

Housing Health and Safety Rating System (HHSRS)

Case Studies

Group A
Protection Against
Accidents

Hazard A4
Fire and Explosions

Example A4.7
Post-1979
Common parts of a
Residential High-rise

Vulnerable Group
All persons aged
60 years and over

Multiple Locations
Yes

Related Hazard A7
Structural Collapse and
Falling Elements

Related Hazard A8
Electrical Hazards

Related Hazard B13
Indoor
Air Pollutants

Related Hazard D18
Crowding and
Space

Dwelling

Description

This assessment is for the common parts of a high-rise residential building. The building is arranged in three interconnected wings that form a 'U' shape.

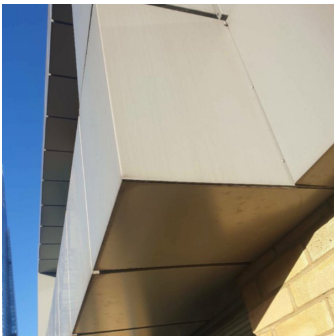
The building is 8 storeys high (lower ground, ground and 1st to 6th floors) with a maximum height (from ground level to the level of the highest floor) of 21 m. The level containing the main entrance lobby and the car park to the building (accessed at street level) is referred to as the lower-ground floor.

Construction of the building was completed in 2002. The building comprises 134 self-contained flats from ground to 6th floors. It also contains a plant room, caretaker's room/cleaner's store, 3 staircases and residential corridors.

Note: No intrusive investigations, examinations or surveys have been undertaken.

Certification

EPC	N/A	
Landlords Gas Safety	N/A	
Landlords EICR	In place	Satisfactory
Fire Risk Assessment	In place	Insufficient
Building Safety Case	In place	



1
Front exterior ACM panels
abutting masonry –
showing flat windows

Deficiencies

External Observations

Walls

Visual examination of the block confirms the external elevations have a mixture of ACM cladding panels (estimated at 1% of the total façade), spandrel and infill panels (15%), brick (39%), rendered areas (25%) and glazing (20%) (in the form of windows).

Aluminium composite material

ACM cladding panels were seen to the top-floor roof facias.

A cladding screening test result report states that a sample of ACM from the building was tested and was categorised as Category 3 ACM, the most combustible category.

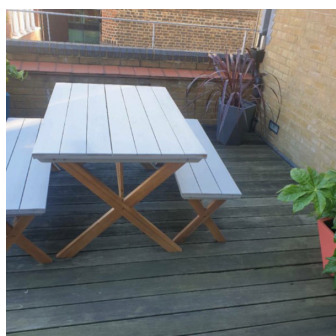
Spandrel panels and infill panels

Spandrel panels were seen arranged in vertical columns above and below windows.

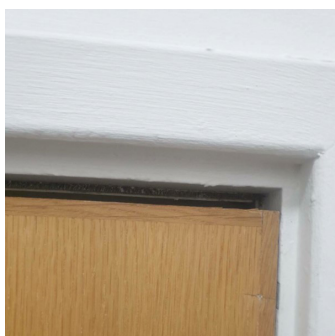
Infill panels were seen to the façades on the top floors. Documentary evidence was provided confirming that the spandrel panels and infill panels are insulated and contain an integral layer of expanded polystyrene. These panels therefore contain combustible material.

Render

Rendered areas were seen to the external façades in several locations around the building. No documentary information has been provided on these areas and it is not known what lies behind the render, whether, for example, it contains combustible insulation. Certain render systems used on buildings contain combustible insulation such as expanded or extruded polystyrene.



2
Timber decking to balcony



3
Excessive gap to head of fire door on escape stair

Brick

Brick cavity walls were noted to large areas of the building. This prompts questions about the cavity, insulation used and combustibility, and cavity barriers and any related means for fire spread. No information has been provided on these matters. In some of the service cupboards in the building, there were gaps in the external walls through which it was possible to see foam insulation boards in the cavity behind the blockwork.

Fire barriers

Due to the lack of intelligence provided and the fact that an intrusive survey was not conducted, the provision or adequacy of any fire barriers to the external walls is not known.

Balconies

The majority of flats have balconies. Balconies are supported on a steel frame and have timber joists. There is timber decking to balcony floors and timber to balustrading. No certification has been seen confirming whether the timber has been treated. Balconies are positioned in series (one above the other) at numerous locations around the building. This could allow for fire to spread between balconies.

