EWS1 Report

1-87 Belgrave Road

30th April 2021

Croydon Borough Council

12125BB

BB7

Revision History

Version	Date	Author	Comments
01	30/04/2021	Shauna Jameson / Jonathan Cornelius	Initial issue to client

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Contents

1. Introduction

BB7 have been appointed to conduct an intrusive survey and provide a comprehensive report forming an EWS1 assessment for 1-87 Belgrave Road in Croydon.

This report outlines BB7's intrusive survey findings, analysis of the external wall systems, and conclusions. BB7 intrusively surveyed the building on 16th March 2021; the survey was conducted by Jonathan Cornelius and Shauna Jameson.

The full building description is found in Section 2 of this report.

Figure 1. Blocks with existing cladding circa 1960s (Belgrave Road in background)

Figure 2. Blocks re-clad. Presumed circa late 1990s

This document and the associated EWS1 form are only applicable to 1-87 Belgrave Road, Croydon. Please note that this document and associated EWS1 form is valid for a period not exceeding 5 years. In accordance with Note 03 of the EWS1 form, this report and the associated EWS1 form have been reviewed by a chartered registrant with the Engineering Council UK (Chartered Engineer) who is registered through the Institution of Fire Engineers.

In reviewing and applying their signature to these documents the Chartered Engineer is verifying that, although they may not have attended site in person, they agree that the inspection was carried out by a suitably experienced engineer and they agree with the assessment and outcome.

2. Building Description

The building is 11 storeys (i.e. ground plus 10) and is served by a single stair core. The residential accommodation is from the first to tenth floor with plant space at the top of the building. There are 44 dwellings in total, the internals of the flats were not reviewed. There are four apartments per floor level.

There is also a bin chute that runs the height of the building which is accessible from the stair via a ventilated lobby, the bin store itself is also provided with ventilation; both the lobby and room itself are served by the same duct with a split plenum. It was also noted that the bin store itself was provided with permanent ventilation directly to outside vit louvred doors. The free area of the vents in both could not be confirmed. Furthermore, the construction of the bin cute appeared to be newer than the rest of the building, this may have been an extension at some point. At the base of the bin chute, a fusible link damper was provided to prevent fire spread and there was a sprinkler head to reduce any potential fire size.

The single stair core is separated from the common area by Georgian wire glass partitions and there were 2 permanent vents at the head. There was also an additional stair that served the 8th to 10th floors, providing two directions of escape from the top floors but then occupants would have to transfer from the second stair into the main stair at the 8th floor and to ground.

The common area between the apartments and stair core was provided with what appears to be an automatically opening vent (AOV) on levels 1-7. Smoke detectors were in the common area and are presumed to activate the ventilation. The travel distance from flat door to stairwell was also restricted below 7.5m which would be in accordance with the design guidance.

No ventilation has been provided to the apartment lobby at ground floor level, ventilation would be achieved by opening the main entrance door in the event of a fire.

The upper three levels (levels 8-10) have a distinctly different arrangement to the other floor levels due to the presence of two stair cores, one of which is the main stair core serving all upper floor levels, and other appears to be a secondary escape stair. Landings served by both stair cores to floors 8 - 10 are separated from both stairs by Georgian wired glass partitions. There does not appear to be ventilation to the enclosed lobbies at these levels, travel distances are within 7.5m to either stair core. There is ventilation to the head of each stair by means of an AOV although detection is located within the enclosed lobby area and not apparent at the head of the stair. The operation of the system at levels 8 – 10 requires further investigation to confirm operational compliance (i.e., if there is smoke logging within the stair cores but not the lobby, will a form of detection enable the AOV's at the head of the stair cores to activate). It would appear that the intent is to ventilate these upper levels via the secondary stair case, however, this is outside the scope of this document.

There was also a dry fire main noted at every other floor level (on even floors) which would allow the Fire Service to connect at the base and then charge the main with water to the floor of fire origin or several floors below as per standard practice. This is beneficial in a tall building as it means they do not have to run numerous lengths of hose up the stair. Furthermore, the lift appeared to be usable by the Fire Service (i.e. an override was identified) which will enable them to reach the floor of fire origin quicker by setting up a bridgehead on the relevant floor.

At the base of the stair, the common area and final escape route was clear and free of obstructions direct to outside. The fire alarm panel was identified in the ground floor common area with what appeared to be a 'redcare' style autodial system along with the sprinkler stop valve. There is a clear route to access the building from outside from the main road. There is a final escape route directly from the stair core to fresh air at the rear of the building, occupants therefore do not need to escape past apartments at ground floor level.

The building is provided with sprinkler protection, but it is not known to what extent they are provided as the internal flats were not reviewed. It is possible that some flats may not have them, or they may be disconnected. A sprinkler flow switch is provided at every level in the building.

The Fire Service would have good hose access to the lower levels of the building and an appliance could reach the lower part of the façade from a public road or the car park at the rear. Although good access is provided to enable the Fire Service to get water onto the lower areas of the façade, a high reach appliance would struggle to reach the full elevations. Furthermore, the response time for high reach appliances in London is likely to be delayed and, as such, they cannot be relied upon.

The buildings were originally constructed circa 1962 – 1965 (REF: https://www.towerblock.eca.ed.ac.uk/development/belgrave-road-wates-croydon-i) and the original construction was a large panel system.

Since the building was constructed, the entire façade has been overclad with a 5mm aluminium cassette panel system with mineral wool insulation directly onto the original structure and a ventilated cavity. It is presumed the over cladding was carried out in the mid-late 1990s based on conversations with the contractor.

Although access prevented an intrusive survey, the bin chute extension is considered to be a different system based on findings from other blocks and includes a metal composite material with a thermoplastic infill on the outer face. The side elevations of the bin chute were 5mm aluminium cassette panel system with mineral wool insulation directly onto engineered brick and steel beams.

At ground floor there was also a render finished system which appeared to be 100mm of PIR insulation abutted directly to the original LPS structure. There was no cavity or cavity barriers identified.

BB7 have been provided with the Fire Risk Assessments for the building which was carried out by Ridge & Partners LLP in 2019.

Figure 3 shows a site plan of building demonstrating the location of the buildings and the boundary formed by the surrounding streets.

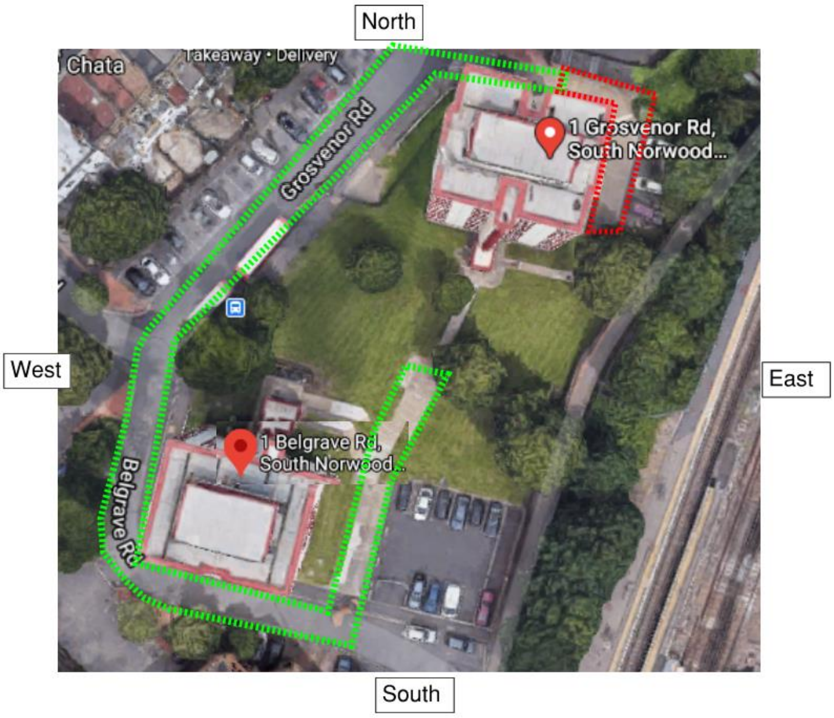

Figure 3. Ariel view of the development

3. LPS Construction

Large Panel System (LPS) construction is a form of construction where large, storey height, pre-cast Reinforced Concrete panels are assembled together on site to form the buildings' structure, this was a very popular method of construction for council housing in the 1960's and 1970's made semi-famous by the Ronan point collapse in May 1968 following a gas explosion. LPS buildings can be designed to be up to 24 storeys in height, but 1-87 Belgrave Road is substantially lower than this.

