EWS1 Report

1-44 Bramley Hill

30th April 2021

Croydon Borough Council

12125BB

Revision History

Version	Date	Author	Comments
01	30/04/2021	Thomas Bradford	Initial issue to client

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BB7

Contents

1. Introduction

BB7 have been appointed to conduct an intrusive survey and provide a comprehensive report forming an EWS1 assessment for 1-44 Bramley Hill, Croydon.

This report outlines BB7's intrusive survey findings, analysis of the external wall systems, and conclusions. BB7 intrusively surveyed the building on 18th March 2021; the survey was conducted by Thomas Bradford.

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

Figure 1. 1-44 Bramley Hill, showing original external 'LPS' walls, photo circa 1985.

Figure 2. 1-44 Bramley Hill, showing current overclad external walls.

This document and the associated EWS1 form are only applicable to 1-44 Bramley Hill. 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 Engineering.

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

1-44 Bramley Hill contains forty-four dwellings in general needs use. The building has thirteen storeys in total, consisting of eleven residential storeys including ground-floor level, a top floor consisting of plant and a lower-ground storey also consisting of plant. The top floor was a roof that has now been enclosed by the cladding system. The building is served by a single stair core.

Flats are separated from the staircase on all floors by a single ventilated lobby where travel distance is within 7.5m from the flat entrance doors to the door to the staircase. The ground-floor lobby does not appear to be provided with any provision for smoke control. A permanent vent is located at the head of the staircase. Smoke control afforded to communal lobbies consists of actuators fitted to windows, which form automatic opening vents (AOVs). Associated automatic fire detection is located within lobbies to activate the AOVs.

The single staircase descends to ground and lower-ground floor level. Escape from the ground-floor level is signed through the ground-floor lobby, past flat entrance doors, which is not an appropriate provision. It is believed that the original design of the premises incorporated means of escape via the lower-ground floor level via a protected route to a final exit door.

A bin chute serves all residential storeys, accessed directly within lobbies. The bin chute descends into the bin store room at ground-floor level where it is separated from the store by a heat activated fusible-link fire shutter. The bin store is accessed directly from external air via a door on the east façade.

Residential dwellings are provided with sprinkler suppression. It is acknowledged that it has not been confirmed if sprinkler suppression has been installed within every single dwelling. Sprinkler suppression is also installed within the bin storeroom, this consists of a single head near to the chute which is a branch off of the main sprinkler system. The sprinkler suppression system has an autodialler that contacts a remote receiving centre on activation.

Two fireman's lifts are provided. A dry rising main outlet is installed within lobbies on even numbered floor levels.

The building was originally constructed in 1965 and the original construction was a large panel system. This style of construction is noted in Section 3 of this report.

The fire and rescue service has good high-reach access to three of the four facades via public highway and a private sub-surface car park with fire service access provisions.

Since the building was constructed, the façade from first to roof level has been overclad with an aluminium cassette panel system. Mineral wool insulation has been fixed directly onto the original external walls. A ventilated cavity exists between the insulation and the aluminium cassette panels. It is understood that the aluminium cladding was installed in the late 1990s.

UPVC double glazing was installed as part of the cladding installation in the 1990s. This included metal composite material spandrel panels with a thermoplastic infill located below windows forming external walls to the communal lobbies.

At ground-floor level the external walls are of a different construction. The existing large panel system walls have been overclad with a

BB7 have been provided with the most recent fire risk assessment report for 1-44 Bramley Hill. The report indicates that it is a Type 4 FRA, conducted on 4th November 2019 by Ridge and Partners LLP. This report will be discussed in more detail in Section 6.8.

Figure 3 shows an aerial view of the building demonstrating the location of the building and fire service access highlighted in green;

Figure 3. Aerial view of 1-44 Bramley Hill.

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 infamous by the Ronan Point collapse in May 1968 following a gas explosion. LPS buildings can be designed to be up to twenty-four storeys in height, but 1-44 Bramley Hill 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 1-44 Bramley Hill was constructed by Wates in the 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.

