EWS1 Report

2-56A Regina Road
Croydon

30th April 2021

Croydon London Borough Council

Revision History

Version	Date	Author	Comments
01	30/04/2021	Stuart Morgan	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 the building which forms the development known as 2-56A Regina Road, located in Croydon. This report outlines BB7's intrusive survey findings, analysis of the external wall systems, and conclusions. BB7 intrusively surveyed the building on 11th March 2021; the survey was conducted by David Werran, James Groves and Stuart Morgan of BB7.

The estate covers a large tower block building with a central core of stair and lifts with a secondary stair to access the top two storeys. These tower blocks are purpose-built developments comprising 44 flats in block 2-56A, the block is eleven (G+10) storeys high. The development, broadly speaking, is bounded by Regina Road, and amenity areas.

Figure 1. View of the development

This document and the associated EWS1 form are only applicable to this building. 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 have not 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 development comprises of a large tower block, the images below show the three blocks with an older image showing all blocks before cladding was applied.

Figure 2. 2-56A Regina Road, Croydon

Figure 3. 2-56A Regina Road, Croydon before re-clad (middle tower)

The blocks built circa 1966 is shaped such that it has one central core, with lifts, one of which could be used as a fireman lift based on the override facilities present, and 4 flats per storey accessed from a ventilated lobby. The lobby is separated from the stair by way of a Georgian wire glass partition and a dry fire main on each floor. In addition to this, the stair is fitted with permanent ventilation at the head of the stair core and an AOV at every level with travel distance below 7.5m which appear to be actuated by smoke detectors in the common areas. There is a refuse chute which is situated in the ventilated flat lobby. At the ground floor, there is a fusible link damper and a sprinkler head to the refuse store. The refuse store is accessed directly from fresh air and is ventilated by louvres through the double doors to outside.

The Tower is enclosed on two sides by grass, the cores forming the buildings are G+10 (approx. 30m) storeys in height with a lower ground storage and a plant room area. The lower ground area has a dedicated escape route which is not useable. 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. There are no balconies present on the buildings. A retrospective sprinkler system has been added to the flats in the building.

The fire service has good access to one road elevation of the of the buildings, there is open space green areas to two façades and hardstanding areas to the other facades.

The building is concrete frame (refer to section 3 for more detail), although there are elements of EPS insulated render at the lower level. It appears that these elements which are set back from the building line at ground floor level are later insulation additions. The upper floors have been covered in an aluminium cladding with a mineral wool substrate onto blockwork. Spandrel panels are also found on two elevations. 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.

BB7 have been provided with a Fire Risk Assessment dated November 2019 conducted by Ridge and Partners LLP. There are a number of high-risk items flagged in the report, such as deficiencies in internal compartmentation with regards to fire stopping.

Figure 4 shows an ariel view of the building demonstrating the buildings and the boundary formed by the surrounding greenspace.

Figure 4. Ariel view of the development

3. Relevant legislation and 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".

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 2-56A Regina Road is substantially lower than this.

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.

Figure 5. Ronan point collapse

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 2-56A Regina 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.