Figure 4. Ronan point collapse

The Ronan point collapse was caused by a gas explosion on a mid-level floor. The explosion dislodged loadbearing panels which triggered a disproportionate collapse. This report does not consider collapse mechanisms under Approved Document A; such an assessment should be carried out by a structural engineer. Croydon Council should satisfy themselves that the structural health of the building is not a risk to life safety during a fire event. Furthermore, it has not been possible to determine the insulation present in external wall panels, and as such it cannot be determined whether a deflagration event could occur. It was typical for the blowing agent to be Pentane in the 60's and 70's. This report therefore does not consider deflagration risks as this would need to be determined by a DSEAR expert.

There are many types of LPS construction, and it is not possible to definitively state which type of structure was used; however, it is known that 1-87 Belgrave Road was constructed by Wates in the late 1960's. A large number of LPS buildings were based on the Bison method of construction. Typically, the external walls of LPS buildings are similar to that shown in the figure below and correspond to the site findings.

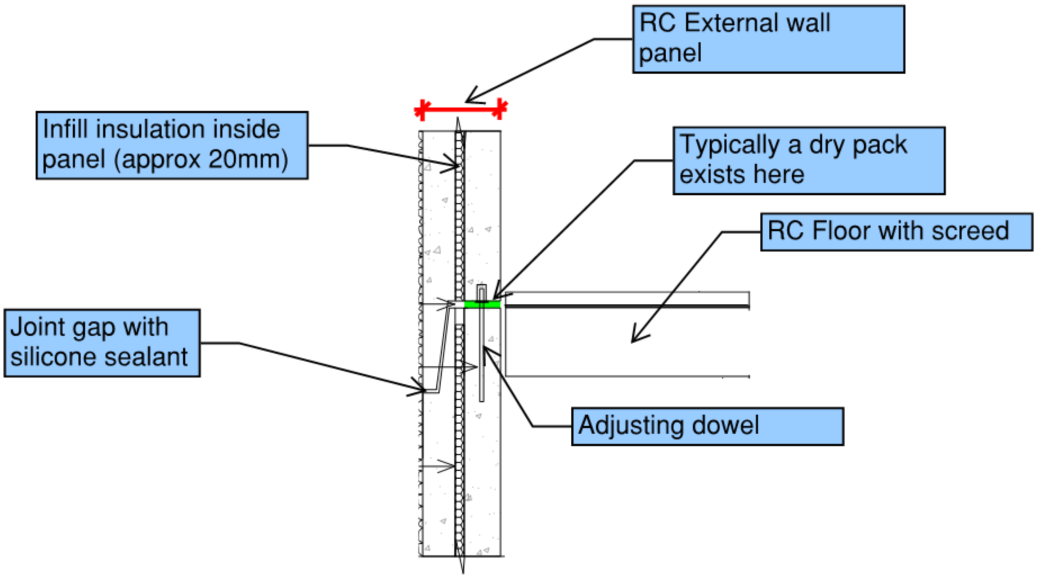

Figure 5. Typical composition of external walls

It can be seen that there is a thin insulation layer within the panel itself and there is a path to this cavity from outside at the joint gap. This insulation is typically a form of EPS or XPS which is a highly combustible substance, however, it is encapsulated between two >100mm leaves of RC which means it is offered a significant degree of protection. The cavity in which the insulation exists is generally 20mm wide, but this can vary across the different manufacturers. Based on making drill holes at the building it was found that the cavity was within the 20-25mm range. There is a route for fire spread via the joint between panels, the silicone sealant used is of a substantial volume and will offer some fire resistance into the panel system, however, a period of time cannot be determined. Typically, a dry pack is present which aids in preventing fire re-entry into the building.

Whilst there is a risk of fire making its way to this zone, the risk is substantially lowered by the 100mm layer of mineral wool insulation which has been provided as part of the re-cladding works. On that basis the combustible insulant in the structural panel itself has been largely not considered as part of this report. Due to the location of the insulant, it is not likely to contribute to uncontrolled fire spread. Furthermore, if fire did reach the insulation the rate of fire spread in this cavity would likely be low on the basis that the cavity has a small width and will not entrain air to any great degree, and the fire would need to sufficiently make its way through the insulation to spread which would take time to accomplish. On that basis it is considered reasonable to omit this layer of insulant from the main risk assessment, however, it will still be acknowledged to exist.

Due to the different types of structural wall present in LPS buildings (i.e. flank wall, side wall, etc) there are panels of different styles which have been noted. Typically, most panels are the same as that noted in Figure 5, the difference of note is the coarseness of the facing material. The other system that exists commonly is a facing brickwork system. The exact method of construction is not known, however, from investigations it is clear that a cavity exists between the brick work and the substrate behind. Again, there are multiple types of construction method that could be employed here, so assumptions based on common practice have been made as part of this assessment.

Similar to the method shown in Figure 6 there are a number of instances where the facing brick work is supported with an RC upstand/downstand. The residual cavity formed is similar to that shown in Figure 7.

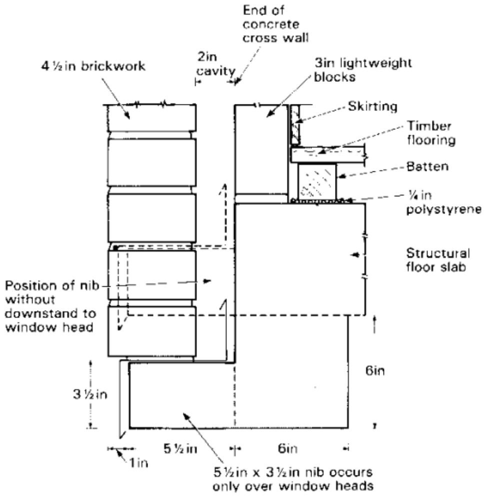

Figure 6. Typical brick on RC downstand

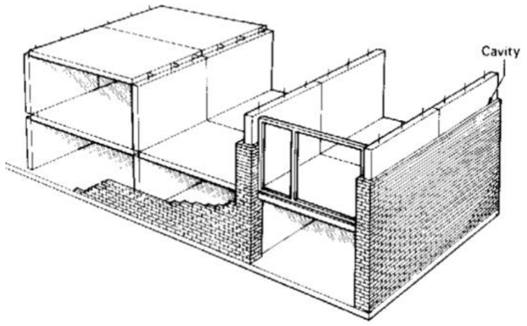

Figure 7. Typical brick façade to LPS

A cavity is typically formed between the facing brick work and the RC structure/block work substrate. Based on drill hole surveys this cavity was found to exist., but it could not be determined whether insulation exists in this cavity.

