suppression. The mechanical smoke ventilation system should achieve 10 air changes per hour. For clarity, natural smoke ventilation is not advised, as openings into the spectator seating areas could represent a hazard for occupants in that area.

The covered car park will include specific Electric Vehicle (EV) charging points. Therefore, the structural fire resistance and compartmentation within the car park will be increased to 120 minutes. Additionally, the fire suppression system is expected to include a High Hazard category (see Section 3.3, Section 5.2 and Section 5.4).

Basement

The basement level should include mechanical smoke ventilation, noting that it already includes BS EN 12845 suppression. The mechanical smoke ventilation system should achieve 10 air changes per hour and be in accordance with Section 27.2.3 of BS 9999.

Refuse Stores

Each refuse store should include 0.2m^2 of permanent ventilation directly to the outside.

3.10. Escape within the Ancillary Areas

The ancillary areas (car park, refuse stores, plantrooms, bike stores) should only be accessed from the outside, or from the dedicated basement staircases in between the central cores. Ancillary areas should not connect to any residential staircase or discharge route from a residential staircase.

The only exceptions are the communal terraces on Levels 6 and 7, and the private amenity space on Level 1. It is noted that the use of these areas will not be any less satisfactory than a typical flat, as there will be no cooking appliances proposed, no barbeques and the quantity, type and distribution of combustibles will be similar to a flat. The communal terraces are permitted to be accessed from the residential cores at either end of the building as the risk of smoke ingress into the cores from these permanently opened terraces is very limited. For the private amenity space, it is noted that this is accessed from the central cores, via permanently open balconies on either side, therefore the risk of smoke ingress into the central cores from the private amenity space is very limited. These departures are subject to agreement with the Building Control Body and the local Fire Service.

Travel within most ancillary areas (communal terraces, private amenity, plantrooms, bike stores, refuse stores, Club Office, First Aid, Kitchen, car park) should be limited to 22m in a single direction of escape, noting the A2 risk profile employed. However, for the higher risk plantrooms (LV switchroom, energy centre, substation) a maximum travel distance of 9m in a single direction of escape is proposed.

3.11. Escape within Commercial Areas

Travel within commercial areas (i.e., where members of the public are expected) such as the commercial units, Club VIP, Club Bar, Shop & Tickets should be limited to 20m in a single direction of escape, noting the B2 risk profile employed.

3.12. Escape within Spectator Areas

It is noted that Welling United FC will be occupying the sports grounds, and part of the finished building will represent their new stadium. The detailed design of the sports grounds is expected to be progressed at RIBA Stage 4, in accordance with the recommendations of the Green Guide. At this stage, attention is drawn to a number of key requirements of the Green Guide:

- A list of all departures noted for the building should be included in the List of Deviations.
- The maximum holding capacities within each stand separately are impacted upon by the physical condition of the stand (P factor) and the safety management system employed by Welling United FC (S factor).
- As a key assumption of this report, the P and S factors have both been assumed as 1.0, noting that the sports grounds will be maintained in very good condition and that the safety management system will be of a very high quality.
- The P and S factors should be reviewed on a yearly basis, and it is expected that over time these could degrade, noting that a value of 1.0 is the maximum and 0.0 is the minimum.
- A full Fire Safety Plan should be developed by Welling United FC prior to occupation, (which is expected to be undertaken during RIBA Stage 4).
- During events a significant number of trained members of staff (stewards) are expected to implement the Fire Safety Plan.
- In accordance with BS 9999, it is expected that Welling United FC will employ as a minimum an enhanced Management Level 1.
- A low-risk rating has been assumed for each stand in accordance with Section 15.9 of the Green Guide. Therefore, the stands should be constructed of non-combustible materials such as masonry or reinforced concrete, with steel or other non-combustible materials for the roof (if applicable). Similarly, external wall materials will comply with Regulation 7(2), representing low risk overall. Timber of CLT structures should not be employed, as it would adversely impact the maximum occupancy within the stand. Any catering facilities should be enclosed in fire resisting construction and be kept remote from the stands and associated escape routes.

- The current design indicates two food stalls at the North of the pitch, each in proximity to a final exit. Therefore, one final exit has been conservatively discounted in order to estimate the maximum emergency egress capacity of the stadium.

The spectator areas are proposed to be split into four stands, the North stand, East stand, South stand and West stand. For each stand separately, maximum occupancy numbers have been estimated using the Green Guide. These calculations should be further detailed and confirmed in coordination with the design team at RIBA Stage 4.

The maximum occupancy numbers for each stand separately should be the lowest of the entry capacity, holding capacity, exit capacity and emergency exit capacity.

The entry capacity is calculated by assuming a maximum of 660 persons per hour for each entry point. The maximum entry capacity should assume entry within a single hour.

The holding capacity should be confirmed by the Architect, as the total number of seats, minus any seats with restricted views. The usable seats are then multiplied by the P and S factors, and this results in a reduction, in case the P and S factors are less than 1.0. For this fire strategy, P and S factors have been assumed as 1.0, subject to confirmation with Welling United FC. At this stage the holding capacity has been identified as the actual number of seats provided on plans, subject to confirmation with the Architect that no seats include restricted views.

The exit capacity is calculated by assuming each stand is cleared within 8 minutes, during normal egress conditions. This is the travel time to evacuate the viewing areas within each stand.

The emergency exit capacity is calculated by measuring the time taken for occupants to reach a place of relative safety outside of the viewing areas. This depends on the risk rating of each stand separately. For this fire strategy, a low-risk rating has been assumed for each stand, therefore allowing for up to 8 minutes to reach a place of relative safety in an emergency. In order to calculate the emergency egress capacity for low-risk sports grounds, in accordance with Section 15.9 of the Green Guide, the 8 minutes of travel time should be to empty the stands / viewing accommodation (referred to therein as Zone 2) and enter a place of relative safety (referred to therein as Zone 3). Please refer to Figure 6 of the Green Guide for more information.

The exit capacity and the emergency exit capacity have both been measured by assuming all stands have emptied the viewing accommodation and are in a place of relative safety around the pitch. It is noted that in accordance with the Green Guide, the pitch is not permitted to be used as part of the egress calculations for a new build stadium. Therefore, the occupants should discharge onto the circulation areas around the pitch, at pitch level, but not the pitch itself. The design team should confirm that sufficient widths are provided around the pitch for the expected occupancy numbers in each area separately. The current widths indicated have been used.

Exit doors are assumed to open in the direction of escape and be wide enough for the expected occupancies. Therefore, design adjustment is expected to have all exits from the sports grounds open in the direction of escape.

Turnstiles should not be along an escape route. Therefore, design adjustment is expected going forward to relocate these outside of the emergency egress route.

Five final exits are noted from the spectator areas as presented below:

- Final exit at the North-East of the building onto Park View Road (approx. 3350mm wide).
- Final exit at the North-West of the building onto Park View Road (approx. 3350mm wide).
- Final exit at the West of the building onto Roseacre Road (approx. 1600mm wide). however this serves only the ancillary areas and the first-floor areas of the West stand.
- Final exit at the South-East of the building into Danson Park (approx. 3350mm wide).
- Final exit at the South-East of the building into Danson Park (approx. 3350mm wide).