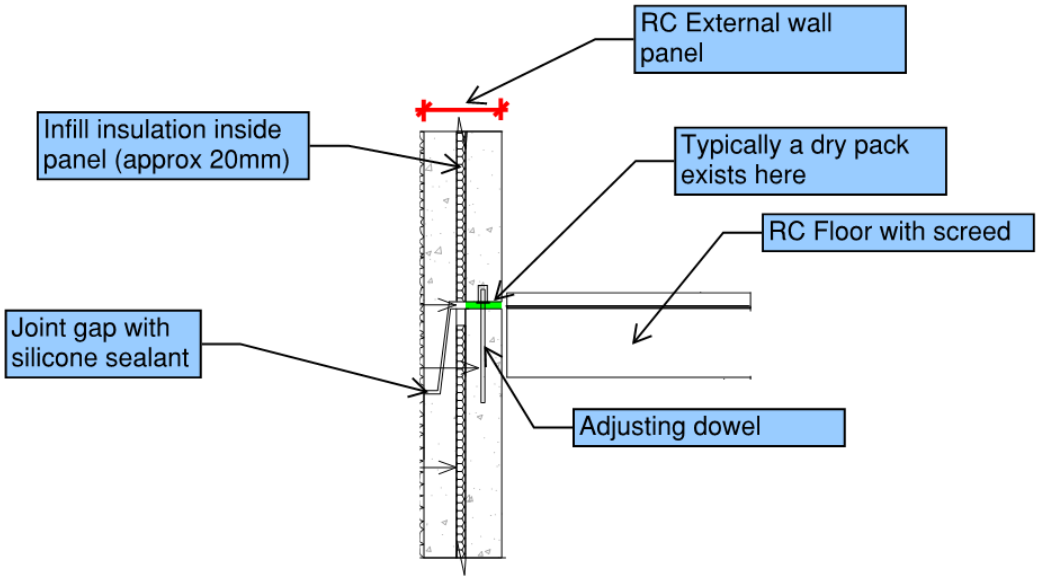

Figure 6. Typical composition of external walls

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 very 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 be likely 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 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 6, 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 7 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 8.

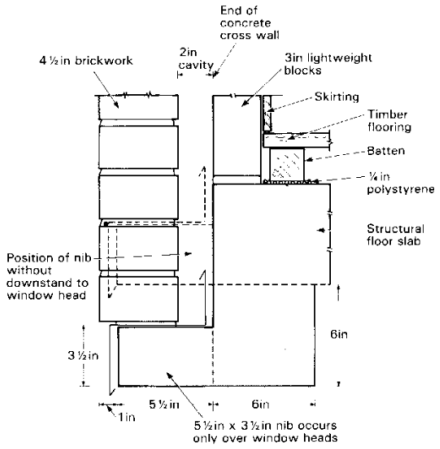

Figure 7. Typical brick on RC downstand

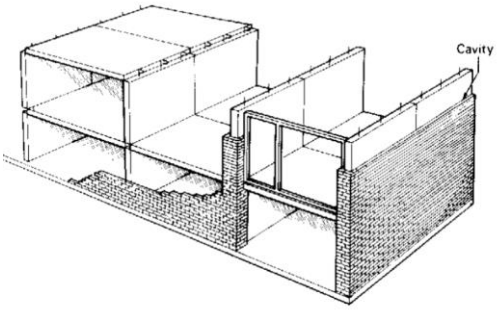

Figure 8. Typical brick façade to LPS

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.

The building below shows a typical LPS structure from the Penge Road development/The Waldrons before re-cladding took place. It can be seen that the majority of the façade is RC with areas of infill brickwork on the side walls.

Figure 9. Typical LPS building prior to re-cladding

4. Assumptions, scope & liabilities

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

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 18 m above ground level, or where there are reasons where a higher risk is associated with the building type; e.g. care homes etc. All blocks are above 18m in height, therefore they have been assessed under the EWS1 guidance recommendations.

A charted fire engineer has been used to review this report. Whilst the Chartered fire engineer did not attend site or review all the supplementary information, a detailed review of the report was undertaken. He relied on his knowledge of those undertaken the work were of suitable experience. Where necessary questions were raised as part of the review.