Typically, cavity barriers can be omitted from cavities formed between two layers of masonry which are >75mm thick, and the guidance has historically allowed for combustible insulation to be present in such cavities. This is due to the fact that masonry is dense, inert, robust and non-combustible and is very unlikely to contribute to uncontrolled fire spread. As per the rest of the wall system the brick work is situated by c. 100mm mineral wool insulation which will offer a high degree of protection. On that basis it is considered reasonable to omit the areas behind the facing brick work from the risk assessment, however, the presence will still be acknowledged.

4. Scope & Limitations

4.1 Scope

This report is based on the information provided by Croydon Borough Council. The scope was to review the building and the product will be an EWS1 form and accompanying report. Please note that this report and the EWS1 form issued will only apply to the buildings specifically noted in Section 1 of this report.

Under the EWS1 process, the building may require remedial works before it is satisfactory. As part of this scope, we will provide a completed EWS1 form for the building, which is designed to satisfy lenders.

We cannot guarantee that lenders will be satisfied with the EWS1 form, but this form has been agreed by many lenders and, as far as we are aware, is the only system available for this purpose.

The EWS1 form has been coordinated by RICS and supported by MHCLG in principle.

4.2 Limitations

This review is for the sole and exclusive use by Croydon Borough Council in relation to the buildings noted in Section 1 of this report only.

This review considers the combustibility and risks of external fire spread via the external walls only, and does not endorse any other elements of the design such as alarm, suppression, structural protection, etc.

In the site survey a reasonable sample of locations were reviewed. We can only base the findings of our report on the sample information gathered during these site surveys.

4.3 Relevant Legislation & Guidance

The decision was taken by the client that the building will be subject to an assessment to quantify the risk posed by the wall materials to residents with respect to health and safety.

As part of the UK Government approach to fire safety since the Grenfell Tower fire, information has been supplied to building owners, particularly those who own and manage multi-storey residential buildings. Most recently, a document entitled '*Advice for building owners of multi-storey, multi-occupied residential buildings, (2020)*' provided advice for multi-storey buildings of any height.

As part of that guidance it states that, the Requirement B4 is clear and requires that "*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 location of the building. The need to assess and manage the risk of fire spread applies to buildings of any height*".

5. EWS1 Assessment Scheme

5.1 Requirements

Irrespective of the application of regulation to existing buildings and those under construction, valuations for residential apartments in a block now seek confirmation of compliance with the limitations in the use of combustible materials.

As it is not possible to verify this in a majority of existing premises a scheme has been devised in conjunction with the Building Societies Association and UK Finance to include an inspection and assessment option on the relative risk in case of fire.

In summary, the concept is for a technically competent engineering professional to inspect or otherwise ascertain the material used and construction of the external walling types and associated attachments. Subject to the findings of the inspection and the combustibility of the materials, options are available to assess whether it is considered to present an unacceptable level of risk and if remedial action is necessary.

Dependent on the outcome the following reports and documents will be required:

- A1 – EWS1 form completed with A1 confirmed plus inspection report
- A2 – EWS1 form completed with A2 confirmed plus report of assessment and conclusions regarding acceptable risk
- A3 – EWS1 form completed with A3 confirmed plus report of assessment and conclusions regarding unacceptable risk plus report giving remedial and interim measures
- B1 – EWS1 form completed with B1 confirmed plus report of assessment and conclusions regarding acceptable risk
- B2 – EWS1 form completed with B2 confirmed plus report of assessment and conclusions regarding unacceptable risk plus report giving remedial and interim measures

An EWS1 form is primarily intended for buildings where the highest floor is greater than 18m above ground level, or where there are reasons where a higher risk is associated with the building type, e.g. care homes etc. This building is in scope as it is >18m in height.

5.2 Mechanism for Fire spread

When reviewing a building with combustible products on the façade, the EWS1 form asks for the following to be considered in accordance with note 9 of the aforementioned (as detailed under the scope section 1.2 of this document.)

There is obviously some subjectivity as to exactly how to apply these requirements and further uncertainty as to how a particular wall build up or a wall with multiple build ups will behave in a fire.

BR 135 describes the mechanism for fire spread in Figure 03 of the document. This is illustrated in the figure below of this document.

This details that it is possible for fire to spread even on a building with a non-combustible façade via the windows. This mechanism is called restricted fire spread because fire may spread to the apartment above but it would then need to grow and develop before breaking out again to spread to the apartment above. This is described in BR 135 as follows:

"Following the initiation of a fire inside the building, if no intervention occurs, the fire may develop and break out from the room of origin through a window opening or doorway . Flames breaking out of a building from a post-flashover fire will typically extend 2m above the top of the opening prior to any involvement of the external face, and this is therefore independent of the material used to construct the outer face of the building envelope.

This form of fire spread should be feasible for the fire service to extinghuish and prevent it from spreading.

Rapid fire spread may be due to combustible materails which form part of the external wall build up or via fire spread within the cavity.

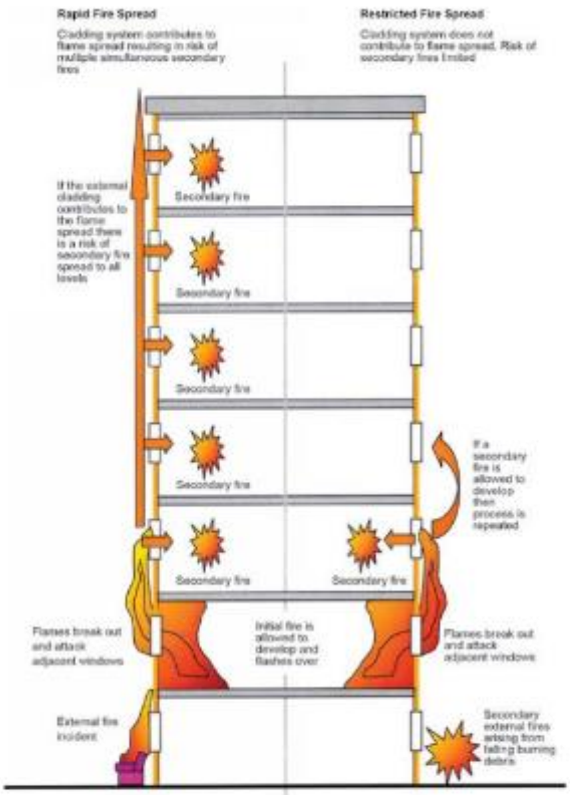

Figure 8. Mechanism for fire spread

When considering the requirements of the EWS1 form, the most probable prediction is made of the most possible worst reasonable case is reviewed against this criteria.

Then factors such as the height of buildling, the number of stairs, the provision of fire service access, the passive and active measures, are reviewed to evalulate the risk.

This is detailed in Section 8: Analysis.

6. Survey findings

6.1 Survey

BB7 intrusively surveyed the building on 16th March 2021. The survey was conducted by Jonathan Cornelius and Shauna Jameson. BB7 had pre-determined multiple survey locations on the building to maximise the findings of the visit and provide a representative sample, these were specified at compartment lines and around openings to ensure that cavity barriers were provided in their respective locations.

The locations were agreed with the contractor ahead of the survey. BB7 surveyed 13 locations across the two buildings.

When surveying buildings from a fire safety perspective, confirming the existence of issues over several areas is key to ensuring a reliable survey. The number of survey points were specified so that any issues could be confirmed where found or could be proven as a "one off" if only found once. The number of locations surveyed was intended to provide reliability in the findings.

6.2 Location 1

Location 1 was on the East elevation.