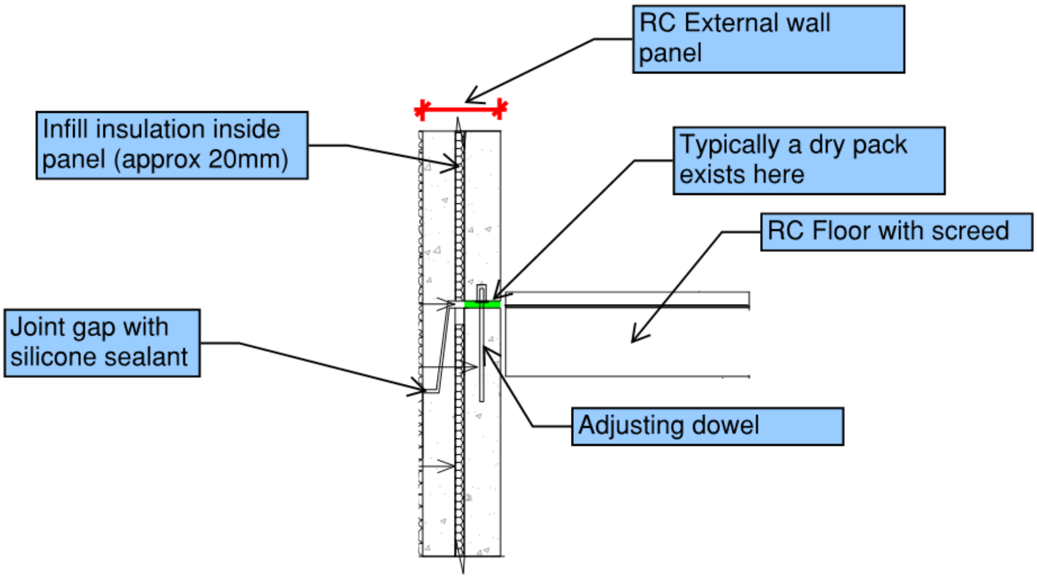


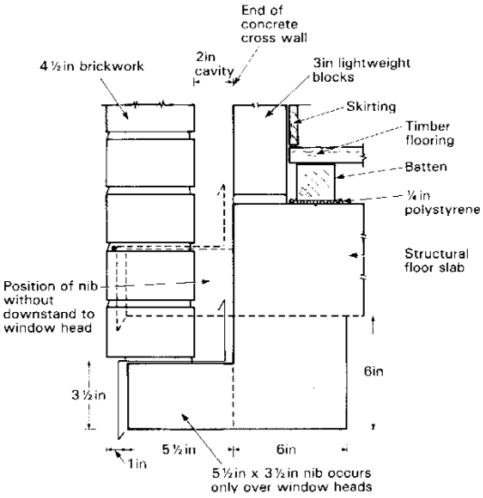
Figure 5. Typical composition of external walls

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 reinforced concrete 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 fire resistance 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 a reinforced concrete upstand/downstand. The residual cavity formed is similar to that shown in Figure 7.



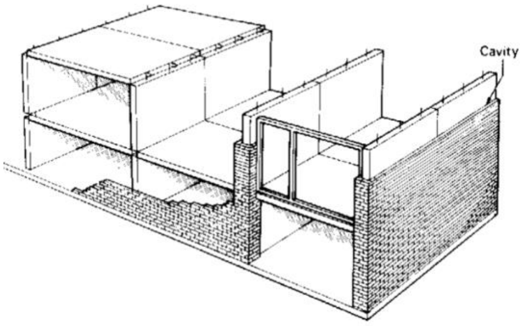


Figure 6. Typical brick on RC downstand

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 brickwork from the risk assessment, however, the presence will still be acknowledged.

4. Assumptions, scope & liabilities

4.1 Scope

This report is based on the information provided by Croydon London 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 building 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 London Borough Council in relation to the building 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 the site survey.

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 within this scope as it is over 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.

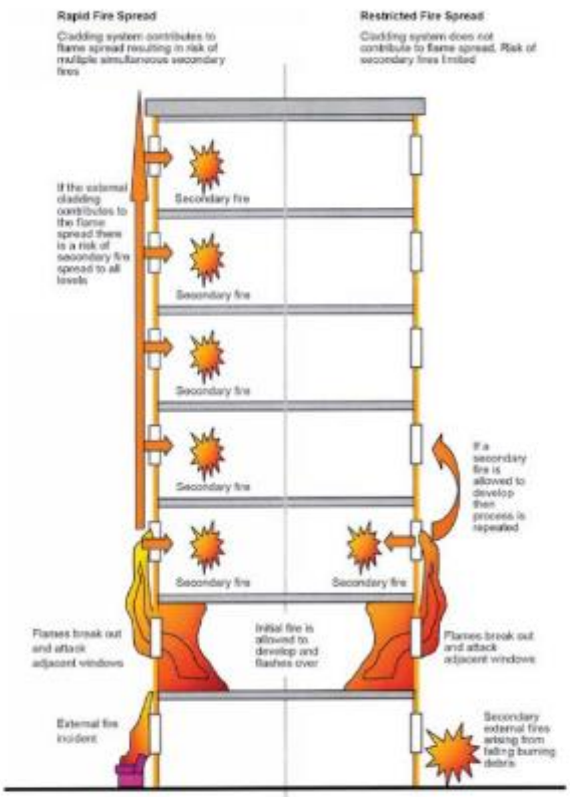


Figure 8. Mechanism for fire spread

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 7: External wall analysis.