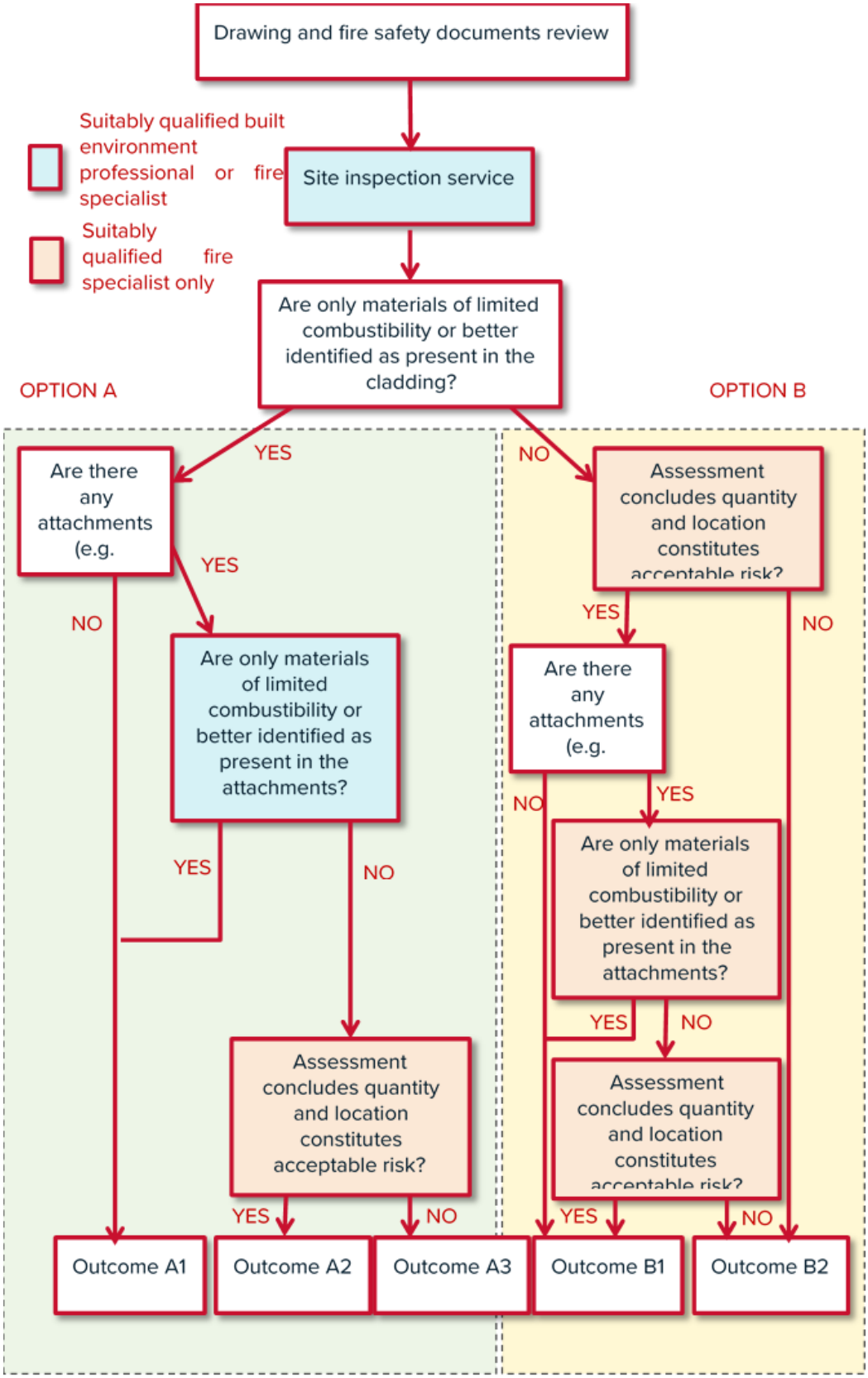

Figure 10. EWS1 Process

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 3 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.

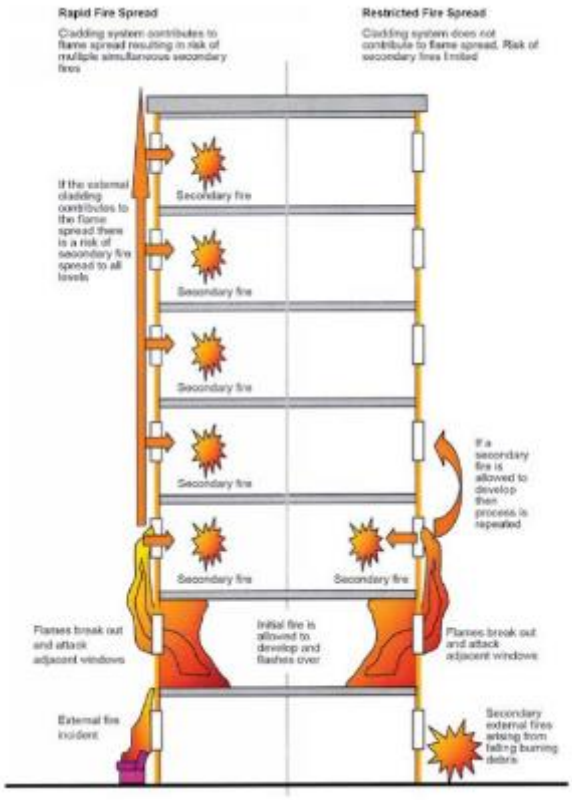

Figure 11. Mechanism for fire spread

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.

6. Survey findings & analysis

6.1 Survey

BB7 intrusively surveyed the building on 1st April 2021, the survey was conducted by David Werran; Stuart Morgan and James Groves. 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 opening up contractor ahead of the survey. BB7 surveyed 4 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.