The system was found to be:

- 5mm solid aluminium cassette panel attached to aluminium rail system.
- 70mm horizontal (floor level) and vertical (party wall) reinforced mineral wool cavity barrier. The cavity barrier sat on top of the insulation (i.e. did not break the insulation) and was under compression.
- 60-70mm clear cavity.
- 110mm mineral wool insulation with metal fixings.
- >100mm RC Structure. A hole was drilled through the concrete to determine the thickness in a number of locations, however, it could not be further determined what was behind the concrete without potentially compromising the integrity of the structure and causing damage internally.

The same build up was identified at each of the following locations, however, they have been separated into four for the review.

Figure 9. Location 1 area inspected

Location 1.1

Location 1.1 was at the 2nd floor under a flat window. Horizontal cavity barriers were identified at floor level. However, no cavity barriers were found around the window opening. Based on information from the contractor the re-cladding took place in the late 1990's, the guidance at this time did not require cavity barriers around openings. The barrier under the opening at compartment floor level was partially folded rather than fully folded along its axis. It is considered that this will still provide an effective break in the cavity.

Figure 10. Location 1.1 horizontal cavity barrier folded over and under compression

Figure 11. Location 1.1 70mm clear cavity

Figure 12. Location 1.1 solid concrete behind 100mm mineral wool insulation

Figure 13. Location 1.1 cavity barrier with robust metal fixing and reinforced with mineral wool

Location 1.2

Location 1.2 was behind a large panel between flat windows on the 2nd floor. A horizontal cavity barrier was found at 3rd floor level. There was no vertical cavity barrier around the window as per location 1.1. This was on the elevation of a single flat, therefore, a vertical cavity barrier was not expected. The horizontal barrier above this point which was partially obscured by the cladding above was not found to be folded, and therefore it is not fitted under compression. The cavity barrier is unlikely to provide effective resistance against fire and smoke spread.

Figure 14. Location 1.2 concrete behind 100mm mineral wool

Figure 15. Location 1.2 70mm cavity barrier at 3rd floor level.

Location 1.3

Location 1.3 was at a kitchen extract duct on the 2nd floor. The full panel could not be removed but the outer vent panel was removed to show the duct was wrapped in mineral wool and was continuous to outside.

Figure 16. Location 1.3 kitchen extract ductwork wrapped with mineral wool

Figure 17. Location 1.3 30mm mineral wool encapsulating ductwork

Location 1.4

Location 1.4 was at the party wall between flats on the 2nd floor and both horizontal and vertical cavity barriers were identified. The cavity barriers at floor level sat between the aluminium rails (i.e. they were not continuous) and the vertical cavity barrier sat on the party wall between flats. It was found at this location that there are intermediate rails which are not open to fresh air and form a cavity between two windows. This will be addressed in Section 8 of this report.

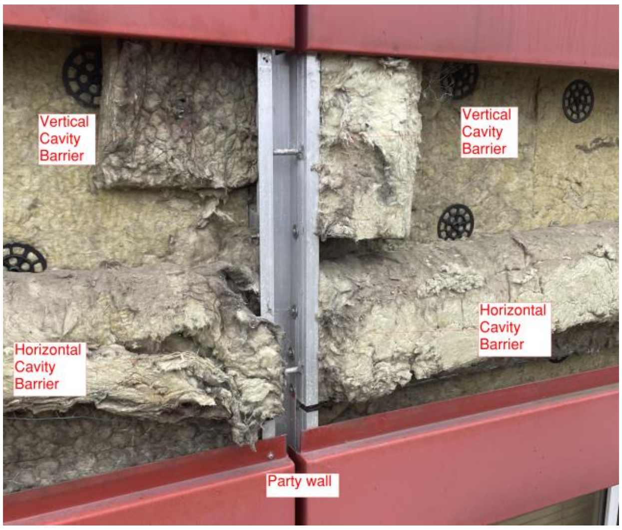

Figure 18. Location 1.4 horizontal and vertical cavity barriers identified.

Figure 19. Location 1.4 vertical cavity barrier damaged and not under compression

Figure 20. Location 1.4 cavity behind panel looking down

It should be noted that the horizontal barriers between locations 1.1 and 1.4 were not found to be folded, and therefore it is not fitted under compression. The cavity barrier is unlikely to provide effective resistance against fire and smoke spread.

Location 1.5

Location 1.5 was at the kitchen extract on the 3rd floor. There was no cavity barrier identified around the ductwork.

Figure 21. Location 1.5 kitchen extract with no cavity barrier

Location 1.6

Location 1.6 was under the flat window at 3rd floor level. Horizontal cavity barriers were identified, however, they were not folded over and unlikely to be under compression behind the panel. They also sat between the aluminium rails so were not continuous, but the barriers were found to be sat flush with the insulation.

Figure 22. Location 1.6 horizontal cavity barrier not continuous or folded over

6.3 Location 2

Location 2 was also on the East elevation at ground floor.

The system was found to be:

- 3-5mm render
- 150mm yellow PIR style rigid insulation
- No cavity barriers were identified
- Original RC structure.

The same build up was identified at each of the following locations, however, they have been separated into two for the review.

Figure 23. Location 2 areas reviewed

Location 2.1

A hole was cut into the render at Location 2.1. This was aimed to be at the compartment line between two flats on the ground floor.

Figure 24. Location 2.1 – 150mm deep insulation to concrete behind

Figure 25. Location 2.1 - 3-5mm of render with thermo plastic insulation behind

Figure 26. Location 2.1 thermo plastic insulation material

There was no break in the in insulation identified on the party / compartment wall line. This type of material is combustible.

Location 2.2

Location 2.2 was at the kitchen extract on the ground floor. The ductwork was provided with a steel 'letterbox' enclosure to separate the ductwork from the insulation and render.

Figure 27. Location 2.2 extract boxed in with steel

6.4 Location 3

Location 3 was on the North elevation.

The system was found to be:

- 5mm solid aluminium cassette panel attached to aluminium rail system.
- 70mm horizontal (floor level) and vertical (party wall) reinforced mineral wool cavity barrier. The cavity barrier sat on top of the insulation (i.e. did not break the insulation) and was under compression.
- 60-70mm clear cavity.
- 110mm mineral wool insulation with metal fixings.
- >100mm RC structure.

The areas that were reviewed are provided in the following picture.

Figure 28. Location 3 areas reviewed

Location 3.1

Location 3.1 was under the flat window on the 2nd floor and horizontal cavity barriers were identified; however, they did not form a continuous horizontal fire break and they were not folded over so unlikely to be under compression behind the panel and will not likely restrict fire/smoke spread.

Figure 29. Location 3.1 100mm horizontal cavity barrier on top of mineral wool insulation

Figure 30. Location 3.1 solid concrete behind 100mm mineral wool insulation

Location 3.2

Location 3.2 was at the kitchen extract from a flat on the 2nd floor. A means of protection had been provided around the ductwork. This encapsulated the ductwork and was continuous to outside.

Figure 31. Location 3.2 duct to outside wrapped in 30mm mineral wool

Location 3.3

Location 3.3 was at 2nd floor under the flat window. A horizontal cavity barrier was identified and folded over, therefore, compression fit.