6. Survey findings

6.1 Survey

BB7 intrusively surveyed the building on 18th March 2021. The survey was conducted by Thomas Bradford. 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 five locations across the building.

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.

It was not possible to inspect kitchen extract ductwork that penetrates the external wall system. This is because they were located in panels that were in internal 90 degree wall returns. It was not possible to remove cladding panels located in internal 90 degree wall returns. On all other buildings inspected for Croydon Council, with the same cladding, it was found that the kitchen extract ductwork is not provided with cavity barriers where they pass through the cavity behind the aluminium cladding. It is reasonable to assume that this would also be the case for 1-44 Bramley Hill.

6.2 Location 1

Location 1 is located on the north elevation, facing Bramley Hill. The overclad external wall system was investigated here.

The system was found to be:

- 5mm solid aluminium cassette panel attached to aluminium rail system.
- 100mm horizontal (floor level) 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.
- 130mm solid concrete. A hole was drilled through the concrete to determine the thickness, however, it could not be further determined what was behind the concrete without potentially compromising the integrity of the structure and causing damage internally. Based on the style of construction the LPS panel would be substantially larger than 110mm. Please refer to Section 3 for further details.

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

Figure 9. Location 1 areas inspected.

Location 1.1

Location 1.1 was at the second-floor level where the cavity barrier between the first and second-floor level was identified. A horizontal cavity barrier was found in this location. The cavity barrier was found to abut the cladding support bracket.

Figure 10. Location 1.1 horizontal cavity barrier with mechanical fixings.

Figure 11. Location 1.1 cavity between the insulation and aluminium panel.

Location 1.2

Location 1.2 was at the third-floor level where the cavity barrier between the second and third-floor level was identified. A horizontal cavity barrier was found in this location. The cavity barrier was found to abut the cladding support bracket.

Location 1.3

Location 1.3 was also at the second-floor level where the cavity barrier between the first and second-floor level was identified. A horizontal cavity barrier was found in this location. The cavity barrier was found to abut the cladding support bracket.

Cavity barriers at locations 1.1, 1.2 and 1.3 were found to consist of mineral wool, reinforced with wire, fixed to the underlying mineral wool insulation with metal fixings. One edge of the mineral wool cavity barrier is folded over so that it compresses onto the aluminium cladding to fill the full width of the cavity. One edge of the cavity barriers is folded over to achieve the compression. Cavity barriers should be fully folded, but only a lip has been folded over, or an edge. This is considered to be suitable because good compression is achieved and the barrier creates a good seal. It is considered that the cavity barriers folded like this would be effective in reducing the migration of fire and smoke.

6.3 Location 2

Location 2 is located in the recess on the north elevation at ground-floor level, facing Bramley Hill. The ground-floor level consists of a rendered wall system.

The system was found to be:

- 10mm render.
- 135mm polyurethane insulating foam.
- 130mm solid concrete. A hole was drilled through the concrete to determine the thickness, however, it could not be further determined what was behind the concrete without potentially compromising the integrity of the structure and causing damage internally. Please refer to Section 3 for further details.

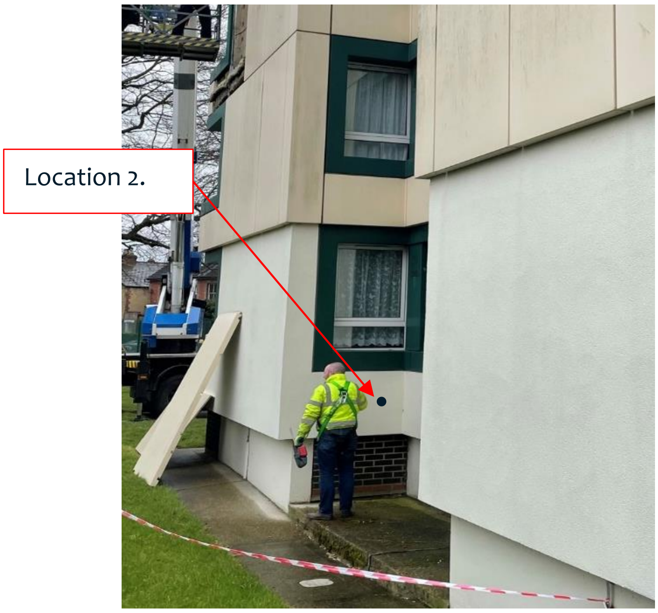


Figure 12. Location 2.