Therefore, by discounting one exit, three final exits of 3,350mm wide each could still accommodate the proposed maximum occupancy numbers presented in Table 3 below.

Table 3 – Stand Capacities

Stand	Capacity type	Calculation	Numbers	Maximum occupancy
North	Entry	1 turnstiles = 1 x 660 persons	660	**464**
	Holding	464 standing	464	
	Exit	8 mins x 82 pers / min x 1.2m	787	
	Emergency	8 mins x 82 pers / min x 1.2m	787	
East	Entry	5 turnstiles = 5 x 660 persons	3,300	**2,635**
	Holding	563 seated and 2,072 standing	2,635	
	Exit	8 mins x 82 pers / min x 4.1m	2,689	
	Emergency	8 mins x 82 pers / min x 4.1m	2,689	
South	Entry	1 turnstiles = 1 x 660 persons	660	**200**
	Holding	200 standing	200	
	Exit	8 mins x 82 pers / min x 1.2m	787	
	Emergency	8 mins x 82 pers / min x 1.2m	787	
West	Entry	3 turnstiles = 3 x 660 persons	1,980	**636**
	Holding	636 seated	636	
	Exit	8 mins x 82 pers/min x 2.15m	1,410	

	Emergency	8 mins x 82 pers/min x 2.15m	1,410	
Total occupancy for the stands (without Club VIP and Hospitality)				**3,935**

It is noted that the flow rates employed in accordance with the Green Guide are the following:

- 82 persons / meter width of escape route, for horizontal escape.
- 66 persons / meter width of escape route, for vertical escape.

For the gangways / staircases within the stands, a constant width of 1,200mm has been identified, which is commensurate with new construction. Each gangway would provide a capacity of up to 633 persons. The current gangways indicated on plans indicate sufficient vertical exit capacity.

3.13. Travel Distance

The maximum travel distance within protected entrance hallways should be 9m, as measured from the furthest room to the flat entrance door.

The maximum travel distance within the landings of the protected internal staircase should be 9m, as measured from the furthest room to the flat entrance door.

Within unventilated communal corridors, travel distances should be limited to 7.5m in a single direction of escape, as measured from the entrance door of any flat to the ventilated lift/staircase lobby door.

Within ventilated lift/staircase lobbies, travel distances should be limited to 7.5m in a single direction of escape as measured up to the staircase door.

Travel distances are not restricted within common balcony / deck approach designs, but the hose laying distances should still be met (see Section 7.2).

Travel within most ancillary areas (communal terraces, private amenity, plantrooms, bike stores, refuse stores, Club Office, First Aid, Kitchen, car park) should be limited to 22m in a single direction of escape, noting the A2 risk profile employed. However, for the higher risk plantrooms (LV switchroom, energy centre, substation) a maximum travel distance of 9m in a single direction of escape is proposed.

Travel within commercial areas (i.e., where members of the public are expected) such as the commercial units, Club VIP, Club Bar, Shop & Tickets should be limited to 20m in a single direction of escape, noting the B2 risk profile employed.

3.14. Provision of Refuges

The ground floor should include level escape suitable for disabled occupants directly to the outside from all areas. There is generally no requirement for a refuge area in a residential building. Notwithstanding this, it is noted that one lift per core will be designed as an evacuation

lift in support of dignified escape for disabled occupants (see Section 3.18), as required by London Plan Policy D5.

For the first floor of the stadium, refuge areas are required within each protected stair core, achieving a minimum of 1400mm x 900mm and located outside the general escape route. Each refuge area should include emergency voice communication devices in accordance with BS 5839-9.

For the sports grounds, disabled seating areas are provided at pitch level within the North stand and the West stand. It is expected that each disabled spectator will be escorted by a suitably trained member of staff at all times during event days.

The design team should confirm how the building complies with The Equality Act.

Personal Emergency Evacuation Plans (PEEPs) need to be developed for regular occupants (PEEPs). PEEPs must outline the fire safety requirements and evacuation procedures for persons with disability to ensure that the differing needs of all persons using the building are properly considered.

3.15. Provision of Muster Points

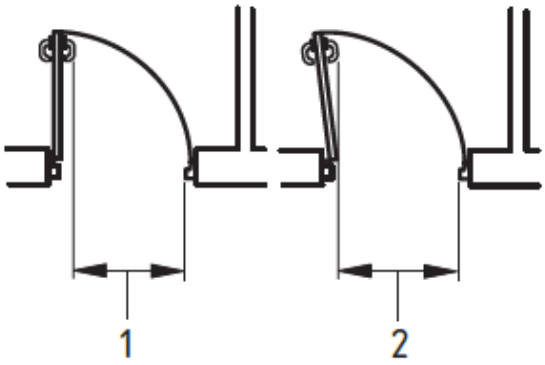
Suitable muster points must be identified once occupants leave the building. It may be acceptable to have one common muster area depending on available space in the surrounding area. The route to the muster point shall be clear of the building, well defined, and if necessary, suitably guarded from possible traffic. The selection of the muster point should not adversely impact on Fire Service access and facilities.

3.16. Escape Doors

Escape doors should not be fitted with a lock, latch or bolt fastening. These should always be easily openable from the inside by occupants making their escape. Any security devices should release the door upon activation of the fire alarm.

The minimum clear exit width of any door will be 850mm in support of independent disabled evacuation. The clear width is measured as per the extract below.

The minimum clear width of any escape route or circulation area should be 1,200mm.



Key

1 Effective clear width (door stop to projecting building hardware)

2 Effective clear width (door stop to door leaf)

3.17. Vertical Means of Escape

The residential staircases serve a floor in excess of 18m; therefore, these have to be designed as firefighting cores. The minimum clear width of the residential staircases should achieve 1,100mm.

For the sports ground's areas, the absolute minimum width of any staircase or gangway should be 1,200mm, with a maximum of 1,800mm. Vertical exit capacities are sufficient as discussed in Section 3.12.

Each residential staircase should be enclosed in 120 minutes fire resisting construction (and FD60S fire doors) up to a final exit at ground floor level. The staircases should discharge directly to a final exit leading to a place of safety. Staircases should not connect to ancillary, commercial or stadium areas (see Section 3.10).

Each staircase within the stadium should be enclosed in 90 minutes fire resisting construction and FD60S fire doors up to a final exit at ground floor level. The minimum clear width of the staircases within stadium areas should achieve 1200mm.

Only fire resisting letter boxes achieving 30 minutes and constructed of materials achieving Class A2-s3, d2 or better are permitted in the main entrance lobbies at ground floor level. Furniture or combustibles are not permitted.

3.18. Lifts

Considering the building height is greater than 18m and the residential staircases need to be firefighting cores, one lift for each residential core should be designed as a firefighting lift, resulting in a total of four firefighting lifts proposed in the scheme.