Figure 32. Location 3.3 horizontal cavity barrier

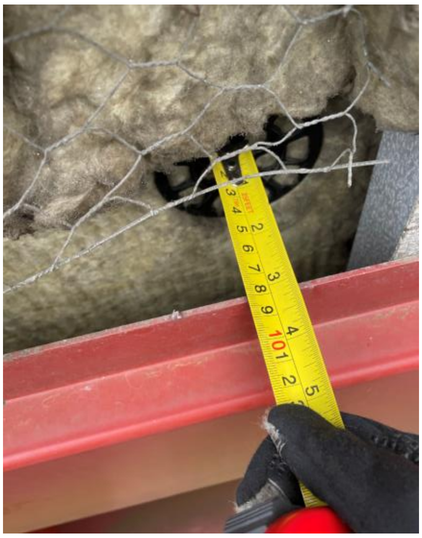

Figure 33. Location 3.3 80mm cavity between insulation and panel

6.5 Location 4

Location 4 was on the bin chute extension on the side wall. The system was found to be:

- 5mm solid aluminium cassette panel attached to aluminium rail system.
- 70mm horizontal (floor level) reinforced mineral wool cavity barrier. The cavity barrier sat on top of the insulation (i.e. did not break the insulation).
- 60-70mm clear cavity.
- 110mm mineral wool insulation with metal fixings.
- Presumed 10mm cement particle board (CPB). A hole was drilled through to determine the thickness, however, it could not be further determined what was behind without potentially compromising the integrity of the structure and causing damage internally.

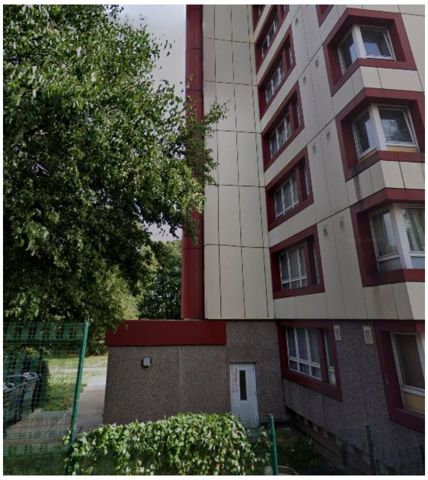

Figure 34. Bin chute & lobby side wall

Figure 35. Location 4 horizontal cavity barrier mechanically fixed but not folded over

Figure 36. Location 4 approx. 10mm thick CPB

There were no vertical cavity barriers identified in this location, however, the horizontal cavity barriers were in place at floor levels. The cavity barriers are not under compression in this section of external wall and will not likely provide an effective means for inhibiting fire and smoke spread.

The method of construction used, i.e. with a sheathing board, is a relatively modern method of construction.

6.6 Infill panels

Infill panels are noted to exist on the rear elevation of the building forming the external wall system to the bin store. Figure 37 below shows the panels location and that they stack full height. The infill panel below a glazed window was opened up to identify its construction on a number of similar buildings. It was found that the infill panel is a composite panel consisting of an unknown thermoplastic material sandwiched between two thin layers of steel. The panels appeared to be the same from a visual survey on this block.

Figure 37. Infill panels

6.7 Internal survey

The common areas in 1-87 Belgrave Road were reviewed internally on each level.

The building is served by a single stair, however, there is an additional stair that serves floor 8 – 10. There were four flats per upper floor level. The full height stair was provided with a vent at the head (approx. 1.0m²).

There were service risers in the protected stair and lobby. The majority were provided with 'Masterboard with Intumescent sealant' fire stopping, although the stair should be kept sterile and remain free of fire load. The riser is not considered to prevent a significant risk.

The flats opened into a lobby with ventilation via an AOV. It is presumed that the AOV works on detection which was identified in the lobby on levels 1-7. There were service risers located in the lobby, with fire stopping provided to service penetrations, however, there were some issues identified, including poor fire stopping around cable penetrations. The sprinkler stop valve was noted in the lobby of both buildings, there was no tank identified, however, as per other surveys it is presumed they are served by a water tank on the roof.

It could not be established the extent of the system as the flats were not reviewed internally.

The bin store is accessed from the lift lobby via a ventilated lobby separated with double door fire protection. The doors inspected appeared to be solid and robust with working self-closers. The bin store is provided with a wall mounted sprinkler and a fusible link damper at the base of the bin chute which will limit potential fire size and spread. This is shown in the following figure.

Figure 38. Bin store fusible link and sprinkler

Dry riser outlets were provided on all even floors. There was also what appeared to be an auto-dial system which was assumed to automatically call the Fire Service on detection in the common area or link to a monitoring station who then call them.

6.8 Fire Risk Assessment

The following information has been provided:

- Fire Risk Assessment (RB-Y7BYMU) - Assessed 2019-11-01 - For Belgrave Road (1-87) (RB-ZBWNWA)

The following provides a review of the documents and the information provided represents that found in the reports. This was to gain additional understanding of the building and potential risk but does not endorse or influence the findings of the documents.

An FRA dated 15th January 2020 was conducted by Ridge and Partners LLP. The overall risk rating determined is provided in the following figure.

FIRE RISK RATING

LIKELIHOOD **MEDIUM**	SEVERITY **EXTREME HARM**	RISK **SUBSTANTIAL**
Normal fire hazards for this type of occupancy, with fire hazards generally subject to appropriate controls (other than minor shortcomings).	Significant potential for serious injury or death of one or more occupants. Includes high dependency occupants such as a care home or properties with poor compartmentation.	Considerable resources might have to be allocated to reduce the risk. Improvements should be undertaken urgently.

Figure 39. Fire Risk Rating from Ridge & Partners LLP FRA

This rating was based on the assessment findings which were that there was generally poor housekeeping, with some storage in the stair lobby, and there were issues with compartmentation and fire stopping identified. Additionally, although ventilation was identified in the stair and lobby, it could not be confirmed how these operated.

Summary

There are high-risk items detailed in the FRA and these should be actioned to reduce the risk.

The findings of the FRA align with the findings of the internal survey carried out, however, it was not part of the scope of this assessment to review in detail.

The action plan is extensive, and all action points should be completed. Until this is done, the building risk is increased.

7. Fire Service Access & Facilities

This section has been added to demonstrate the availability for a pump appliance to gain access to each elevation to fight a fire.

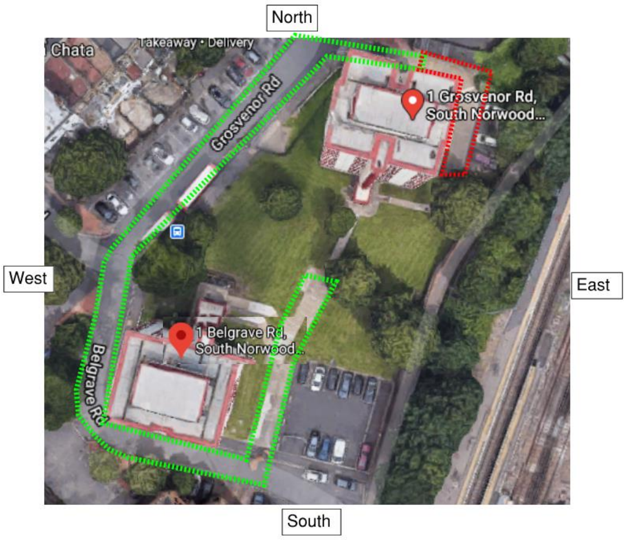

Figure 40. Site Plan

The building is bounded on three sides by Grosvenor Road, Belgrave Road and the car park access. This is considered to provide good Fire Service access within sufficient proximity to the majority of the elevations on the development.

On the North and West elevations, the Fire Service can reach the front within 18m and the car park provides access East and South within 18m. The section highlighted in red would be accessible, however, it had a locked gate and was particularly narrow.

Where access cannot be achieved by an appliance directly to the façade, there are pedestrianized routes with paved pathways which would enable them to reach the façade and apply water without delay to the lower levels without undue delay. However, a high reach appliance would struggle to reach the full elevations. Furthermore, the response time for high reach appliances in London is likely to be delayed and, as such, they cannot be relied upon.

Internal Provisions

There are dry riser outlets provided on every even floor level within the lobby serving the stair. The riser inlet is provided in the lobby on the ground floor. Both lobby and stair are provided with ventilation.