6.2 Location 1

6.2.1 Insulated render cladding

Location 1 was on the South elevation at second floor level where the insulated render cladding exists. The system was found to be:

- 10mm render
- 100mm EPS insulation a Euroclass E combustible thermoplastic.
- 130mm solid concrete. A hole was drilled through the concrete in some locations 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. This was also confirmed based on a view underneath the external walls at ground floor level.

This location was surveyed due to the presence of the render system. The EPS exists at all points on the ground floor level and is continuous in nature. The system returns into the bin store and also the buildings entrance.

Figure 12. View of insulation

Figure 13. View of system from underside showing insulation on existing structure

Figure 14. View of insulation to lower portion of building

6.3 Location 2

Location 2 was on the rear (South) elevation of the block, at first floor level where the metal cladding exists. The system was found to be:

- 50mm metal cassette panel cladding formed of 5mm aluminium.
- 40mm cavity
- 100mm mineral wool
- 130mm solid concrete. A hole was drilled through the concrete in some locations 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.

This location was surveyed due to the presence of the metal cladding and the potential presence of a barrier around the openings. There is a cavity at this location, an outer cavity between the metal cladding and the mineral wool.

Vertical and horizontal cavity barriers were found in the cavity in this location, it was a mineral wool type product reinforced with wire. This cavity barrier has to be folded over in order to ensure that the barrier fills the full depth of the cavity. However, the barrier was found to be poorly fitted with gaps appearing next to the façade carrier system, it was not under compression or folded into position so it may allow fire to bypass the compartment line here, which is not permissible.

Cavity barriers would be required between the mineral wool cladding and the external metal covering. Considering the extent of the metal cladding in this location, BB7 would have expected full cavity barrier provisions as per Approved Document B although both the rockwool and metal cladding are non-combustible and would not greatly contribute to a façade fire.

Figure 15. Location of survey

Figure 16. Poorly fitted cavity barriers around window

Figure 17. Poorly fitted cavity barrier at compartment floor. Brick wall system can be seen & no cavity barriers around window.

Figure 18. Depth of mineral wool insulation

6.4 Location 3

Location 3 was on the East elevation of the block at the third-floor vertical compartment line, at this location the metal cladding section runs the height of the building. The system was found to be:

- 50mm metal cassette panel cladding formed of 5mm aluminium.
- 40mm cavity
- 100mm mineral wool
- 130mm solid concrete. A hole was drilled through the concrete in some locations 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.

This location was surveyed due to the presence cladding and the vertical compartment lines, cavity barriers would be expected at the vertical compartment lines. There is one cavity at this location. An outer cavity between the metal cladding and the mineral wool.

A vertical and horizontal cavity barrier was found in the cavity in this location. The horizontal barrier was in line with the compartment floor. However, the vertical barrier was not at the compartment line and therefore, we assume this is provided for an effective lateral break. The barriers were mineral wool type product reinforced with wire, which were common at the time of installation. This cavity barrier has to be folded over in order to ensure that the barrier fills the full depth of the cavity to reach the rear of the cassette panel, however, the barrier was found to be poorly fitted with gaps appearing next to the façade carrier system, it was not under compression so it may allow fire to bypass the compartment line here, which is not permissible.

Cavity barriers would be required between the mineral wool insulation and the external metal covering. Considering the extent of the metal cladding in this location, BB7 would have expected full cavity barrier provisions as per Approved Document B although at the time of installation, cavity barriers would not have been required around openings. A cavity barrier should exist across the whole system from RC structure to the inside face of the aluminium cladding which was not found in this case. However, this could be considered acceptable as both the mineral wool and metal cladding are non-combustible and would not likely contribute to a façade fire. In addition to this, as the mineral wool is the same material as the cavity barriers, this would reduce the likelihood of the cavity barrier being flanked by fire.

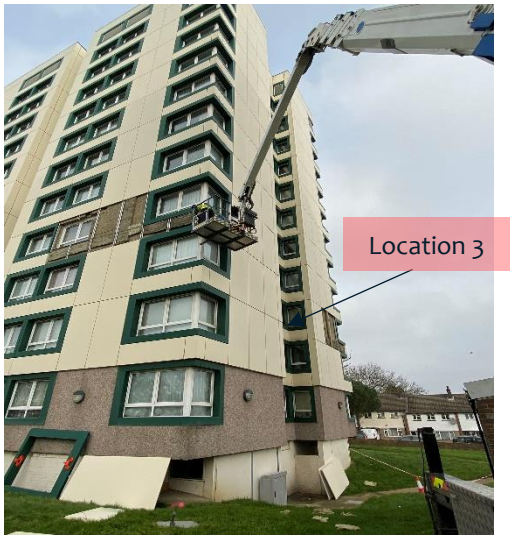

Figure 19. View of location

Figure 20. Vertical compartment line not under compression.