Location 2 was at the ground-floor level, investigating the make-up of the rendered system covering the ground-floor level. The aluminium cladding covers first-floor level and above. It is considered that the polyurethane foam is combustible.

Figure 13. Location 2 – Render removed.

Figure 14. Location 2 – Polyurethane foam and measurement.

6.4 Location 3

Location 3 is located on the east elevation, facing Dering Road. The overclad external wall system was investigated here.

The system was found to be:

- 5mm solid aluminium cassette panel attached to aluminium rail system.
- 100mm horizontal (floor level) 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.
- 130mm solid concrete. A hole was drilled through the concrete to determine the thickness, however, it could not be further determined what was behind the concrete without potentially compromising the integrity of the structure and causing damage internally. Based on the style of construction the LPS panel would be substantially larger than 110mm. Please refer to Section 3 for further details.

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

Figure 15. Location 1 areas inspected.

Location 3.1

Location 3.1 was at the compartment floor junction between first and second-floor level where the cavity barrier between the first and second-floor level was identified. This location included an inspection around a first-floor window opening.

No cavity barriers were identified around the window opening. This is consistent with the design guidance contained within Approved Document B 1992 that was current at the time the cladding and UPVC windows were installed. Window frames appear to have been installed without their original structural openings and have not been installed to suit the cavity created by the cladding.

A silicon/rubber expansion joint was also evident in this location between the reinforced concrete compartment floor and the LPS above. It is not considered that the silicon/rubber expansion joint seal will contribute to significant fire spread.

Figure 16. Location 3.1 – no cavity barriers provided around window openings.

Figure 17. Location 3.1 – grey silicon/rubber expansion joint between the concrete compartment floor and the LPS panels.

Location 3.2

Location 3.2 was at the third-floor level where the cavity barrier between the second and third-floor level was identified. The underlying substrate, consisting of large panel system, was drilled to gauge the thickness of the concrete. It was found that the concrete was at least 100mm thick.

Figure 18. Location 3.2 folded cavity barrier.

Figure 19. Location 3.2 - 100mm hole drilled in concrete

Location 3.3

Location 3.3. was also at third-floor level where the cavity barrier between the second and third-floor level was identified.

Consistent with location 1, cavity barriers were found to consist of mineral wool, reinforced with wire, fixed to the underlying mineral wool insulation with metal fixings. One edge of the mineral wool cavity barrier is folded over so that it compresses onto the aluminium cladding to fill the full width of the cavity.

Within all three locations an aluminium bracket passes through the cavity barrier. The bracket is 100mm thick and the aluminium cladding panels fix onto it. The bracket is fixed to the underlying substrate. There is little concern that the brackets break the cavity barriers because the recessed opening in the brackets, where the cladding fixes into, is open to external air. There are also some brackets that are hidden behind panels that provide a central fixing for wider cladding panels. These are typically located below and above windows. The fixing bracket is hidden completely, so is not open to the atmosphere. This means that the cavity barrier is broken where the fixing bracket passes through it.

Figure 20. Location 3.1 - 100mm break in cavity barrier for an aluminium bracket.

Figure 21. Location 3.3 - 100mm break in cavity barrier for an aluminium bracket. This bracket is hidden behind wider cladding panels, providing an additional fixing point for the panels.

6.5 Location 4

Location 4 was located on the south elevation, facing the building's resident parking area. The overclad external wall system was investigated here at the line of the compartment floor between first and second-floor level, and at the line of the vertical party wall between two flats.

The system was found to be:

- 5mm solid aluminium cassette panel attached to aluminium rail system.
- 100mm horizontal (floor level) 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.
- 130mm solid concrete. A hole was drilled through the concrete to determine the thickness, however, it could not be further determined what was behind the concrete without potentially compromising the integrity of the structure and causing damage internally. Based on the style of construction the LPS panel would be substantially larger than 110mm. Please refer to Section 3 for further details.