In support of dignified escape for all mobility impaired persons as required by London Plan Policy D5, it is proposed that one lift for each residential core as well as the basement bicycle lift and the lift within the West stand should be designed as an evacuation lift, resulting in a total of six evacuation lifts proposed in the scheme.

Firefighting lift shafts should be enclosed in 120 minutes fire resisting construction and FD60 fire doors. Firefighting lift installations should conform to BS EN 81-72 and BS EN 81-20.

The firefighting lifts should not be more than 7.5m away from the firefighting staircase door. This is not currently achieved, and design adjustment is expected going forward.

Evacuation lift shafts should be enclosed in 90 minutes fire resisting construction and FD60 fire doors.

Lifts within residential areas should open only into a ventilated lift/staircase lobby.

3.19. Service Risers

Service risers should be enclosed in 90 minutes fire resisting construction (and FD60S fire doors), including adequate 90 minutes fire stopping in line with each floor. Service risers should only open into a ventilated lift/staircase lobby. This is not currently achieved at ground floor level, as the service risers are opening into the discharge route from residential staircases, which represents a project risk going forward.

Service risers should not be used for storage; therefore, the service / store should be only used for services and / or meters. These should be designed in accordance with BS 8313.

3.20. Escape Beyond Final Exits

For each final exit separately, travel beyond final exits should not be adversely impacted upon by unprotected areas within the building façade. Therefore, one of the three options below should be employed:

- Escape is directly away from the building.
- Escape is possible in both directions along the building façade along the perimeter, with at least one escape route available in a fire scenario.
- The building façade is protected to 90 minutes fire resistance within 1,800mm of the escape route.

It is noted that some final exits from the sports grounds are towards the South into Danson Park. These exits are critical in support of emergency and normal egress from the stadium, in order to allow for the maximum occupancies proposed. The design team should confirm a right of way is provided at all material times for spectators and occupants to escape into Danson Park, in coordination with the local Council. This represents a project risk, subject to detailed design development.

4. Requirement B2: Internal Fire Spread (Linings)

"To inhibit the spread of fire within the building, the internal linings shall adequately resist the spread of flame over their surfaces; and have, if ignited, either a rate of heat release or rate of fire growth, with is reasonable in the circumstances." - Part B of Schedule 1 of the Building Regulations 2010."

In this context, "internal linings" means the materials or products used in lining any partition, wall, ceiling, or other internal structure. The interior wall and ceiling surfaces in a building may have a significant influence on how quickly a fire may develop. It is particularly important that in circulation spaces, where the rapid spread of fire is most likely to prevent occupants from escaping, the surface linings are restricted by making provision for them to have low rates of heat release and surface spread of flame.

The materials used in construction, walls and internal linings of the walls and ceilings should be classed in accordance with the requirements of Table 6.1 in ADB Volume 2 as a minimum, and tested in accordance with the national classifications, BS 476-7 or under the European Classifications in accordance with BS EN 13501-1, as outlined in the extract below.

For clarity, these are the same requirements as per BS 9991 or BS 9999, however the National Classifications are no longer applicable.

Location	Classification
Small rooms of maximum internal floor area: a. 4m^2 in residential accommodation b. 30m^2 in non-residential accommodation	D-s3, d2
Other rooms (including garages)	C-s3, d2
Other circulation spaces	B-s3, d2[1]

NOTE:

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

5. Requirement B3: Internal Fire Spread (Structure)

"The building shall be designed and constructed so that, in the event of a fire, its stability will be maintained for a reasonable period. A wall common to two or more buildings shall be designed and constructed so that it adequately resists the spread of fire between those buildings. To inhibit the spread of fire within the building, it shall be sub-divided with fire-resisting construction to an extent appropriate to the size and intended use of the building. The building shall be designed and constructed so that the unseen spread of fire and smoke within concealed spaces in its structure and fabric is inhibited." - Part B of Schedule 1 of the Building Regulations 2010"

5.1. General

The fire resistance of building elements are classified in different fire resistance classes or combinations of those, which specify different performance criteria. These classes include:

- The ability to maintain load-bearing capacity during a fire (classification "R").
- The ability to prevent the spread of fire and smoke directly by maintaining the integrity of the element (classification "E").
- The ability to insulate against radiation across the element (classification "I").

Normally the fire resistance classification is followed by a time limit in minutes (30, 60, 90, 120, etc.) which shows the time the performance criteria is fulfilled during a standardized fire test.

5.2. Structural Fire Resistance

The early failure of the load-bearing structural elements during a fire represents a risk to:

- Occupants, some of whom may need to remain within the building during evacuation.
- Firefighters, who may be engaged on operations within the building during the fire; and,
- People in the vicinity of the building could be hurt by falling debris or building collapse.

This can be prevented by providing such load-bearing structural elements with a minimum standard of fire-resistance, in terms of resistance to collapse or failure of load bearing capacity when exposed to fire (classification "R").

In accordance with BS 9991 and BS 9999, the building should include 90-minute structural fire resistance considering the top occupied floor is assumed to be more than 18m but less than 30m, and the risk profiles employed are C2, B2 and A2.

However, in support of Electric Vehicles (EVs) in the covered car park, the structural fire resistance within the car park should be increased to 120 minutes.

Any structural element that provides support to other fire rated elements should achieve at least the same fire rating as those elements they support. There is no requirement to provide

structural fire protection to any structure solely supporting a roof, although any structure supporting a roof terrace, roof top plant or escape route from a plantroom (unless solely used for maintenance access) should be provided with the appropriate period of fire resistance.

5.3. Minimum Fire Resistance Standards

Fire resistance periods are taken as per Tables 3 and 4 of BS 9991 and Table 22 and 23 of BS 9999. The period of fire resistance is based on the height of the building and risk profiles employed. The fire resistance periods and classifications should be tested in accordance with the relevant parts of BS 476.

The overall compartmentation strategy is presented in Table 4. For fire doors, “30”, “60” and refers to the period of fire resistance with respect to Integrity (E) only, and “S” refers to the ability to resist the passage of smoke by means of intumescent strips and smoke seals as necessary.

Table 4 - Compartmentation Strategy

Building Element	Minimum Fire Resistance (minutes)	Fire Doors
Elements of structure	90R	N/A
Compartment floors (all floors)	90REI	N/A
Firefighting shafts (firefighting staircases)	120REI	FD60S
Firefighting shafts (firefighting lifts)	120REI	FD60
Security control room	120 REI	FD60S
Evacuation lifts	90REI	FD60
Protected shafts (service risers)	90REI	FD60S
Protected shafts (natural smoke shafts)	90REI	FD90S
Fire resisting external walls (see Sections 3.8 and 6.4)	90REI	FD30
Party Walls (see Section 6.4)	90REI	N/A
Compartment walls (flats)	60REI	FD30S
Compartment walls (common corridors / lobbies)	60REI	FD30S
Compartment walls (commercial units)	60REI	FD60S
Compartment walls (ancillary areas)	60REI	FD60S

Compartment walls (car park)	120REI	FD120S
Protected entrance halls / Protected internal staircases	30REI	FD30
Cavity Barriers	30E, 15I	N/A

5.4. Fire Compartmentation

All floors should be constructed as compartment floors achieving 90 minutes fire resistance. Any shaft (except firefighting shafts) penetrating compartment floors should be constructed as a protected shaft achieving 90 minutes fire resistance (i.e., service risers, natural smoke shafts, etc.).