Figure 21. Wall behind mineral wool

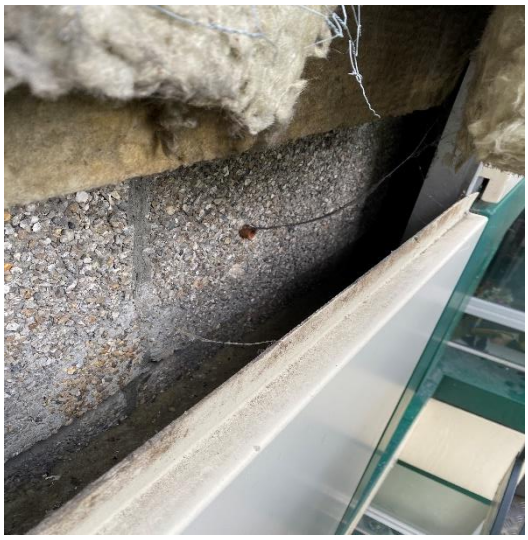

Figure 22. Gap behind metal cladding

6.5 Location 4

Location 4 was on the East elevation at third floor level where the metal cladding system reaches the corner of the building. The system was found to be:

- 50mm metal cassette panel cladding formed of 5mm aluminium.
- 40mm cavity
- 100mm mineral wool
- 130mm solid concrete. A hole was drilled through the concrete in some locations 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.

This location was surveyed due to the presence of the compartment line and the window. The cavity barrier was a reinforced mineral wool product, however they not folded in areas to fill the metal cladding completely and therefore do not provide an effective break against fire.

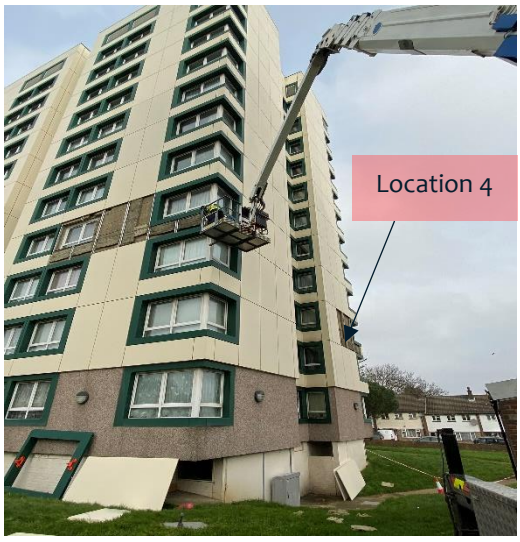

Figure 23. Survey location

Figure 24. Folded cavity barrier

Figure 25. Non folded horizontal barrier

Figure 26. Wall behind mineral wool

6.6 Infill panels

Infill panels are noted to exist on either side of the building forming the external wall system to the common areas. Figure 27 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 27. Infill panels

6.7 Internal survey

The common areas in 2-56A Regina Road 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 stairs were provided with a vent at the head.

There were service risers in the protected stair. The majority were provided with 'Masterboard with Intumescent sealant' fire stopping and, 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. There were also service risers located in the lobby with 'Masterboard with Intumescent sealant' 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, therefore, the system is presumably mains fed.

The refuse chute is situated in the ventilated flat lobby.

Figure 28. Bin chute damper with fusible link in bin store (example taken from 58-108A Regina Rd)

Figure 29. View of sprinkler (example taken from 58-108A Regina Rd)

At ground floor, there was residential storage accessed from the lobby serving the stair. The storage was provided with a fire door and kept locked.

Dry riser outlets were provided on every other floor, There was also what appeared to be an auto-dial system linked to the addressable fire panel at ground floor level which was assumed to automatically call the Fire Service or central monitoring station who will call LFB, on detection in the common area.

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.