The building is not presumed to be provided with a firefighting shaft, however, there was a Fire Service lift override which would mean they could use it in the event of a fire to reach the upper floors quickly. The stairs are approx. 1100mm, which is sufficient width for a firefighting stair.

There is also an auto-dial system identified in the ground floor lobby which is expected to automatically call the Fire Service on detection within the common area. This is a benefit as it removes the reliance on the resident calling in the event of a fire.

The building is also provided with sprinkler protection which is likely to reduce the potential fire size and spread, although it is not known the extent of the provision or if all flats have working sprinklers.

8. Analysis

8.1 Overview

There are four systems present due to the original construction, over cladding, extension, and infill panels. Analysis of the build-up behind the original concrete construction was not carried out on site as removing large panels could be potentially damaging to the building.

The main cladding system was found to be:

- 5mm solid aluminium cassette panel attached to aluminium rail system.
- 100mm horizontal (floor level) and vertical (party wall) mineral wool cavity barrier reinforced with wire. The cavity barrier sat on top of the insulation (i.e. did not break the insulation) and was under compression.
- 60-70mm clear cavity.
- 110mm mineral wool insulation with metal fixings.
- 100mm solid concrete / masonry. A hole was drilled through to determine the thickness; however, it could not be further determined what was behind without potentially compromising the integrity of the structure and causing damage internally. Please see Section 3 for further detail. In the case of the extension a cementitious particle board was found indicating an SFS system behind.

8.2 Background issues

There are some items which should be addressed before the analysis of each system, these items will feed into each analysis.

Large Panel System (LPS)

It was not possible to intrusively review or definitively identify what type of LPS structure was used, however, based on the dates of construction the typical composition of the external wall is expected to be as Figure 5 of this report. This was expected to include a thin insulation layer, typically a form of EPS or XPS, within the panel itself and there is a path to this cavity from outside.

This form of insulation is a highly combustible substance; however, it is encapsulated between two >100mm leaves of RC which means it is offered a significant degree of protection.

Based on making drill holes at the building it was found that the cavity was within the 20-25mm range.

Although there is a route for fire spread via the joint between panels, the silicone sealant used is of a substantial volume and will offer some fire resistance into the panel system, however, a period of time cannot be determined. Furthermore, it was typical for a dry pack to be present which is expected to aid in preventing fire re-entry into the building.

The risk of a fire breaking into this cavity is also significantly reduced due to the mineral wool insulation included in the over cladding system.

Therefore, although there is potentially combustible insulation in the LPS, it is not likely to contribute to uncontrolled fire spread and based on the justification in Section 3 of this report, the risk has been acknowledged but omitted from the external wall assessment.

Cavity barriers

Based on the contractor's knowledge of the building the re-clad occurred in the mid-late 90's, it is likely that the cladding system would be designed to Approved Document B: 1992 (ADB). Section 9 of ADB 1992 requires that cavity barriers should be provided at compartment floors and walls, the period of fire resistance which should be achieved by products are:

- Cavity barrier – 30 minutes integrity and 15 minutes insulation; and
- Fire barrier (i.e. fire stopping) – the integrity and insulation time should be the same as the fire resistance time for the compartment it serves in line with compartment floors only evidenced by Diagram 27 and Table 13

Diagram 27 and Table 13 of ADB: 1992 provide the guidance requirements for the placement of cavity barriers. Diagrams 39 and 40 below show the requirements at the time of construction, and that no cavity barriers are required around openings.

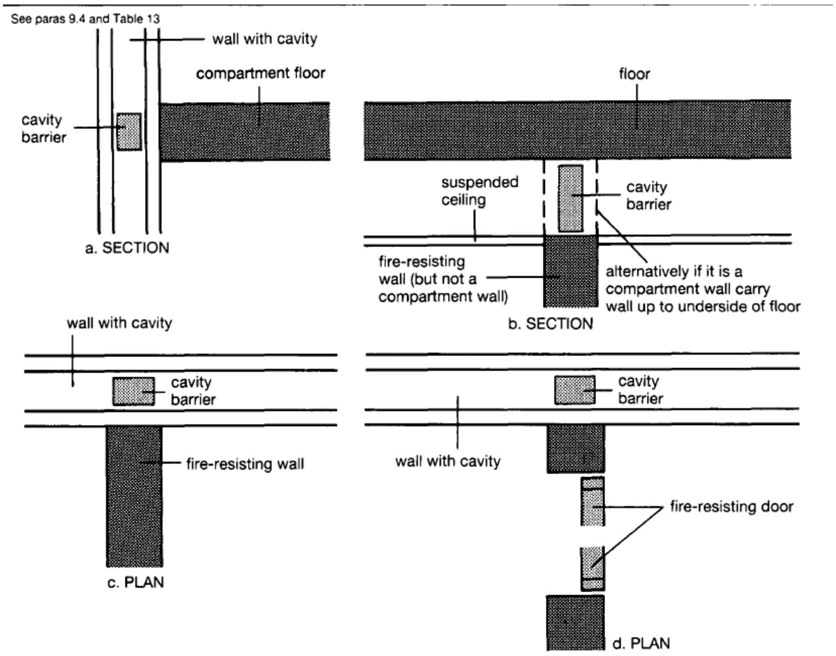

Figure 41. Diagram 27 ADB1992

B3

Openings in cavity barriers

9.14 Any openings in a cavity barrier should be limited to those for:

a. doors which have at least 30 minutes fire resistance (see Appendix B, Table B1, item 8(a)) and are fitted in accordance with the provisions of Appendix B;

b. the passage of pipes which meet the provisions in Section 10;

c. the passage of cables or conduits containing one or more cables;

d. openings fitted with a suitably mounted automatic fire shutter; and

e. ducts which (unless they are fire-resisting) are fitted with a suitably mounted automatic fire shutter where they pass through the cavity barrier.

Table 13 **Provision of cavity barriers**

Cavity barriers to be provided:	Purpose group to which the provision applies(3)			
	1b & c dwelling houses	1a Flat or maisonette	2 Other residential and institutional	3-7 Office, shop & commercial, assembly & recreation, industrial, storage & other non-residential
1. At the junction between an external cavity wall, which does not comply with Diagram 28, and a compartment wall that separates buildings; and at the top of such an external cavity wall.	x	x	x	x
2. Above the enclosures to a protected stairway in a house of three or more storeys (see Diagram 29a). (1)	x	-	-	-
3. At the junction between an external cavity wall which does not comply with Diagram 28, and every compartment floor and compartment wall.	-	x	x	x
4. At the junction between a cavity wall which does not comply with Diagram 28 and every compartment floor, compartment wall, or other wall or door assembly which forms a fire resisting barrier.	-	x	x	x
5. In a protected escape route, above any fire resisting construction which is not carried full storey height, or (in the case of a top storey) to the underside of the roof covering.(1)	-	x	x	x
6. Above any bedroom partitions which are not carried full storey height, or (in the case of the top storey) to the underside of the roof covering.(1)	-	-	x	-
7. Above any corridor enclosures which are not carried full storey height, or (in the case of the top storey) to the underside of the roof covering, where the corridor (which is not a protected corridor) should be sub-divided to prevent fire or smoke affecting two alternative escape routes simultaneously (see paragraph 3.21 & Diagram 30).(2)	-	-	x	x
8. To sub-divide any cavity (including any roof space) so that the distance between cavity barriers does not exceed the dimensions given in Table 14.	-	-	x	x
9. Within the void behind the external face of rainscreen cladding at every floor level, and on the line of compartment walls abutting the external wall, of buildings which have a floor more than 20m above ground level.	-	x	x	-

Key x provision applies
- provision does not apply

Notes
1. The provisions in items 2,5 and 6 do not apply where the cavity is enclosed on the lower side by a fire resisting ceiling (as shown in Diagram 31) which extends throughout the building, compartment or separated part.