The firefighting staircases and firefighting lifts should be constructed as residential grade firefighting cores achieving 120 minutes each with FD60S/FD60 fire doors, respectively.

Each flat and common corridor / lobby should be a standalone, independent fire compartment achieving 60 minutes fire resistance and FD30S fire doors.

Most ancillary area should be a standalone, independent fire compartment achieving 90 minutes fire resistance and FD60S fire doors.

In support of Electric Vehicles (EVs) in the covered car park, the car park should be a standalone, independent fire compartment achieving 120 minutes fire resistance and FD120S fire doors.

Each commercial unit should be a standalone, independent fire compartment achieving 90 minutes fire resistance and FD60S fire doors.

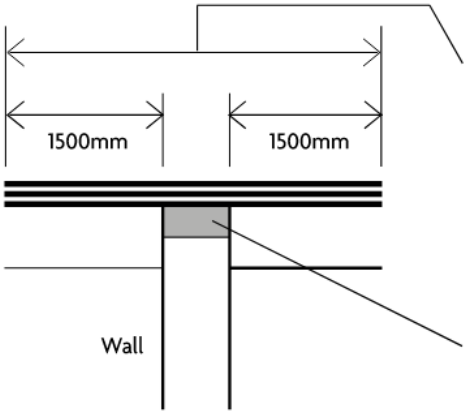
Any external wall which falls within 1000mm of a relevant boundary should be constructed as a party wall achieving 90 minutes fire resistance from both sides. External walls including fire resisting construction should achieve 90 minutes fire resistance and include FD30 fire doors (see Sections 3.8 and 6.4).

Protected internal hallways within flats should achieve a minimum of 30 minutes fire resistance and FD30 fire doors. Protected internal staircases within duplex flats should achieve a minimum of 30 minutes fire resistance and FD30 fire doors.

Fire resisting construction should be continued up to the underside of the structural floor above (or roof) and below the floor served (i.e., through ceiling or floor voids).

The junction of a compartment wall with a roof should be in accordance with Diagram 5.2 of ADB (as extracted below).

a. ANY BUILDING OR COMPARTMENT



Roof covering over this distance to be designated B_{ROOF}(t4) rated on deck of material of class A2-s3, d2 or better. Roof covering and deck could be composite structure, e.g. profiled steel cladding.

Double-skinned insulated roof sheeting should incorporate a band of material rated class A2-s3, d2 or better, a minimum of 300mm in width, centred over the wall.

If roof support members pass through the wall, fire protection to these members for a distance of 1500mm on either side of the wall may be needed to delay distortion at the junction (see paragraph 5.9).

Fire-stopping to be carried up to underside of roof covering, e.g. roof tiles.

5.5. Fire Doors

Doors in fire-separating elements are some of the most important features of a fire protection strategy. They protect escape routes from the effects of fire so that occupants can reach a final exit; and they protect occupants, fire-fighters, and the contents and/or structure of a building by limiting the spread of fire.

The fire door ratings should be as per Table 12 of BS 9991 and Table 30 of BS 9999, when tested in accordance with BS 476-22 in accordance Table 4 of this report. Fire doors should be self-closing unless they give access to plantrooms, cupboards or service risers, in which case they should be kept locked.

Fire doors should also be marked with the appropriate fire safety signage complying to BS 5499-5. Fire doors to cupboards and service ducts should be marked on the outside, all other fire doors marked on both sides (except within flats).

5.6. Fire Stopping

In order to ensure that fire compartmentation is efficient, all junctions with fire resisting construction and fire resisting elements as well as penetrations for services should include fire stopping which should be fit-for-purpose. The rating of fire stopping should achieve as a minimum the rating of the fire resisting enclosure in which the penetration is proposed.

5.7. Fire Resisting Dampers / Ductwork

Where a penetration in fire resisting construction is proposed for ventilation systems, this should be provided with a fire / smoke damper or fire resisting ductwork that is fit-for-purpose (and connected to the fire alarm system). The rating of the fire / smoke damper or ductwork should achieve as a minimum the rating of the fire resisting enclosure in which the penetration is proposed. Fire / smoke dampers are not permitted in the common escape staircases and kitchens, and fire resisting ductwork should be employed instead.

5.8. Concealed Spaces

In order to ensure that fire does not spread within the building via cavities, cavity barriers should be provided in the following locations and in accordance with Figure 24 of BS 9991 and Figure 35 of BS 9999:

- At the junction of an external cavity wall with a compartment floor and compartment wall, or other fire resisting construction.
- At the junction of an internal cavity wall with fire resisting construction.
- Around all openings (e.g., windows, doors, etc.) within an external cavity wall.
- Around the edges of cavities.
- To limit the size of extended cavities to 20m of 10m where materials in the cavity achieve Class C-s3, d2 linings as a minimum, or not, respectively.

6. Requirement B4: External Fire Spread

"The external walls of the building shall adequately resist the spread of fire over the walls and from one building to another, having regard to the height, use and position of the building; The roof of the building shall adequately resist the spread of fire over the roof and from one building to another, having regard to the use and position of the building." - Part B of Schedule 1 of the Building Regulations 2010."

6.1. External Wall Materials

The building is a 'relevant building' in accordance with Regulation 7(4) as it is a residential block of flats assumed to include a floor in excess of 18m above ground.

Therefore, materials forming part of the external walls (including specified attachments and balconies) must achieve Class A2-s1, d0 or A1 in accordance with BS EN 13501-1. Attention is drawn to the exceptions to this requirement, as listed in Regulation 7(3). For clarity, even if exempt, membranes should still achieve Class B-s3, d0 or better.

Additionally, Regulation 7(1A) has been introduced to prohibit the use of relevant metal composite materials forming part of the external wall systems or specified attachments of all buildings. Relevant metal composite materials are defined as any panel or sheet, having a thickness of no more than 10mm which is composed of a number of layers two or more of which are made of metal, alloy or metal compound and one or more of which is a substantial layer made of a material having a gross calorific value of more than 35MJ/kg when tested in accordance with BS EN ISO 1716. A substantial layer is defined as a layer which is at least 1mm thick or has a mass per unit area of at least 1kg/m^2.

6.2. Cavity Barriers in External Walls

Cavity barrier requirements are presented in Section 5.8. Cavity barriers should be provided in the following locations of external walls:

- At the junction of an external cavity wall with a compartment floor, compartment wall or other fire resisting construction.
- Around all openings (e.g., windows, doors, etc.) within an external cavity wall.
- Around the edges of cavities.
- To limit the size of extended cavities to 20m.