Deficiencies

External Observations

Windows and Penetrations to External Wall Systems

Flats have openable windows adjacent to infill panels, spandrel panels, rendered areas and areas of brickwork. There are also patio doors that open onto balconies. This could be a route for fire to spread from flats to external walls or for a cladding fire to enter flats.

Numerous plastic vent-terminations were seen around the building to areas of brickwork, render and infill panels. These extract points are presumed to be for ventilation to the flats. No documentation evidencing fire-stopping to these extract points has been seen. The vents could be a route for fire to spread from flats to the external walls or for a cladding fire to reach inside.

In one of the wings was a residential corridor on each floor, with windows that are openable onto spandrel panels and rendered areas. The windows could be a route for a cladding fire to enter the corridor, compromising this escape route.

Other external observations

Lighting units are attached to infill panels adjacent to some balconies. At least one flat also has a power supply to the balcony area. These represent possible ignition sources.

Fire service vehicle access is available to the entire length of two of the elevations (the two longest elevations, so there is well over 50% access to the external walls).

Two dry rising mains are provided near the main entrance to the building. Both are served by two fire hydrants each, located appropriately.

No parking for vehicles is possible close to the outside of the building because generous pavements have been provided. This reduces any risk to the buildings external walls from a vehicle fire nearby.

There is an external courtyard at ground-floor level accessed from the common corridor. No emergency lighting could be seen to the courtyard. A gate, padlocked shut, prevents exit from this courtyard to the street. The only other way of getting out of the courtyard is via the door into the building, for which a key is required. There is therefore the potential to be trapped in the courtyard if entering without a key.

No lightning protection was seen to the building, and no certificates for a lightning protection system were provided.

Deficiencies

Internal Observations

Compartmentation

The structure of inspected areas appears consistent with there being 60 minutes of fire separation to flats, escape routes and other common areas. However, there are false ceilings to corridors, and only very limited visual inspection of areas above these false ceilings was undertaken during the visit. Certification has not been provided for any previous compartmentation survey carried out at the building.

Several service cupboards are located on each floor of the building. Attempts have been made to fill penetrations with a pink or yellow expanding foam. Some service pipes had fire collars visible, but not all.

Numerous doors to service cupboards do not fit their doorways, with gaps between door frames and walls being sealed with yellow or pink expanding foam in many cases.

Yellow expanding foam is unsuitable as a fire barrier. Pink (fire-resisting) expanding foam is not suitable for sealing excessively large gaps.

Soil pipes from first-floor flats penetrate the ceiling of the basement car park. There is no visual evidence that the pipes have been properly sealed, i.e. fire collars cannot be seen.

Unprotected steel supporting beams can be seen in some of the corridor service hatches and service cupboards. Although some of the steels have a spray-on fire protection applied, others have no rust or fire protection. If a fire were to start in (or spread to) the cupboards, the structural integrity could be compromised.



4
Penetrations to service
cupboards and damaged
ceiling

There is only one door protection between one of the staircases and the basement car park, the latter being a high-risk area for fire (the floor plans from the planning stage show a protected lobby here). The door is a 30-minute fire door, but it is in poor condition. A fire in the car park could result in smoke and fire filling this escape staircase. Providing a lobby (as shown on the plan) is a satisfactory way of overcoming this problem.

Means of escape

Escape is possible in two directions for all flats. There are three escape staircases, one in each wing, protected from corridors by fire doors. There are therefore alternative means of escape if one escape route is overcome with smoke/fire. All staircases are of adequate width (being at least 110cm).

There is an emergency exit door at the foot of each escape staircase. Two mechanisms are in use to open these: a 'push pad to open' device and a Redlam bolt. This two-fold procedure to exit the building is not suitable; the doors should be easily openable using a single movement.