6.8 Fire Risk Assessment

The following information has been provided:

- 2-56A FRA 2019
- Fire Risk Assessment (RB-TY6P6U) - Assessed 2019-11-22

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 22nd November 2019 was conducted by Ridge and Partners LLP. The overall risk rating determined is provided in the following figure.

PROPERTY NAME	ADDRESS
Regina Road (2-56A)	2-56A Regina Road London
PROPERTY REFERENCE	SE25 4TW
RB-36B7CE	

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 30. 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 Type 4 FRA and these should be actioned to reduce the risk.

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

Until the FRA findings are actioned, the building risk is increased. Both action plans are extensive and all action points should be completed.

7. Fire Service Access

This section has been added to demonstrate ready access for a pump appliance to gain access to fight a fire. Rear access to the building should be kept clear of any residents carparking to ensure that the Fire Service are not hindered in their attempts to access some elevations of the tower block. The building appears to be ADB compliant, however, due to the height of the building, there would be a delay in getting water onto the façade as a high reach appliance would be required. High reach appliances are not typically the first type of appliance scrambled to an apartment fire.

Figure 31. 3D site plan

The development is bounded on three sides by amenity land presumably managed by the Local Authority. This provides good fire service access to the majority of the development. Main access is provided via Regina Road with car parking available.

Access is gained to the block through a drop key. Internally the tower block is fitted with a Premises information box (PIB), a firemans lift with over-ride at ground floor level, a dry fire main which has an outlet on every other floor and an addressable panel at ground floor which shows the fire location.

However, Fire Service access should be assessed as part of a risk analysis of the building.

8. Analysis

8.1 Overview

This section will provide an analysis of each main system and their suitability for use. The following systems are considered to be the main types for analysis:

- System 1 – Insulated EPS with a 10mm render finish on existing RC structure.
- System 2 – Metal cladding with a 100mm mineral wool onto existing RC structure
- System 3 – insulated spandrel panels

BB7 will analyse each system as outlined above.

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.

8.2.1 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 64 and 65 below show the requirements at the time of construction, and that no cavity barriers are required around openings.

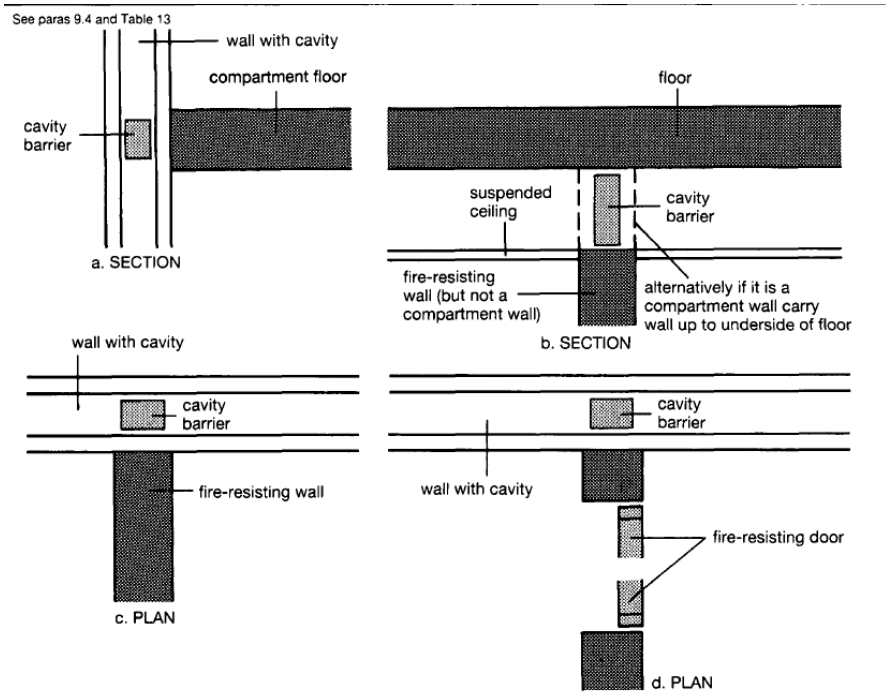

Figure 32. Diagram 27 – ADB 1992

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.

Figure 33. Table 13 – ADB 1992

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.

8.2.2 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.