6.3. Roof Coverings

A roof is any external wall with a slope of more than 70º from the horizontal. Roof coverings are proposed to achieve a performance of B_{ROOF}(t4) in all areas.

Attention is also drawn to the requirement for junctions of compartment walls with a roof, in accordance with Section 5.4. Therefore, the deck of the roof should be a material of limited combustibility.

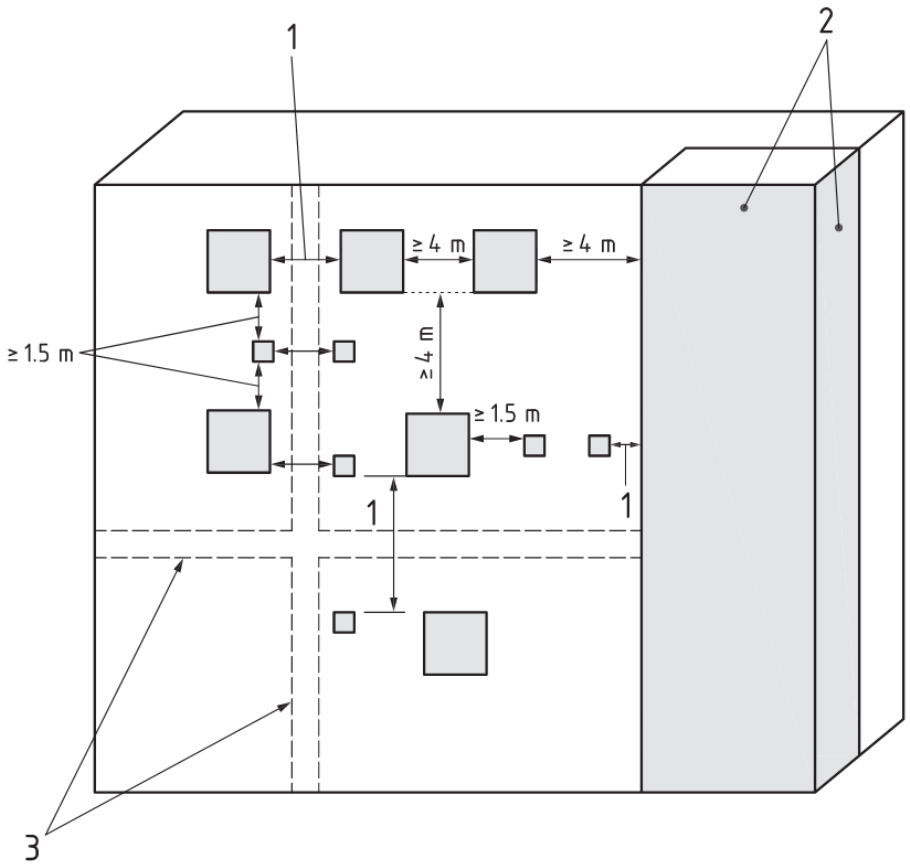
Green roofs should be designed in accordance with 'Fire Performance of Green Roofs and Walls', published by the Department for Communities and Local Government.

6.4. Separation Distances

Any external wall which falls within 1000mm of a relevant boundary should be constructed as a party wall achieving 90 minutes fire resistance from both sides.

In protected external walls, only small, unprotected areas may be ignored, if in accordance with Figure 21 of BS 9991 (as extracted below).

Figure 21 **Exclusions from unprotected area calculations**



Key

1 Unrestricted

2 External wall of shaft that is enclosed by a minimum of 60 min fire resistance from the accommodation side

3 Compartment boundaries

Re-entrant corners of the external wall system separating different fire compartments should include fire resisting walls (of the same rating as the highest rated compartment at that junction) within 1.8m of the junction of different fire compartments.

Separation distance calculations have been undertaken in accordance with the tabulated solutions of BR187. The relevant boundaries for the residential areas have been selected as presented below:

- Towards the North, the middle of the adjoining public road (Park View Road).
- Towards the East, the actual site boundary.
- Towards the South, the actual site boundary.
- Towards the West, the actual site boundary, where adjoining other properties.
- Towards the West, the middle of the adjoining public road (Roseacre Road), where facing this public road.
- In between the different wings / stands of the proposed building, the middle distance in between the different wings of the same building.

BR 187 indicates that for areas with reduced fire load densities (<25kg/m^2), a radiation intensity of 84 kW/m^2 should be used (i.e., residential). For areas with increased fire load densities (>25kg/m^2), a radiation intensity of 168 kW/m^2 should be employed (i.e., commercial units, ancillary areas, sports grounds areas, etc.).

The stands within the sports grounds are expected to be low risk, of non-combustible masonry or reinforced concrete construction. Timber frame or CLT construction is not expected at this stage, which is a critical element in support of the occupancy of the stands (see Section 3.12), which also indicates that a fire within the stands is very low risk when considering external fire spread across the site boundary.

The overall calculations are presented in Table 5. The minimum separation distances required have been halved due to the provision of automatic fire suppression throughout the building. The design team should confirm the dimensions employed are accurate and that the maximum unprotected areas are achieved.

The design team should carefully review these calculations as a project risk going forward. The current separation for all residential areas on the East elevation is less than 1m, resulting in the entire façade having to be fire rated to 90 minutes and including fire resisting (integrity and insulation) windows kept locked shut.

Table 5 - Separation Distance Calculations

Elevation	Radiator Height (m)	Radiator Width (m)	Radiation Intensity (kW/m^2)	Assumed Boundary Distance (m)	Maximum Unprotected % Elevation Allowed
Residential areas					
North	3.0	18.0	84	>2.0	100%
East	3.0	18.0	84	<1.0	0% Party Wall
South	3.0	18.0	84	>2.0	100%
West (facing Roseacre Road)	3.0	18.0	84	>2.0	100%
Commercial, ancillary and sports grounds areas					
North	6.0	12.0	168	>4.3	100%
East	6.0	21.0	168	0.0	0% Party Wall
South (below stands)	6.0	15.0	168	<1.0	0% (Party Wall)
South (facing Danson Park)	6.0	9.0	168	<1.0	0% (Party Wall)
West (facing other properties)	6.0	12.0	168	0.0	0% Party Wall
West (facing Roseacre Road)	6.0	12.0	168	>4.3	100%

7. Requirement B5: Access and Facilities for Fire and Rescue Service

"The building shall be designed and constructed so as to provide reasonable facilities to assist fire fighters in the protection of life; Reasonable provision shall be made within the site of the building to enable fire appliances to gain access to the building." - Part B of Schedule 1 of the Building Regulations 2010."

7.1. Vehicle Access

Vehicle access to the exterior of the building is needed to enable a pumping appliance to supply water and equipment for firefighting and rescue activities. The building is complex, therefore a hybrid approach is proposed, in order to provide different Fire Service facilities, depending on the residential and non-residential areas within the building.

The building includes areas in excess of 18m above ground. Therefore, for the residential areas, each core should be designed as a firefighting shaft, including a ventilated firefighting staircase, firefighting lift, ventilated lift/staircase lobbies (for the two cores at each end of the building) or open communal balconies / decks (for the central cores) and a dry rising main.