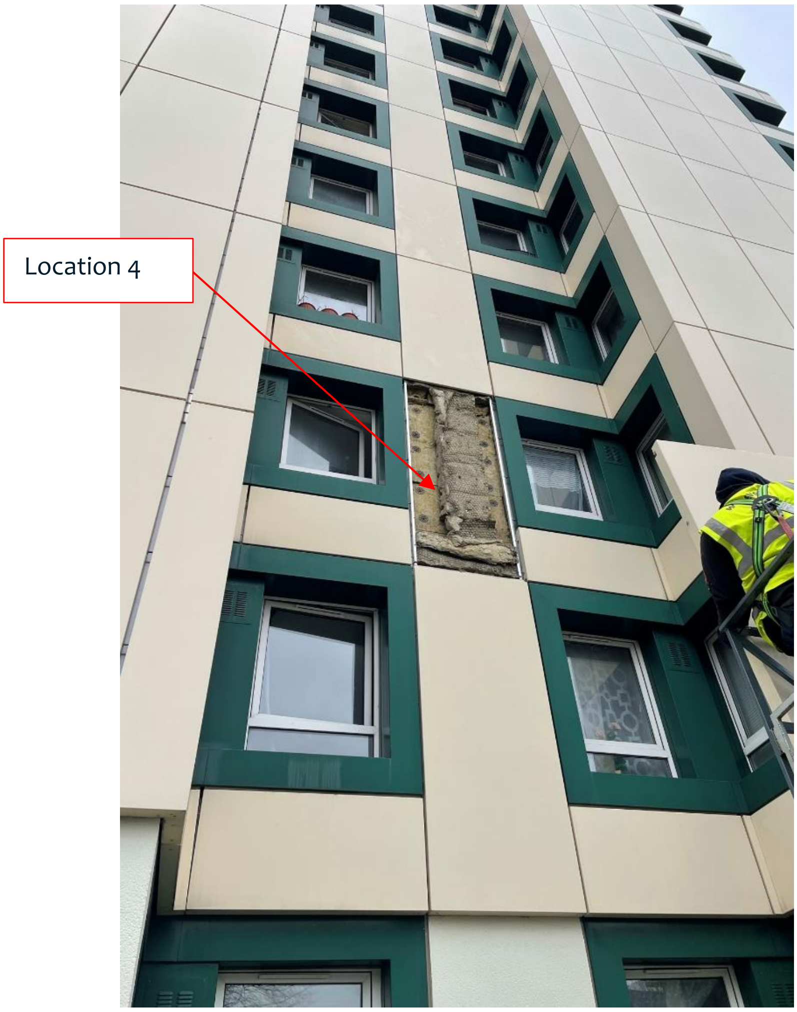


Figure 22. Location 4 inspected.

Location 4

Location 4 was at the second-floor level where the cavity barrier between the first and second-floor level was identified. The cavity barrier on the line of the compartment party wall was also identified.

The vertical cavity barrier consists of the same mineral wool reinforced with wire. However in this location, as shown in figure 23 below, the cavity barrier is not folded along a section of it. This means that the cavity barrier would not fit compressed against the aluminium cladding panel, leaving a gap for fire and smoke to spread horizontally within the cavity. The risk is considered to be tolerable considering that it is only the vertical cavity barrier and the critical direction is vertically and not laterally. Horizontal cavity barriers were found to be compressed, meaning that any fire/smoke spread would be restricted to the cavity of the adjacent flat only and not flats above.

The intersection between the cavity barriers appeared to be suitable. The intersection between the cladding support rails and the cavity barriers also appeared to be suitable.

Figure 23. Location 4 – The vertical cavity barrier is not folded in the area highlighted.

6.6 Location 5

Location 5 is located internally of the building at first-floor level within the communal lobby. The infill panel below a glazed window was opened up to identify its construction. 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 ground-floor level consists of a rendered wall system.

Figure 24. Location 5 – infill panel below glazed window.

Figure 25. Location 5 – hole drilled and an unknown thermoplastic identified within the panel.

Infill panels are located below glazing on external walls in the lobbies at each floor level on the west and east façade only. All infill panels appear to be the same and are consistent to those found on other similar Croydon owned buildings.

6.7 Internal Survey

The communal areas in 1-44 Bramley House were reviewed internally on a selection of typical floor levels.

The block is served by a single stair and there were four flats per upper floor level. The stair is provided with a permanent vent at the head (estimated as 1.5m²).

The single staircase descends to ground and lower-ground floor level. Escape from the ground-floor level is signed through the ground-floor lobby, past flat entrance doors, which is not suitable. It is believed that the original design of the premises incorporated means of escape via the lower-ground floor level via a protected route to a final exit door. It is recommended that the original design of the escape route is reinstated whereby occupants are directed through the lower-ground floor level to external air. Or at least as a viable alternative.

Flats are separated from the staircase on all floors by a single ventilated lobby where travel distance is within 7.5m from the flat entrance doors to the door to the staircase. The ground-floor lobby does not appear to be provided with any provision for smoke control. A permanent vent is located at the head of the staircase. Smoke control afforded to communal lobbies consists of actuators fitted to windows, which form automatic opening vents (AOVs). Associated automatic fire detection is located within lobbies to activate the AOVs. It should be ensured that the ground-floor lobby is afforded smoke control like upper floor levels.