2. The provision of item 7 does not apply where the storey is sub-divided by fire resisting construction carried full storey height and passing through the line of sub-division of the corridor (see Diagram 30), or where the cavity is enclosed on the lower side as described in Note 1.

3. The classification of purpose groups is set out in Appendix D, Table D1.

Internal fire spread (structure) Approved Document
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Figure 42. Table 13 - ADB1992

Cavity barriers should be provided in the outer cavity in line with all compartment walls and floors based on the guidance at the time of construction. The outer cavity is considered to exist between the RC/brick substrate and the rear of the Aluminium cassette panel.

Double skin masonry systems

Cavity barriers can be omitted from certain types of construction such as construction comprising two leaves of masonry >75mm thick. The reason for this is due to the robustness offered by the masonry. This exemption is not relevant to the re-clad element of the building, it would only be applicable to the existing structure.

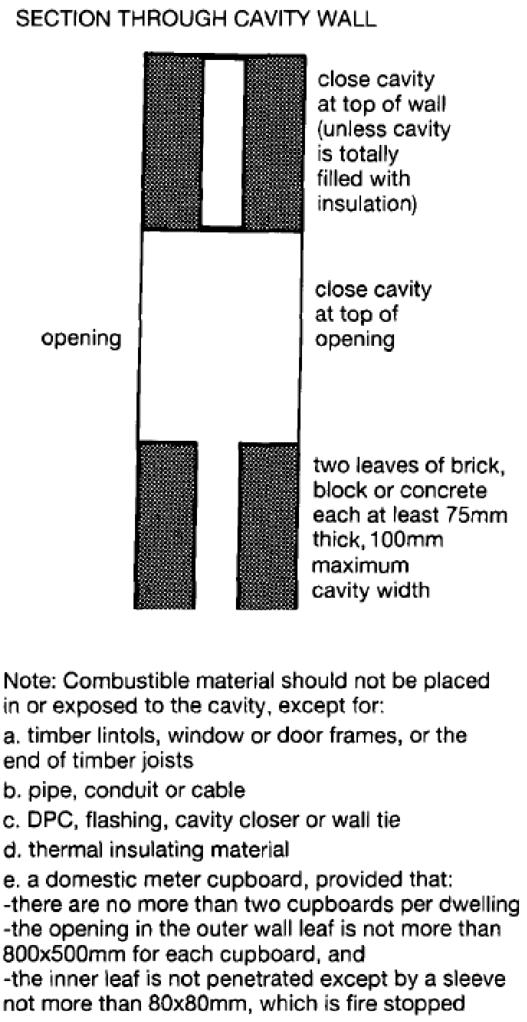

Figure 43. Diagram 28 – ADB 1992

It should be noted that all other construction types require cavity barriers to be fitted. Furthermore, any cavity existing outside of the masonry cavity will also require barriers.

8.3 System Analysis

System 1: Aluminium panel with mineral wool insulation

System 1 was the predominant cladding system on the building and comprised of the materials in the table below. It should be noted that this is from the original substrate outwards and behind the LPS was not reviewed.

Material	Combustibility	Volume	Comments
100mm concrete / masonry	Euroclass A1 to BS EN 13501-1	All locations	Due to the non-combustibility BB7 consider that this item is low risk in terms of uncontrolled fire spread. Please note that there is likely a thin EPS insulant between two >100mm layers of RC in the structure which is Euroclass E. Due to the encapsulation of this layer and the protection offered by the mineral wool this layer has been discounted as it is very unlikely to contribute to fire.
100mm mineral wool insulation	Typically, Euroclass A1 /A2 to BS EN 13501-1	All locations	Non-combustible, low risk of fire spread in the cavity.
60-70mm clear cavity	N/A	All locations	No combustible components.
100-110mm reinforced mineral wool cavity barrier	Typically, Euroclass A1 /A2 to BS EN 13501-1	Compartment floors, party walls	Locations of cavity barriers not strictly in accordance with ADB, however, generally adequate provision
5mm Solid aluminium cassette panel fixed to aluminium railing	Typically, Euroclass A1/A2 to BS EN 13501-1	All locations	Due to the non-combustibility BB7 consider that this item is low risk in terms of uncontrolled fire spread.

Behind the solid aluminium cassette panel was a 60-70mm cavity and 110mm mineral wool insulation mechanically fixed to the concrete panel system. In the majority of cases, the mineral wool insulation was tightly fitted and abutted. Any gaps between the insulation were kept to a minimum and generally the installation was considered adequate. The non-combustible insulation is considered to reduce the possibility of uncontrolled fire spread.

Cavity barriers were typically found at compartment floors. There were some at vents (kitchen extract) and they were also not provided around window openings and, due to the rail system, they were not continuous horizontally at floor level.

Where the cavity barriers were present, they were reinforced with wire (typical) and where they were folded over, they were compression fixed on top of the insulation (i.e. it was not broken), however, as the insultation is non-combustible, this is considered to be adequate as it is unlikely that a fire could flank the barrier and spread on the façade. Both materials are non-combustible and unlikely to contribute to fire spread. Although the cavity barrier does not go back to the substrate, the risk is considered to be low as the insulation is also non-combustible and is unlikely to degrade during fire exposure.

Although the full Aluminium panel around the kitchen vent could not be removed, the small vent panel was removed and, in most of the locations reviewed, it was identified that adequate cavity barriers were around the ductwork from the kitchen extract in most locations and only a few did not have cavity barrier protection.

There were no cavity barriers around the flat windows, however, if a fire were to break out of a window, then it is unlikely to rapidly spread through the cavity and up the building due to the lack of combustible materials and the flame front will not have a substrate to continue the fire spread. Furthermore, when fitted properly the fire spread will be inhibited by the horizontal cavity barriers at floor level. It was found in numerous locations that the cavity barriers were not fitted under compression meaning that there is potential for fire to bypass the cavity barriers. Whilst this would be considered to be low risk if limited instances were found, on this building BB7 did not find evidence of compartment floor barriers being folded and fully filling the cavity to the rear of the cassette panels. On that basis BB7 recommend that the cavity barriers are upgraded to ensure that they will inhibit the unseen spread of fire and smoke. This can be done in one of two ways:

1. Fold the existing barriers such that they are under compression; or
2. Provide new barriers.
3. BB7 would be satisfied with either option and would consider that the requirement of the Building Regulations to inhibit the unseen spread of fire and smoke in concealed spaces would be achieved.

It can be seen in location 3 of the survey findings that there is a continuous strip of large aluminium panels stretch the height of the building. This could not be reviewed at an area between two flats so it could not be determined if there were vertical cavity barriers at party / compartment walls.

Fixing brackets located at the ends of cladding panels are not considered to present a significant concern. Primarily because the 'C' shape of the bracket is open to external air and the rails sit against the insulation. However, the fixing brackets that are located centrally of wider panels between windows are of greater concern, as they would allow fire and smoke to bypass the horizontal cavity barriers. The brackets are 100mm wide and pass through the horizontal cavity barriers, meaning that the barriers are not continuous. The risk of this is considered to be low as the gap is small. It is also more likely that fire will spread from one dwelling to another externally, rather than through this gap in the cavity barrier, especially considering the channel in the bracket is isolated. The bracket is solid aluminium and there is no combustible insulation to potentially fuel fire spread. Furthermore, the flats are sprinklered which is likely to reduce the potential fire size and spread.