Pump appliance vehicle access to the residential areas of the site should be via Park View Road at the North of the building. From here, pump appliance vehicle access should be provided within 18m and line of sight of the entrance to each firefighting staircase as well as the associated dry rising main inlet valves.

Vehicle access to the commercial, ancillary and sports grounds portion of the site should also be via Park View Road at the North of the building, and further extended via Roseacre Road at the West of the site. From here, pump appliance vehicle access should be provided to 15% of the building perimeter in accordance with Table 19 of BS 9999, noting that the commercial, ancillary and sports grounds together include a cumulative floor area of less than 8000m^2. It is noted that approximately 20% of the building perimeter is accessible to a pump appliance on Park View Road and Roseacre Road.

A pump appliance should not have to reverse more than 20m, without a suitable turning point. It is noted that the public roads adjoining the building, Park View Road and Roseacre Road, do not include any dead-end portions in proximity to the building.

The size and mass of fire appliances is not standardized. The dimensions of access routes and hard standings vary according to the fire appliances that are used in a particular fire authority area. The local Fire Service should therefore be consulted to ascertain their recommendations relating to access roads. It is recommended that the hard-standing requirements of this appliance be considered during consultation and confirmed as achieved by the podium with a structural fire engineer.

The typical access route specifications for a pump are presented in GN29 as issued by the London Fire Brigade as extracted below. These are expected to be achieved via the public roads adjoining the building (Park View Road and Roseacre Road).

Appliance Type	Min. width of road between kerbs(m)	Min. width of gateways (m)	Min. turning circle between kerbs (m)	Min. turning circle between walls (m)	Min. clearance height (m)	Min. carrying capacity (tonnes)
Pump	3.7	3.1	16.8	19.2	3.7	14.0

7.2. Access into the Building

Any perimeter doors providing access into the building should achieve a minimum width of 750mm (unless otherwise specified in this report) in support of firefighting operations. Doors should not be located more than 60m apart from each other.

Any security provisions providing access to the building should enable the responding Fire Service to conduct their operations effectively.

The dry rising mains should be designed, installed and maintained in accordance with BS 9990. They should include an inlet valve on the building façade, adjoining the entrance to the staircase served. Dry rising main outlet valves should be provided on the full landing of each staircase (including the ground floor). The horizontal portion of the main should not extend more than 18m. This is not achieved, and design adjustment is expected going forward.

All areas in all flats should be within 45m along a route suitable for laying hose as measured from a dry rising main outlet valve.

The ancillary areas at basement level should be within 45m along a route suitable for laying hose from the pump appliance parking location. Similarly, all ancillary areas on Roseacre Road and Park View Road should be within 45m along a route suitable for laying hose from the pump appliance parking location.

However, it is acknowledged that some ancillary areas within the South portion of the building (part of the sports grounds) cannot be reached within 45m along a route suitable for laying hose from the pump appliance parking location. These areas are still covered by a commercial grade suppression system in accordance with BS EN 12845, in order to reduce the risk overall. This is subject to review and agreement with the Building Control Body and London Fire Brigade.

For each residential core, the staircase should be a firefighting staircase enclosed in 120 minutes fire resisting construction and FD60S fire doors. For each residential core, one of the lifts should be designed as a firefighting lift enclosed in 120 minutes fire resisting construction and FD60 fire doors. Each firefighting lift should be designed, installed and maintained in accordance with BS EN 81-72 and BS EN 81-20.

The firefighting lifts should not be more than 7.5m away from the firefighting staircase door. This is not currently achieved, and design adjustment is expected going forward.

7.3. Water Supplies

The building should include a suitable operational hydrant within 90m of the entrance of the building. If this is not achieved, a new private hydrant would be required within 90m of each residential staircase entrance, as well as the associated dry rising inlet valves. Private hydrants should be in accordance with BS 9990.

7.4. Basement Smoke Ventilation

The basement level should include mechanical smoke ventilation, noting that it already includes BS EN 12845 suppression. The mechanical smoke ventilation system should achieve 10 air changes per hour and be in accordance with Section 27.2.3 of BS 9999.

7.5. Wayfinding Signage

In support of firefighting operations, the building should be provided with wayfinding signage in accordance with Sections 15.13 to 15.16 of ADB, considering the residential areas will include a floor in excess of 11m in height.

7.6. Secure Information Box

In support of firefighting operations, the building should be provided with a secure information box in accordance with Sections 15.18 to 15.21 of ADB, considering the residential areas will include a floor in excess of 11m in height.

7.7. Evacuation Alert Systems

In support of firefighting operations, an evacuation alert system in accordance with BS 8629 and Section 15.17 of ADB should be provided within the building, considering the residential areas will include a floor in excess of 18m in height.

7.8. Security Control Room

A security control room is provided next to the final exit onto Park View Road, at the North-East of the building. This should be enclosed in 120 minutes fire resisting construction and FD60S fire doors. Fire alarm panels (or repeater panels) are expected to be provided in this area for all relevant fire safety systems within the building. Additionally, emergency voice communication, CCTV and other critical systems should be connected to this room in order to enable the effective implementation of the Fire Safety Plan and evacuation of the building in a fire scenario.