Within the building, spanning the ground to 7th floors, there is a large atrium:

- Within the atrium on each floor is an open walkway. Entrance doors to numerous flats lead off the walkways (18 flats in all). An accommodation staircase descending from the 6th to ground floor is open to the atrium. The open walkways do not have non-permeable guarding and bulkheads to prevent fire and smoke spreading from lower floors. There is no provision for smoke ventilation in the atrium apart from a manually openable roof hatch (installed to give access to the roof).
- A fire in a flat could discharge smoke and heat into the atrium (should the fire door to the flat fail or not close properly after the occupant evacuates), which could make the atrium impassable.
- No fire strategy or other documentation has been seen that explains the rationale behind this layout.
- There are two exit doors from the basement car park; one of these does not have an emergency override and needs a key fob to be unlocked from the carpark side. Because of the size of the car park and resultant travel distances, two emergency exits are needed.

Deficiencies

Internal Observations

Fire Signage

On the whole, sufficient directional fire exit signs are provided to direct residents to the nearest escape stairs and out of the building.

Only one fire action notice can be seen in the building, which directs the reader to raise the alarm if there is a fire, even though no communal alarm system or call points are present and there being a stay put policy currently in place.

Only one (of the two) emergency exits from the car park is signed as such.

Fire doors

Entrance doors to flats and doors throughout common areas are marked as FD30. All doors inspected (except for cupboard doors) were noted to be fitted with self-closers, cold smoke seals and intumescent strips (apart from an exit door to the car park).

The vast majority of fire doors throughout the common parts of the building have Georgian wired-glass vision panels. Many of these vision panels appear to have been fitted retrospectively using a sticky type of mastic and are poorly fitted to the door, sometimes with missing beading and with no evidence of intumescent strips. Only a few of the vision panels have been correctly installed.

The fire door between the basement car park and one of the escape staircases was noted to have excessive gaps and some missing screws to its hinges. The other exit door from the car park (door between car park and main entrance lobby) had missing cold smoke seals and intumescent strips.

Several doors between corridors and staircases and cross-corridor doors had defects such as not closing fully by the action of their self-closing devices, having excessive gaps or being warped.

Smoke control system

At the head of each of the three escape staircases there are openable vents to allow venting of smoke to the outside. One of these can be opened by a switch at the foot of the stairs, but this switch is displaying a fault. The vents to the other two staircases are roof access hatches, but the only means of opening these is by pulling a cable, and reaching this cable requires a ladder. There is also an opening vent at the head of the accommodation staircase in the atrium, which is an access hatch to the roof. This must also be manually opened by pulling a cable, but in this case, no ladder is required.

There is adequate provision of natural smoke ventilation to the car park via louvred vents to most of the perimeter.

Fire suppression/sprinkler system

The building has no sprinkler system or any other kind of fire suppression system. This would not have been a requirement during construction, but such a system would provide additional protection if present.

Fire alarm and detection system

The building has no communal fire alarm or detection system.

There was good visibility in the car park, such that the outbreak of any fire could be seen from any position. There are no call points, but the layout is such that a shout of 'fire!' might be heard throughout.

Flats have mains-wired, standalone smoke detectors to entrance lobbies.

Emergency lighting

Deficiencies

Internal Observations

It was noted that there was emergency lighting present in all escape routes, but a few of the bulbs were not working.

No certificates have been provided for the emergency lighting.

Lifts

The building contains a firefighting lift. No details of servicing or compliance have been seen.

Dry risers

There are two dry risers in the building. A test certificate was seen for the dry riser system, stating that it was satisfactory.

Documentation

A fire risk assessment was carried out two years ago, but it is not considered to be adequate. Also several of the points raised still await action.

There is no EWS1 certificate or supporting documentation.

Relevant Baseline Indicators

0

Satisfactory
or N/A

1

Not
Satisfactory

2

Defective

3

Seriously
Defective

Subject	Score	BI	Baseline Indicators
8 Internal Doors	0 1 2 3	8.1	Internal doors leading between areas of a single dwelling must provide a sufficient barrier to the spread of smoke and fire, any glazing must respond safely to collision, and must be designed for functionality to avoid strains or entrapment when in use and must be maintained in good repair. All bathrooms and WC doors must be fitted with a suitable lock and not contain clear glass.
19 Fire Safety	0 1 2 3	19.3	An annual gas safety check should have been undertaken within the last 12 months with a satisfactory result. Any heating provided by LPG shall be inspected annually by a suitably qualified engineer.
	0 1 2 3	19.4	The electrical installation should have been inspected and tested within the last 5 years.
	0 1 2 3	19.5	There should be sufficient, properly designed and appropriately sited smoke and heat detectors with alarms in every dwelling. These should be properly maintained and regularly tested.
	0 1 2 3	19.7	Egress through doors/windows that are required for means of escape should not require the use of a key or a code.