Service riser cupboards were located in the lobbies. A concrete compartment floor is located within the cupboards at each floor level. Riser cupboards contained electrical cables and a drainage pipe, which present little risk to the communal area. The sprinkler stop valve was noted in the lobby of the building, there was no tank identified, it is possible that the system is mains fed of a sprinkler tank is located at lower-ground or roof level. The sprinkler suppression system has an autodialler that contacts a remote receiving centre on activation.

The bin store is accessed directly from external air via a door on the east façade. A bin chute serves all residential storeys, accessed directly within lobbies. The bin chute descends into the bin storeroom at ground-floor level where it is separated from the store by a heat activated fusible-link fire shutter. Unfortunately, at the time of the survey the fusible link had broken and the shutter was fixed open by rope. The fusible link should be replaced, and the rope removed.

Figure 26. Bin store automatic shutter – fixed open with rope.

A dry rising main outlet is installed within lobbies on even numbered floor levels.

6.8 Fire Risk Assessment

The following information has been provided:

- Fire Risk Assessment (RB-IZE55X) - Assessed 2019-11-04 - For Bramley Hill (1-44) (RB-TRWIQL)

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.

Ridge & Partners LLP

A Type 4 FRA dated 4th November 2019 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 27. Fire Risk Rating from Ridge & Partners LLP FRA

This rating was based on the assessment findings which were generally related to compartmentation and fire stopping issues. lobby, and there were issues with compartmentation and fire stopping identified. One particular concern is the lack of separation within the shaft forming the dry riser shaft.

Summary

There are high-risk items detailed in the FRA and these should be actioned to reduce the risk. The action plans were extensive and all action points should be completed.

The FRA failed to identify the possible lack of provision for smoke control at ground-floor level and the inadequate means of escape route, where occupants are directed out of the building via the ground-floor lobby. Occupants should be directed to lower-ground floor level as per the original design. However, it was not part of the scope of this external wall survey to review in detail the fire safety precautions internally of the building.

Until the FRA findings are actioned, 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 28. Site Plan

The building is bounded on two sides by Bramley Hill and Dering Road. The other two sides are bound by the boundaries of adjacent properties.

This is considered to provide good high-reach fire service access within sufficient proximity to three of the four elevations of the building. Although it is unlikely that a high-reach appliance will be immediately dispatched, initial access will likely be a standard pump appliance, so a fire at high level will be more difficult to tackle.

From the access road, from Bramley Hill, the fire service can reach the front within 18m and the car park provides access to the south and east elevations within 18m.

Where access cannot be achieved by an appliance directly to the façade, there is foot access via the grassed area outside, which would enable them to reach the façade and apply water without delay.

Internal Provisions

A dry rising main outlet is installed within lobbies on even numbered floor levels. The dry rising main inlet is located in the lobby on the ground-floor level.

Both lobby and stair are provided with provision for smoke control, however as noted previously, there appears to be a lack of provision for smoke control in the ground-floor lobby.

Two fireman's lifts are provided. The stairs are approx. 1100mm, which is sufficient width for a fire service access.

Sprinkler suppression is installed within dwellings and the bin store room, which is likely to reduce the potential fire size and spread. The sprinkler suppression system has an autodialler that contacts a remote receiving centre on activation. Sprinkler protection is likely to reduce the potential fire size and spread. It is acknowledged that it has not been confirmed if sprinkler suppression has been installed within every single dwelling.

8. Analysis

8.1 Overview

There were four systems present due to the original construction and the overcladding;

1. Original LPS external walls.
2. Aluminium cladding.
3. Composite infill panels under lobby windows.
4. Rendered polyurethane foam at ground-floor level.

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 cladding system was found to be:

- 3-4mm solid aluminium cassette panel attached to aluminium rail system.
- 100mm horizontal (floor level) and vertical (party wall) mineral wool cavity barriers reinforced with wire. The cavity barrier sat on top of the insulation (i.e. did not break the insulation), was under compression and was mechanically fixed in place.
- 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.

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

The existing large panel system (LPS) was not reviewed in any detail as an intrusive survey could damage the integrity of the structure or cause damage internally to the building.

Small holes were drilled from external to establish the thickness of the structure but that was the extent of the review.

LPS construction was a popular method of building high rise flats in the 1960s and 1970s as it was quick to build.

The system is essentially a method of construction in which walls, floors and ceilings, called panels, are produced in factories and then put together on site.

This type of construction is known to cause concern as the structural design is considered to be weak and there are frequently gaps between floor and wall panels. There is considered to be an increased risk if the blocks have gas in them. The annual probability of occurrence of these hazards was found to be very small.

It was noted that there were panels wrapped around the building above the flat windows. This created a gap between the concrete panel of approximately 30mm. In one location, a small amount of EPS was found behind the panel, however, this was not typical.