7.9. Secondary Power Supplies

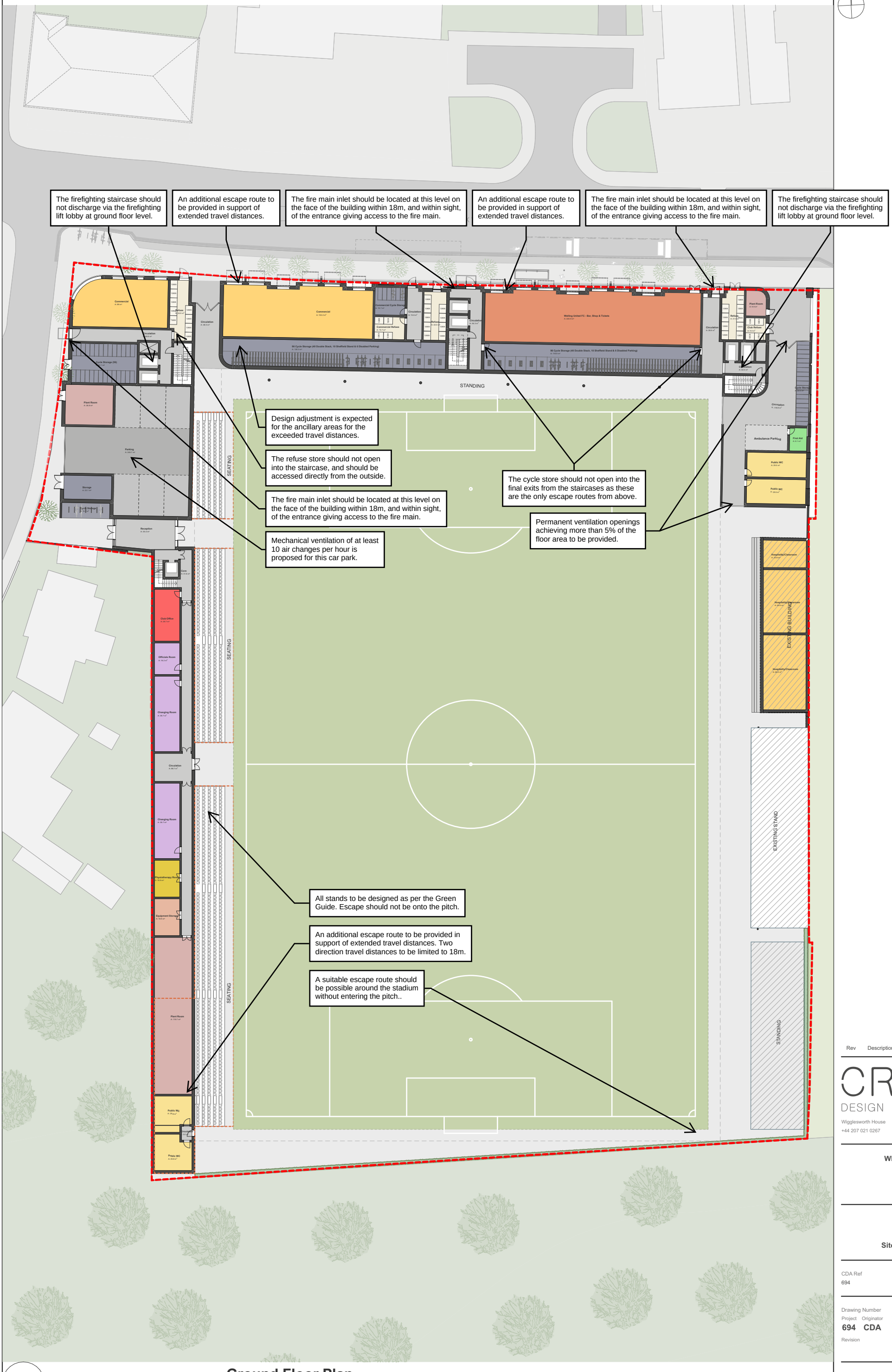
All active fire safety systems should include robust secondary power supplies. Even if some systems are expected to include this as batteries forming part of a proprietary system, some active fire safety systems should include a separate source:

- Firefighting lifts.
- Evacuation lifts.
- Suppression systems.
- Smoke ventilation systems.

7.10. PV Panels (if included)

PV panels (if included) could represent a risk for firefighters. Therefore, a suitable sign should be included at ground floor level in each staircase, adjacent to the fire alarm panel to inform firefighters of this risk. Additionally, an isolation switch for the DC side of the PV panels should be provided adjacent to the main fire alarm panels, in support of firefighting operations.

8. Appendix A – Drawing Plans



0

Ground Floor Plan

1:500

Rev	Description	Drawn	Checked	Date

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WELLING UNITED FC

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CONCEPT

Plans

Site/Ground Floor Plan

CDA Ref	Scale(s)	Original Paper Size
694	1:500	A3

Drawing Number

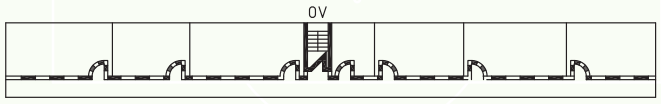
Project	Originator	Volume	Level	Type	Role	Class	Number
694	CDA			DR	A	00	0001

Revision Revision Description

The cycle store should not be entered from a protected lobby or protected corridor forming the only common escape route.

The cycle store should not be entered from a protected lobby or protected corridor forming the only common escape route.

This part of the building should comply with Figure 5.b. of BS 9991 for common balcony approach to a single stair building with a floor level more than 11m above ground. Fire resisting facade up to a minimum of 1.1m should be provided, including fire doors. It is recommended that alternative escape in the other core is provided if possible in order to avoid fire resisting facade and fire doors for the balcony approach.



b) Single-stair building

An additional escape route to be provided in support of extended travel distances.

A suitable escape route commensurate to an escape staircase should be provided at this end of the first floor stand.