PD 7974 recognises the benefits sprinklers and states that they are likely to reduce the potential fire size and spread, along with limiting compartment temperatures to approximately 100°C (CIBSE Guide E, Section 6.6.4). The reduction in severity of a fire within the flat will be substantially less than a flashover fire and, ultimately, the severity of a fire on the façade, if it spreads that far, will also be reduced.

System 2: Extension system

The system present on the refuse chute/lobby section of the building is very similar to the system present on the building with the exception of the substrate. Whilst cementitious particle boards are Euroclass B combustible materials they contribute very little to fire spread generally. BS8414 testing with combustible insulants show that the temperatures at the sheathing board layer are normally low and in the region of room temperature. BB7's recommendations for this system are the same as that for the main system in that cavity barriers should be compression fitted to prevent the unseen spread of fire and smoke.

System 3: Render system

System 3 formed the ground floor elevations around the building and the cladding system is comprised of the materials in the table below. It should be noted that this is from the original substrate outwards and behind the LPS was not reviewed.

<table>
<tr><th>Material</th><th>Combustibility</th><th>Volume</th><th>Comments</th><th>Recommendations</th></tr>
<tr><td>100mm concrete / masonry</td><td>Euroclass A1 to BS EN 13501-1</td><td>All locations</td><td>Due to the non-combustibility BB7 consider that this item is low risk in terms of uncontrolled fire spread. Please note that there is likely a thin EPS insulant between two >100mm layers of RC in the structure which is Euroclass E. Due to the encapsulation of this layer and the protection offered by the mineral wool this layer has been discounted as it is very unlikely to contribute to fire.</td><td rowspan="2">Combustible render systems should be replaced with a non-combustible system.</td></tr>
<tr><td>100mm thermo plastic insulation with 3-5mm render</td><td>Typically, Euroclass E - F to BS EN 13501-1</td><td>All locations</td><td>Combustible insulation behind render with no break or cavity barrier identified at compartment walls.</td></tr>
</table>

At ground floor, the render system largely consists of combustible insulation material and there was no cavity barrier identified.

It is recommended that the render systems should be replaced with a non-combustible system.

System 4: Infill panel

The system was found on the section of façade forming the opening into the refuse chute room below windows:

Material	Combustibility	Volume	Comments	Recommendations
Thermo plastic infill between two layers of steel.	Typically, Euroclass E - F to BS EN 13501-1	All locations	Combustible thermo plastic sandwiched within two layers of steel between windows. Presumed to be typical on each floor.	All window infill panels are to be replaced for non-combustible alternatives on the common area sections.

The system contains a small amount of combustible insulation within the infill panels and there were no cavity barriers identified.

The risk of a fire within the bin store is significantly less than that from a flat and, when inspected, this area was largely sterile on all levels and provided with ventilation. Therefore, there is unlikely to be uncontrolled fire spread.

Furthermore, there were two side mounted sprinklers within the ground floor bin store and the base of the bin chute was provided with a fire shutter activated by a fusible link.

Therefore, the sprinklers would reduce the size of a potential fire and the shutter would reduce the spread of fire vertically. If a fire were to spread vertically, it would be contained to the bin chute extension as the elevation containing flats is stepped back and it is unlikely that there would be enough combustibles to fuel a fire to spread from this area to the adjacent cavity due to non-combustible elements within wall system 1 & 2.

The bin store is accessed internally by way of two fire doors and ventilation is provided within the bin chute. The fire doors were inspected and appeared to be solid and robust so it is unlikely that the flat/ lobbies would be compromised for residents to escape through.

With regards to the panels on the section of façade connected to the common area serving the protected stair and AOV windows, although this is recessed from the elevation with flats, it is still connected to the area accessed by a single stair, therefore BB7 recommend replacement.

9. Conclusions and recommendations

9.1 Conclusions

BB7 have been appointed to provide an EWS1 form for 1-87 Belgrave Road located in Croydon, South London. This report has outlined BB7's intrusive survey findings, analysis of the external wall systems, and conclusions. BB7 intrusively surveyed the building on 16th March 2021; the survey was conducted by Jonathan Cornelius and Shauna Jameson of BB7.

Due to the recommendations that are to follow, the building will have a B2 designation on the EWS1 certificates that will be issued in conjunction with this report.

This report and EWS1 forms issued are valid for a period not exceeding five years.

9.2 Recommendations

BB7 make the following interim and long-term recommendations regarding the building:

Interim recommendations

The B2 designation is based on there being combustible materials present in the infill panels on the façade connected to the stair core. Furthermore, cavity barriers are required to the extension section of the building and works are required to the barriers on the main cladding system.

The B2 designation does not, however, mean that the buildings evacuation strategy needs to change, it just means that we consider remedial works are necessary to bring the external walls up to a point where they need to be for the purposes of the form and government advice.

The coverage of the render system is only on the ground floor and then it is a different system above consisting of aluminium panels, non-combustible insulation and reinforced cavity barriers which are likely to inhibit the unseen spread of fire and smoke in concealed spaces on the floors above ground. Lateral fire spread is much less critical than vertical fire spread.

The risk of the combustible material is generally considered to be low as it is contained to the ground floor and would require a fire source from a flat window. However, the flats are provided with sprinkler protection which is considered to significantly lower the severity of a fire and reduce the risk of a fire actually breaking onto the façade. Furthermore, it is unlikely that a fire will spread due to the non-combustible materials on the remainder of the façade.

The risk of a fire spreading from the ground floor bin store is reduced due to the provision of a sprinkler head and a fusible link damper which will limit the size and spread of fire and prevent a fire from reaching the infill panels.

As such, the risk is considered to be low, however, there is still a risk present to warrant remedial works.

Section 11 of the Governments Consolidated Advice Note provides guidance on this issue. As per this report the building is generally well managed but there are actions on the FRAs which should be actioned, if not done so already.

There are a number of factors which can be considered:

1. Although the building is slightly more than 30m, it is provided with a sprinkler system which can reduce the severity of a fire within a flat.
2. Fire Service access to the building is generally good to the permitter and the Fire Service would not experience an undue delay in getting water onto a façade fire at low level.

However, a high reach appliance would struggle to reach the full elevations. Furthermore, the response time for high reach appliances in London is likely to be delayed and, as such, they cannot be relied upon. A report produced by London Fire Bridge (LFB) 'Fire Facts Incident Response Times 2020' highlights first and second appliance average response times for 2020. They are 5.03 mins and 6.14 mins, respectively.

3. The outer face is solid Aluminium and the insulation is non-combustible mineral wool throughout the main external wall system. This is unlikely to significantly add to fire spread up the external wall.
4. The cavity barriers are generally adequate from the inspection locations and are in locations which are broadly in line with the requirements of ADB. Where not compressed they still reduce the cavity width and will slow down the progression of fire spread.

On the basis of the above, BB7 suggest there is no immediate need to change the current escape However, there are some things that should be actioned to do to ensure occupant safety:

- All action points on the FRA's will need to be actioned and closed.
- Residents should be informed of their responsibilities in terms of fire safety.
- Risers in the lobby and stair should be reviewed to ensure fire and smoke spread is limited into the escape routes.
- The local FRS will need to be informed.

Long term recommendations

BB7 make the following recommendations:

- The render systems should be replaced with a non-combustible system.
- Cavity barriers should be provided were missing at compartment lines, or be remediated such that they are under compression where they are not currently.
- The fusible link on the damper serving the bin chute should be serviced regularly.
- The infill panels on the bin chute elevation should be replaced for a non-combustible alternative.
- All points raised on the Fire Risk Assessment should be adhered to.

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