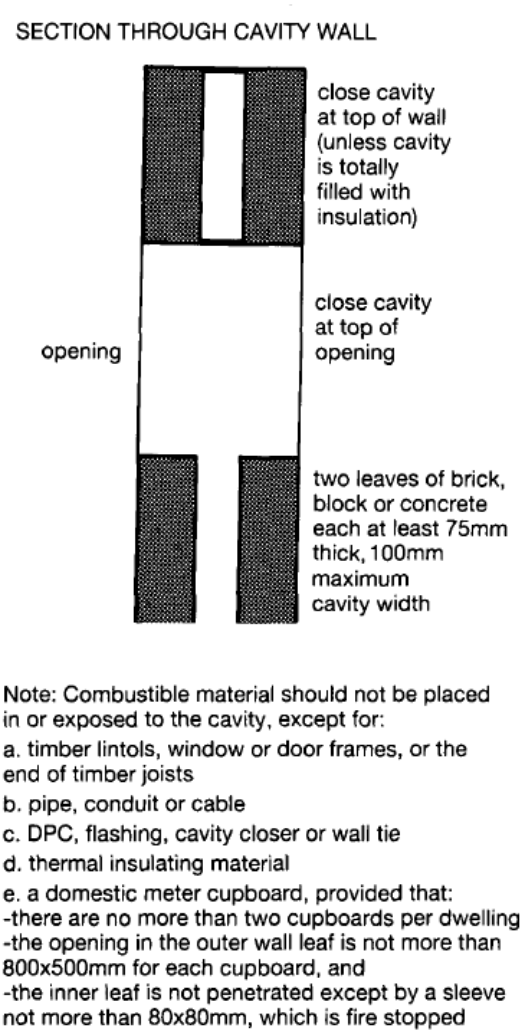

Figure 34. Diagram 28 – ADB 1992

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.

8.2.3 EPS Insulation

EPS Insulation was found to the ground floor of block 2-56A Regina Road. This insulation was placed on top of the existing RC structure, with a render finish. Small areas of this render have been damaged exposing the insulation behind where it has become slightly damaged.

EPS has a Euroclass E rating meaning that it is highly flammable. Unfortunately, no branding could be observed, and many EPS insulations are white in colour. Due to the high combustibility of these products and their behavior in fire which supports fire spread BB7 do not consider that any testing is required to determine the material properties.

8.2.4 Cladding panel

The cladding panels on the upper floors were mounted metal carrier system, the insulation in the cavity was a mineral wool type and therefore non-combustible.

BB7's findings can be summarised as follows:

- cavity barriers were found at compartment lines in the cladding systems. Some barriers were found under good compression; however, most areas were not under compression meaning that the barrier is not fulfilling its function of inhibiting smoke and fire spread.

Whilst there are issues with uncontrolled fire spread due to the cladding materials, BB7 consider the external walls do not effectively inhibit the unseen spread of fire and smoke, contrary to Part B3(4) of the Building Regulations. BB7 recommend that the cavity barriers at vertical and horizontal compartment lines are checked in all locations and were found to be poorly installed they should be replaced. This also includes around windows, and ventilation penetrations. BB7 consider that the horizontal cavity barriers should be replaced wholesale for a tested 30-minute cavity barrier which is of a mineral wool style.

8.3 System 1 – External Wall Installation EPS

The cladding system is comprised of the materials in the table below:

Material	Combustibility	Volume	Comments
Internal dry lining (assumed)	Euroclass 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.
RC structure	Euroclass A1 to BS EN 13501-1	All locations (confirmed in two locations on the building)	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 assumed EPS	Euroclass E to BS EN 13501-1	Low level to 2-56A Block	Highly combustible, limited to low level

Material	Combustibility	Volume	Comments
10mm assumed render	Unknown	Low level to 2-56A Block	Testing of the render required to determine the risk, however, BB7 will recommend replacement of the system for a non-combustible alternative.

The internal portion of the system, i.e. the existing structure, is considered to be a low risk item.

The outer portion of the system where EPS cladding is mounted onto the outer skin of RC structure is not considered to be significantly high risk but it will likely ehhibit fire spread to a degree. On that basis to ensure the life safety of occupants the EPS render system should be removed and replaced with a non-combustible alternative.

8.4 System 2 Mineral wool cladding panels

The cladding system is comprised of the materials in the table below:

Material	Combustibility	Volume	Comments
Internal dry lining (assumed)	Euroclass 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.
RC Structure	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	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.
40mm Clear cavity	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.
50mm metal cladding panel	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.