STANDING

1

Level 01 Floor Plan

1:500

Rev	Description	Drawn	Checked	Date

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Plans

First Floor Plan

CDA Ref	Scale(s)	Original Paper Size
694	1:500	A3

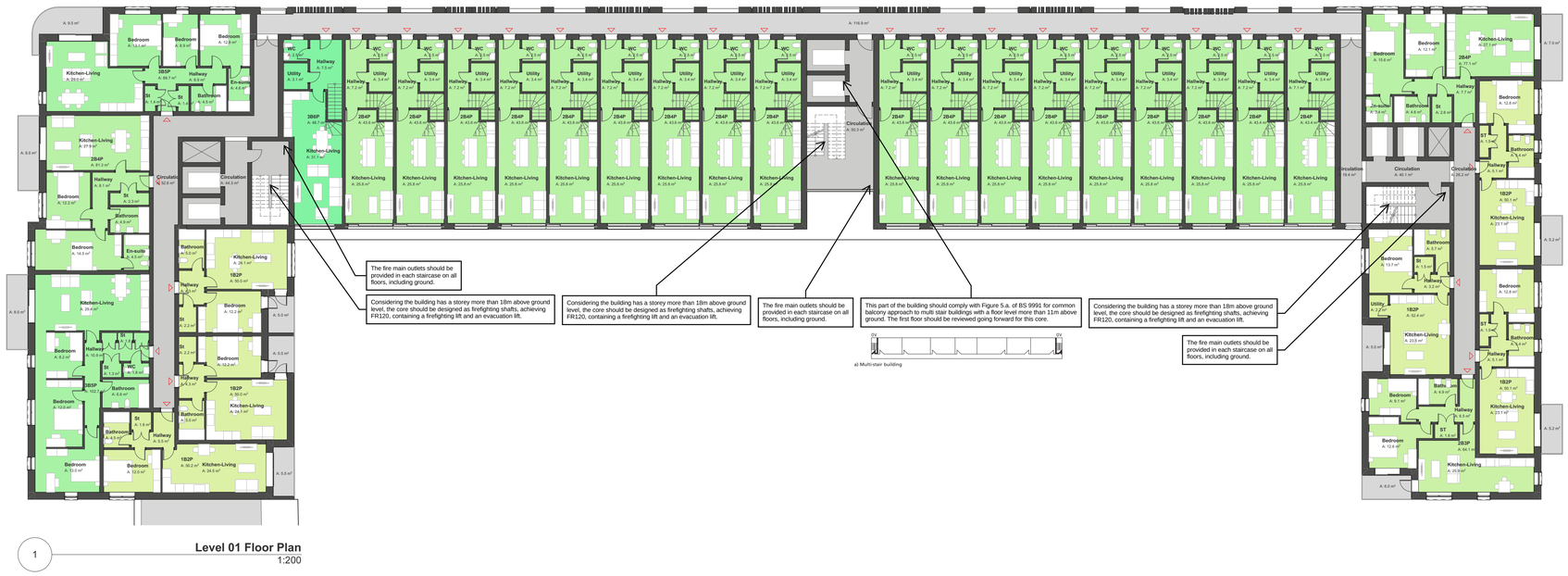
Drawing Number

Project	Originator	Volume	Level	Type	Role	Class	Number
694	CDA			DR	A	00	0002

Revision Revision Description

3

Level 03 Floor Plan
1:200



1

Level 01 Floor Plan
1:200

Revision	Description	Drawn	Checked	Date

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Plans

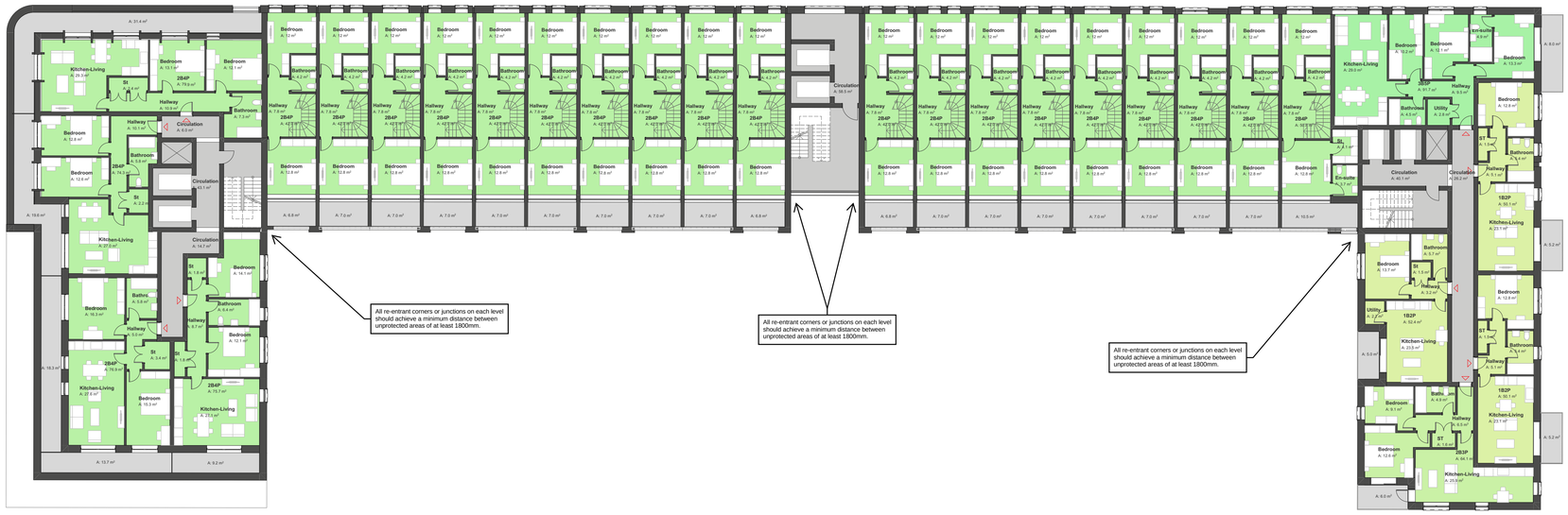
Second & Third Floor Plan

CDA Ref	Scale(s)	Original Paper Size
694	1:200	A1

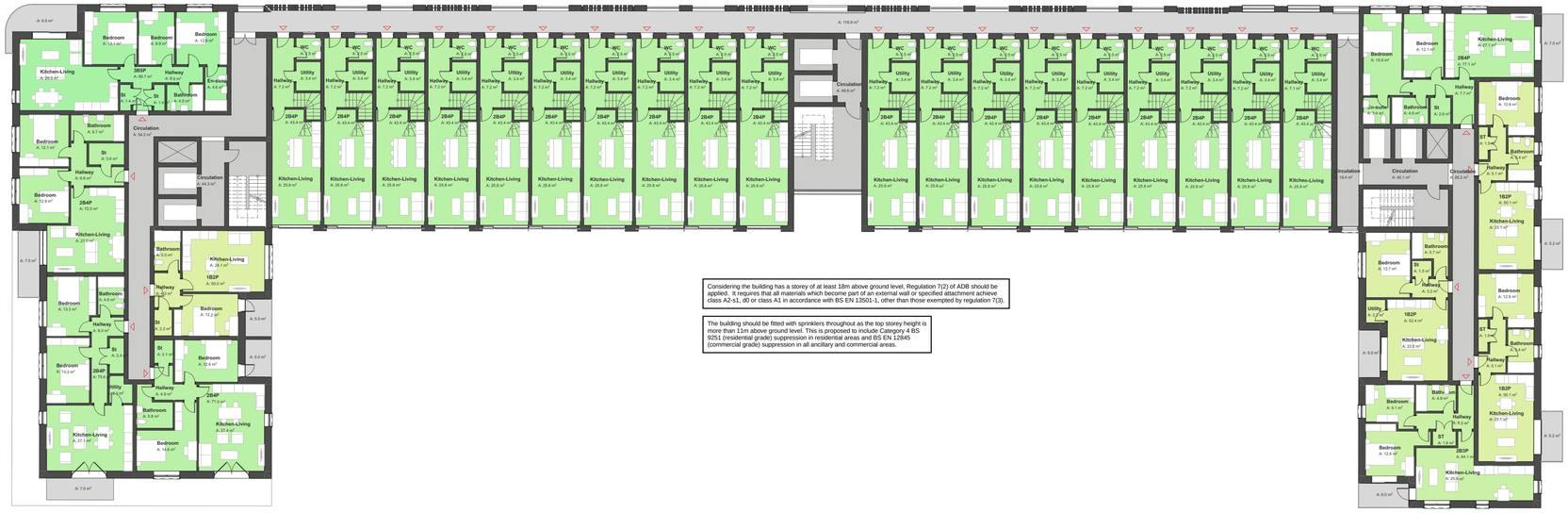
Drawing Number

Project	Originator	Volume	Level	Type	Role	Class	Number
694	CDA			DR	A	00 00	0003

Revision Revision Description



5 **Level 05 Floor Plan**
1:200



4 **Level 04 Floor Plan**
1:200

Revision	Description	Drawn	Checked	Date

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Plans

Fourth & Fifth Floor Plan

CDA Ref	Scale(s)	Original Paper Size
694	1:200	A1

Drawing Number

Project	Originator	Volume	Level	Type	Role	Class	Number
694	CDA			DR	A	00 00	0004

Revision Revision Description

7 **Level 07 Floor Plan**
1:200

6 **Level 06 Floor Plan**
1:200

Revision	Description	Drawn	Checked	Date

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CONCEPT

Plans

Sixth & Seventh Floor Plan

CDA Ref	Scale(s)	Original Paper Size
694	1:200	A1

Drawing Number

Project	Originator	Volume	Level	Type	Role	Class	Number
694	CDA			DR	A	00 00	0005

Revision Revision Description