The risk of the limited amount of combustible insulation is considered to be low due to the robustness offered by the masonry. This is considered to be justifiable based on the following figure which permits combustible insulation within the cavity between two leaves of masonry.

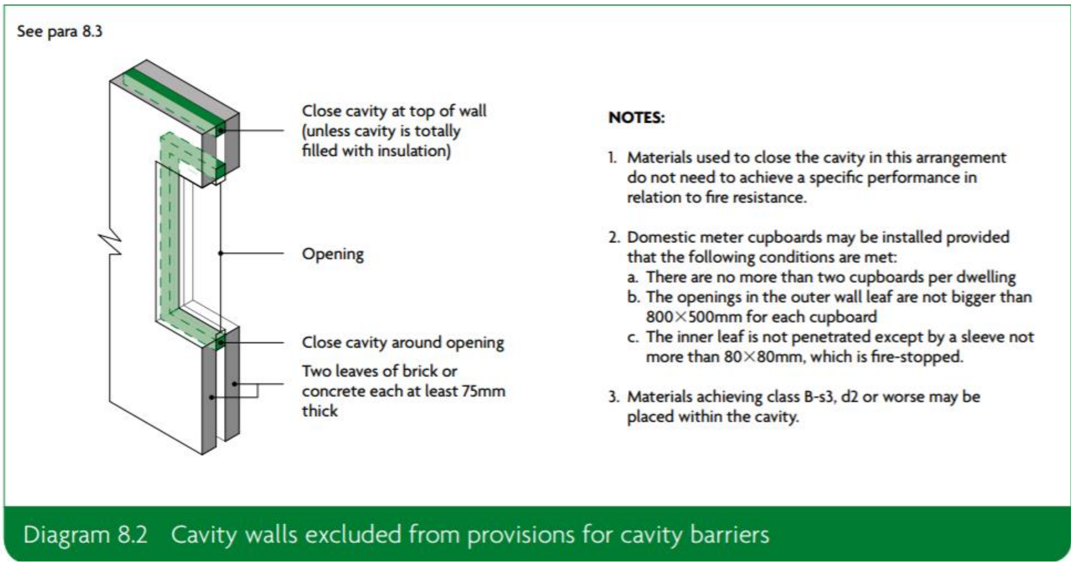


Diagram 8.2 Cavity walls excluded from provisions for cavity barriers

Figure 29. Diagram 8.2 - ADB

Many LPS buildings have been overclad due to inadequate weathertightness and deterioration along with the intent to improve thermal insulation and appearance. This can also create problems if the overcladding system is not installed adequately with appropriate cavity barriers, etc.

Although there was a gap above the window with no fire stopping or cavity barrier, it is not considered to be a route for fire uncontrolled fire spread given that the concrete and insulation is non combustible.

Although there is an inherent risk from this type of construction, it is not considered to contribute to the risk of external fire spread.

Cavity barriers

It is understood that the building was overclad in the 1990s, therefore, the guidance in Approved Document B: 1992 (ADB) has been considered.

Approved Document B: 1992 did not require cavity barriers at the edges of cavities including around openings.

Cavity barriers are not provided at the edges of cavities and around openings such as windows and kitchen extract ducts.

It is appropriate to acknowledge that this requirement changed in 2000. Since 2000 cavity barriers have been required at the edges of cavities including around openings.

The risk of cavity barriers not being provided around window openings and kitchen extract ductwork is considered to be tolerable. This is because of the presence of vertical and horizontal cavity barriers within the ventilated cavity behind the cladding and because all products forming the cladding and insulation are non-combustible.

It is not considered appropriate to install cavity barriers at the edges of cavities, around windows and kitchen extract ductwork because they were not required by Building Regulations when the cladding was installed, and the risk is considered to be tolerable.

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:

System makeup – original LPS walls outwards.			
Material	Combustibility	Volume	Comments
130mm 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.
Large panel system insulant.	Not known. Assumed combustible.	All locations	It is likely that a combustible insulant is present within the large panel system. This would be encapsulated within the concrete panels so is not considered a significant risk.
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 and party walls.	Generally adequate provision, with exception of two issues discussed below.
Solid aluminium cassette panel fixed to aluminium brackets	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 found at compartment floors and party walls. However, they were not provided around window openings and kitchen extract ductwork. Also, due to the fixing brackets, they were not continuous horizontally at floor level.

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. 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.

There was also one issue identified concerning a vertical cavity barrier seen. As shown in figure 23, the cavity barrier is not folded along a section of it. This means that the cavity barrier would not fit compressed against the aluminium cladding panel, leaving a gap for fire and smoke to spread horizontally within the cavity. The risk is considered to be low and tolerable considering that this only relates to the vertical cavity barrier, and lateral fire spread is less critical. Horizontal cavity barriers were found to be compressed, meaning that any fire/smoke spread would be restricted to the cavity of the adjacent flat only and not flats above.