Other Relevant Matters

Consideration of likely fire/explosion scenarios

The assessor is to consider the likelihood of a fire igniting within the scenario presented and the likelihood of that fire becoming uncontrolled. The outcomes relate to the impact of the fire to persons, and includes the effects of smoke inhalation.

The assessor is to consider the likelihood of an explosion occurring and its source, and whether that explosion is also likely to lead to a fire ignition. These outcomes are dependent upon the location of the explosion and the provisions within the building to contain the explosion.

Likely Fire Scenarios

The worst-case scenarios for this building are related to fires involving the external wall system or to severe fires inside the building that affect the unprotected structural steelwork. A fire in a flat, for example, would be able to spread to the wall system in areas where wall insulation or cladding material is combustible, and, from there, potentially spread around the building. A fire of this nature and scale would probably be capable of breaking back into the building through the windows of other flats (having a smoke detector in their internal lobby only) and would then (likely) involve, for example, the lounge, kitchen or bedrooms before the smoke detector in the internal hallway gives a warning of the fire. This could result in multiple deaths within the building. An earlier warning in case of fire provided to each flat, for example to an LD2 standard (interlinked detection to kitchen, living room and bedrooms), would at least give occupants a greater chance of escape if fire were to enter from outside.

A similar result would occur from any fire involving an exterior balcony because the balconies are positioned in series (one above the other) and have wooden floors and joists. It is likely that a fire would jump from balcony to balcony and possibly spread via open (or thermally cracked windows) into the flats above, with a similar outcome to the previous scenario.

A fire in one of the top-floor flats would probably be capable of spreading to the outside via the windows. On doing so, the fire is likely to involve the combustible infill panels and ACM panels that are present to the top floor. Such a fire could be reasonably foreseen to spread laterally around the 'crown' of the building, involving all the other apartments on the top floor of that wing.

Fire scenarios inside the building include a fire in a flat that then escapes and spreads to and around the atrium. As there is no automated method of extracting smoke in this area and given that the atrium walkway is the only means of exit from each flat, occupants would have little option but to remain in their respective flats.

In the basement/ground floor, only one (of the two) emergency exits from the car park is suitable for escape in the event of fire. The other possible means of escape has been fitted with a keyless security device using a magnetic lock to hold the door closed. There is no override to disengage this magnetic lock, and as such anyone (not having the necessary access card) would be unable to escape a fire, especially if the fire had cut off access to the only fire exit. Two emergency exits are necessary to satisfy travel distances in the car park. Furthermore, the fire exit is at the foot of an emergency staircase and should be provided with a lobby (as shown on the plans) to help resist the spread of smoke and fire from a fire in the car park to the emergency staircase. Without the lobby (and in combination with a non-compliant vision panel) fire and smoke from a fire in the car park could be foreseen to enter the escape staircase. This risk is reduced because of the stay-put strategy and because there are alternative staircases, but risk remains. Some penetrations in the basement (in particular around soil pipes) were also noted, which are low risk but do connect directly with flats immediately above, meaning a severe fire in the basement could travel through the plastic pipes into these areas.

Please see the Operating Guidance, part 3, section 9, for explanations of the relevant matters

Other Relevant Matters

0

Satisfactory
or N/A

1

Not
Satisfactory

2

Defective

3

Seriously
Defective

Matters affecting Likelihood of Harm

0	1	2	3
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 Electrical sources of ignition

0	1	2	3
---	---	---	---

 Smoking management

0	1	2	3
---	---	---	---

 Potential for arson

0	1	2	3
---	---	---	---

 Accidental fire spread

0	1	2	3
---	---	---	---

 Cooking provision

0	1	2	3
---	---	---	---

 Fixed heating

0	1	2	3
---	---	---	---

 Lightning

0	1	2	3
---	---	---	---

 Laundry facilities

0	1	2	3
---	---	---	---

 Multiple occupation and
overcrowding

Matters affecting both Likelihood and Harm Outcomes

0	1	2	3
---	---	---	---

 Escape route

0	1	2	3
---	---	---	---

 Dwelling layout

0	1	2	3
---	---	---	---

 Travel distance

0	1	2	3
---	---	---	---

 Operation of exits

0	1	2	3
---	---	---	---

 Obstructions

0	1	2	3
---	---	---	---

 Non-fire resisting fabric – allowing
fire to spread.