Due to the non-combustible nature of both the mineral wool and aluminium cladding panels, the risk of uncontrolled fire is low, although there will be rapid delamination of the cladding panels, this will unaffected the contribution to any fire spread.

Cavity in system

This section of the system is the mineral wool layer outwards.

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.

The reinforced mineral wool cavity barriers (typical) were intended to be 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.

In all locations surveyed the barriers were noted to not be under compression at compartment floor lines 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.

BB7 would be satisfied with either option.

8.5 System 3 - Infill panels

The infill panels are present on both sides of the buildings to the common areas, the table below shows the likely make up of the panels.

Material	Combustibility	Volume	Comments	Recommendations
Thermo plastic infill between two layers of steel.	Typically Euroclass E - F to BS EN 13501-1	Front and rear elevations	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.

Some window openings were provided with infill panels, they were not surveyed because they are integral to the window system above. Generally, from other surveys carried out by BB7 in similar blocks, these panels are combustible. The system was also found on the section of façade

connected to the common area serving the protected stair and AOV windows. The infill panels stack one above the other there is potential that fire could "jump" from one to the other. In order to remove this risk, these infill panels should be removed and replaced with a non-combustible alternative. Figure 32 shows a typical infill panel.

Figure 35. Typical infill panel (taken from 58-108A Regina Rd images)

9. Conclusion and recommendations

9.1 Conclusions

BB7 have been appointed to provide an EWS1 form for the building which form the development known as 2-56A Regina Road, is located in Croydon. This report has outlined BB7's intrusive survey findings, analysis of the external wall systems, and conclusions. BB7 intrusively surveyed the building on 1st April 2021; the survey was conducted by David Werran and Stuart Morgan 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.

9.2 Recommendations

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

9.1.1 Short term recommendations

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

We have identified high-risk materials at low level in the block with EPS insulation noted at low level, which is defined as high risk within the government guidance. This material should be removed and replaced with a non-combustible alternative.

Similarly, the infill panels, which are considered high risk combustibles, should be removed and replaced with a non-combustible alternative.

Section 11 of the Governments Consolidated Advice Note provides guidance on this issue. As per this report the building is well managed. There are a number of actions on the FRA, so these do need to be actioned if not done so already.

There are a number of factors which can be considered:

1. Fire service access to the building is generally good - the closest Fire Service station is approximately 1.4 miles away from the development, therefore extended response times are not expected. Looking at response statistics in 2019/2020 LFB on average had an appliance at the incident within 5 minutes and 13 seconds, which is generally in line with the national average. A second appliance was at an incident on average in 6 minutes and 27 seconds.
2. The outer face rockwool filled cladding is non-combustible so is unlikely to significantly add to fire spread up the external wall.
3. Sprinklers have been installed to the flats in the blocks and will reduce the risk of flat fires becoming uncontrollable.
4. There is an inert, robust substrate of RC structure, which will not allow burn through from the flat.
5. Cavity barriers are installed at vertical and horizontal compartment lines, the presence of the barriers in these locations, although poorly fitted, will somewhat reduce fire spread in the cavity, and will therefore aid in inhibiting the unseen spread of fire and smoke. We therefore do not consider that a fire in the cavity will spread uncontrollably.

6. The EPS system is confined to the ground floor level only and does not span the full height of the building. Whilst lateral fire spread is a consideration, it is not the critical direction for fire spread and will likely occur at a lower rate.
7. In terms of the infill panels, they are typically recessed from the main façade such that it would be difficult for fire to reach the panels. The largest risk of ignition comes from the bin store, however, there will likely be an element of control over the fire due to the fusible link damper and the sprinkler head which will suppress the fire. Furthermore the bin store is ventilated directly to the open air which will reduce the fire severity.

On the basis of the above, BB7 are satisfied that the building need not have a change in evacuation strategy whilst works are being carried out. However, there are some things that should be actioned to do to ensure occupant safety:

- Residents should be informed of their responsibilities in terms of fire safety.
- The local FRS will need to be informed.

9.1.2 Long term recommendations

BB7 make the following recommendations to achieve a B1 rating:

- The EPS insulant and render at lower floors needs to be replaced with a non-combustible alternative.
- Cavity barriers in the Aluminium cladding system should be either remedied such that they are under compression or new barriers provided.
- The infill panels at windows should be removed and replaced with a non-combustible.

All points on the current Fire Risk Assessment should be actioned.

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