The reinforced mineral wool cavity barriers (typical) 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 because the insulation is unlikely to degrade over time. Both materials are non-combustible and are not expected 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.

There were no cavity barriers located around window openings. If a fire were to break out of a window, it is unlikely to rapidly spread through the cavity and up the building due to the lack of combustible materials within the cavity. The flame front will not have a substrate to continue fire spread, and the spread will be inhibited by the horizontal cavity barriers located at compartment floor levels. The requirement is to inhibit the unseen spread of fire and smoke in concealed spaces, which the barriers at compartment floors achieves.

It is also noted that BS7974 assumes that sprinklers will control a fire and as such the severity on the façade will be substantially less than a full flashover fire.

System 2: Infill panels between lobby windows

System 2 formed part of the external walls to communal lobbies, on the east and west façade of the building. The system is comprised of the materials in the table below:

Material	Combustibility	Volume	Comments
Infill panel with presumed thermoplastic insulation.	Typically Euroclass E - F to BS EN 13501-1	Below glazed windows to the communal lobbies on the east and west façade.	Combustible thermoplastic sandwiched between two thin layers of steel.
UPVC window frames.	Typically Euroclass E - F to BS EN 13501-1	Around glazed windows and infill panels to the communal lobbies on the east and west façade.	Although combustible, there is no restriction on the combustibility of window frames.

The system contains a small amount of combustible insulation within the infill panels. The window frames are broken at each floor level by reinforced concrete compartment floors and upstands. Although only a small amount of combustible insulation may be present within the infill panels, there is a risk of fire spread vertically, so therefore it is recommended that the infill panels are replaced with panels that are non-combustible.

System 3: Rendered insulation

System 3 formed the external walls at ground-floor level. The system is comprised of the materials in the table below:

Material	Combustibility	Volume	Comments
130mm 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.
135mm polyurethane foam	Typically Euroclass E - F to BS EN 13501-1	Ground-floor level.	The removal of polyurethane foam is recommended.
10mm render	Typically, Euroclass A1 /A2 to BS EN 13501-1	Ground-floor level.	The removal of the polyurethane foam will require the removal of the render.

The system contains a 135mm thick layer of combustible polyurethane foam insulation under the render. Due to the combustible nature of the product, it is recommended that the polyurethane foam insulation at ground-floor level is replaced with insulation that is non-combustible.

9. Conclusions and recommendations

8.1 Conclusions

BB7 have been appointed to provide an EWS1 form for 1-44 Bramley Hill 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 18th March 2021; the survey was conducted by Thomas Bradford 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.

8.2 Recommendations

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

8.2.1 Interim recommendations

Although the building has a B2 rating due to the recommendations made, it does not necessarily mean that the building's 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.

Infill panels located to the communal lobbies are generally remote from a source of fire, so it is unlikely that a fire within a dwelling will affect the infill panels. Sprinkler suppression lowers fire severity, which lowers the risk of fire reaching the panels.

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

There are a number of factors which can be considered:

1. Although the building is around 30m in height, the building is provided with sprinkler suppression which can reduce the severity of a fire within a dwelling.
2. Fire service access to the building is generally good, although it may be difficult for high-reach appliances to reach one elevation. All facades are within reach of a hose from a standard pump appliance. The closest fire station is less than half a mile away from the building. In 2019, the average first appliance arrival time and second appliance arrival time for Croydon was 5min 13s and 6min 27s 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.

On the basis of the above, BB7 suggest there is no immediate need to change the existing 'stay put' evacuation strategy. However, there are some things that should be actioned to do to ensure occupant safety:

- The fire risk assessment for the premises should be reviewed considering the new information.

- Residents should be informed of their responsibilities in terms of fire safety.
- The shaft forming the dry rising main should be reviewed to ensure fire and smoke spread is limited into the escape routes.
- The means of escape provisions should be reviewed – occupants should be directed to exit via lower-ground floor level rather than through the ground-floor lobby.
- The means of escape provisions should be reviewed – it should be ensured that adequate provision for smoke control is provided to the ground-floor stair lobby.
- The bin store automatic fire shutter should be repaired.
- The local fire and rescue service will need to be informed.

8.2.2 Long Term recommendations

BB7 make the following recommendations:

- Due to the combustible nature of the product, it is recommended that the polyurethane foam insulation at ground-floor level is replaced with insulation that is non-combustible.
- Infill panels located within the external façade in communal lobbies on the east and west elevations should be replaced with panels that are non-combustible.
- Ensure that all recommendations made within the fire risk assessment are actioned.

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