0	1	2	3
---	---	---	---

 Smoke permeable fabric – allowing
smoke to spread.

0	1	2	3
---	---	---	---

 Fire stops to cavities – lack of,
allowing fire to spread.

0	1	2	3
---	---	---	---

 Disrepair to fabric – walls, ceilings
and/or floors may allow smoke,
fumes and/or fire to spread.

0	1	2	3
---	---	---	---

 Internal doors – insufficient doors or
doors of inappropriate materials or
ill-fitting doors.

0	1	2	3
---	---	---	---

 Fire-resisting construction (including
any glazing) protecting escape routes

0	1	2	3
---	---	---	---

 Measures to ensure that fire-
resisting doors are maintained in the
closed position

0	1	2	3
---	---	---	---

 Smoke Control

0	1	2	3
---	---	---	---

 Artificial lighting

0	1	2	3
---	---	---	---

 Levels of compartmentation

0	1	2	3
---	---	---	---

 Provision of appropriate Fire Safety
Signs

0	1	2	3
---	---	---	---

 Fire Detection and Alarm Systems

Other Relevant Matters

0

Satisfactory
or N/A

1

Not
Satisfactory

2

Defective

3

Seriously
Defective

0 1 2 3 Provision of fire-fighting equipment

0 1 2 3 Fire suppression system

Matters related to cladding

0 1 2 3 Condition of cladding

0 1 2 3 Combustibility and fire performance
of external wall construction and
cladding

0 1 2 3 Location and adequacy of cavity
barriers

0 1 2 3 Presence/maintenance of dry/wet
rising mains

0 1 2 3 Presence/maintenance of Firemen's/
Firefighting/Firefighters lifts

0 1 2 3 Access arrangements to the site and
the building for the fire and rescue
service

0 1 2 3 Balconies

Matters related to explosions

0 1 2 3 Unauthorised gas supply

0 1 2 3 Siting of gas tanks

0 1 2 3 Ventilation

0 1 2 3 Hot water storage tank

0 1 2 3 Vented hot water system

0 1 2 3 Unvented hot water system

Likelihood of Harm

Scale Points	
Likelihood of harm from this hazard over the next twelve months	
Very Likely	1 in 1
	1 in 2
	1 in 3
	1 in 5
Likely	1 in 10
	1 in 20
	1 in 30
	1 in 50
Unlikely	1 in 100
	Example Dwelling 1 in 200
	1 in 300
	1 in 500
Very Unlikely	1 in 1,000
	1 in 2,000
	National Average 1 in 3,000
	1 in 5,000

Score

1 in 200

Justification of Scoring

Likelihood of Harm

The building has additional ignition sources, such as light fittings attached to some of the combustible rainscreen materials and the lack of a lightning protection system. There are a number of routes that an uncontrolled fire may take in this building. The building has combustible elements to the EWS that could cause a fire to spread externally, compounded by the presence of balconies with combustible materials. Internally, the large space provided by the atrium which leads on to the MOE means that smoke spread is likely. This is compounded by manually operated, difficult-to-access opening vents to two of the staircases.

These issues are compounded by substandard doors, inadequate compartmentation and the fact that smoke could spread to the stairs from the basement car park.

These factors result in a significant increase in the likelihood of an uncontrolled fire.

Harm Outcomes

Extreme		Severe		Serious		Moderate	
Death, permanent paralysis, etc.		Heart attack, serious fractures, etc.		Chronic stress, severe concussion, etc.		Broken fingers, moderate cuts, etc.	
Very Likely	50.0	Very Likely	50.0	Example Dwelling	50.0	Example Dwelling	25.0
	30.0		30.0		30.0	National Average	90.0
Example Dwelling	20.0		20.0		20.0	These scores are simply calculated as the sum of the other three harm outcomes subtracted from 100%	
Likely	10.0	Likely	10.0	Likely	10.0		
National Average	5.0	Example Dwelling	5.0	National Average	5.0		
	2.0		2.0		2.0		
Unlikely	1.0	Unlikely	1.0	Unlikely	1.0		
	0.5		0.5		0.5		
	0.2		0.2		0.2		
Very Unlikely	0.1	Very Unlikely	0.1	Very Unlikely	0.1		
	0.0	National Average	0.0		0.0		
Score	20.0%	Score	5.0%	Score	50.0%	Score	25.0%

Justification of Scoring

Harm Outcomes

The building has more than one MOE, which goes some way to mitigate the likelihood of harm. However, there are no interim measures in place at the building even though there is significant risk associated with the EWS: the stay-put policy has been retained as opposed to the introduction of a supported simultaneous evacuation plan (backed up by a form of alarm system). The poor smoke management systems, compounded by substandard doors and inadequate compartmentation, mean that there is a significant increase in 'extreme' harms and, to a lesser degree, 'severe', as it is likely that people attempting to

escape will be overcome by smoke. 'Extreme' and 'severe' harms are also increased due to the lack of suppression systems in the flats, signifying that a EWS fire or smoke from common areas filtering into the flats is likely to lead to injury or death. Delayed evacuation is also likely to increase the level of 'serious' harms due to burns, minor injuries and smoke inhalation. In terms of day-to-day living, occupants will probably suffer from significant mental distress upon becoming aware of the high fire risk associated with the external cladding system on the building, impacting 'serious' harms.

Safety Ratings

Scenario 1
As described in this document

Key

Category	Band	Score
1 Legal duty to take action	High	10,000
2 Discretion to take action	Medium	1,000
	Low	100

Likelihood of Harm 1 in 200			
Extreme 20.0%	Severe 5.0%	Serious 50.0%	Moderate 25.0%
Category	Band	Score	
1 Legal duty to take action	High	10,000	
	Example Dwelling	1,101	
2 Discretion to take action	Medium	1,000	
	Low	100	
	National Average	17	

Score
1,101

Scenario 2

After works meeting baseline indicators

Likelihood of Harm
1 in 300

Extreme 20.0%	Severe 5.0%	Serious 50.0%	Moderate 25.0%
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Category	Band	Score
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1 Legal duty to take action	High	10,000
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2 Discretion to take action	Medium	1,000
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Low	100
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Example Dwelling +	17
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Score	National Average
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739**Scenario 3**

After further improvements

Likelihood of Harm
1 in 3,000

Extreme 5.0%	Severe 0.0%	Serious 5.0%	Moderate 90.0%
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Category	Band	Score
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1 Legal duty to take action	High	10,000
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2 Discretion to take action	Medium	1,000
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Low	100
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Example Dwelling +	17
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Score	National Average
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17**Justification of Scoring**

After works meeting baseline indicators

Compliance with BIs would see some work done to improve the building: BI 8.1 would see some repairs made to the internal doors where necessary. BI 19.5 would see the automatic fire detection upgraded encompassing an appropriate fire alarm system to common parts.

BI 19.7 would see the courtyard door be replaced to one which does not require a key, and the car park door that requires a key fob would be replaced for one with manual override facility. Whilst this would lead to a decrease in the likelihood, further works would be necessary to resolve the issues in this building.

Justification of Scoring

After further improvements

A properly conducted FRA, supported by an intrusive report and assessment would be necessary. This should see replacement/mitigation of combustible external wall systems including removal of flammable materials from the balconies. There would be an overhaul of the smoke management system, and testing/upgrade to the emergency lighting. The issue with the atrium would be resolved by enclosing the MOEs that open onto it. Fire doors should be confirmed as conforming to BS 476 or replaced with correct door and full compartmentation should be achieved by stopping up gaps with correct intumescent collars etc. Generally, management improvements should be recommended and implemented. It is likely interim measures would be recommended as a result of the FRA such as a waking watch, an audible communal fire alarm system and/or a review of the stay put policy, and the installation of a SIB, wayfinding and fire action notices required. Overall, these further works would return the likelihood and harm outcomes to the national average.

Other Relevant Legislation and Guidance

Leasehold properties

In a leasehold property, there may be restrictions on works that can be carried out without the freeholder and management company's express approval. This could include, for example, alteration of doors and windows as well as maintenance of the structure of the building (e.g. the roof).

Updates

Matters for consideration listed in this section were correct at the time of publication. For the most up-to-date legislation and guidance in these areas, please visit the [gov.uk](https://www.gov.uk) website.