EWS1 Report

1-87Regina Road

Croydon

30th April 2021

Croydon London Borough Council

BB7

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 1-87 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 1-87, 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 3 large tower blocks, the images below show the three blocks of the buildings with an older image showing all blocks before cladding was applied.

Figure 2. 1-87 Regina Road, Croydon

Figure 3. 1-87 Regina Road, Croydon before re-clad (left of picture)

The block, built circa 1964, is shaped such that it has one central core with a secondary stair available between the 8th and 10th floor and 4 flats per storey accessed from a lobby. The Tower is G+10 (approx. 30m) storeys in height. There are no balconies present on the building. At a later date a sprinkler system has been added to the flats in the building, but it is not known to what extent they are provided as the internal flats were not reviewed. It is possible that some flats may not have them, or they may be disconnected.

Stair landings 1 - 7 are served by a single stair and are separated from the lobby by a Georgian wired glass partition. Ventilation is by means of an AOV with detection situated in the lobby. The travel distances within these from each apartment entrance are within 7.5m.

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

There is also a bin chute that runs the height of the building which is accessible from the stair via a ventilated lobby, both the lobby and refuse chute room were ventilated via the same duct with a split plenum. It was noted that the bin store itself was provided with permanent ventilation via louvred doors which vent directly to fresh air. The free area of the vents in both locations could not be confirmed. Furthermore, the construction of the bin cute and associated lobbies appeared to be newer than the rest of the building, this may have been an extension at some point. At the base of the bin chute, a fusible link damper was provided to prevent fire spread up the bin chute and there was a sprinkler head to suppress a fire originating in this space.

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 building is concrete frame (refer to section 3 for more detail), although there are elements of PIR 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.

The fire service has very good access to one road elevation of the of the buildings, there is open space green areas to one façade and hardstanding areas to the other facades. The rear of the building is bound by bin store area.

BB7 have been provided with a Fire Risk Assessment dated January 2020 conducted by Ridge and Partners LLP. There are a number of high-risk items flagged in the report, such as deficiencies in internal compartmentation, faults with the AOV's and fire door issues which must be rectified immediately if not already done so. It is also noted in the report that there are issues with storage in means of escape areas and electrical cupboards.

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 1-87 Regina Road is substantially lower than this.

Figure 5. Ronan point collapse

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

There are many types of LPS construction, and it is not possible to definitively state which type of structure was used; however, it is known that 1-87 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.

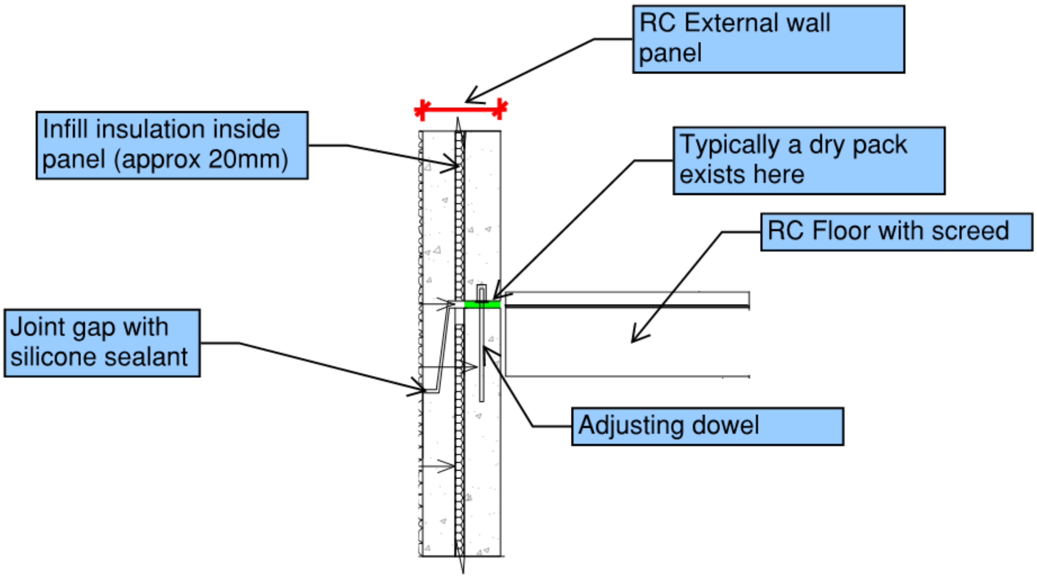

Figure 6. Typical composition of external walls

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.

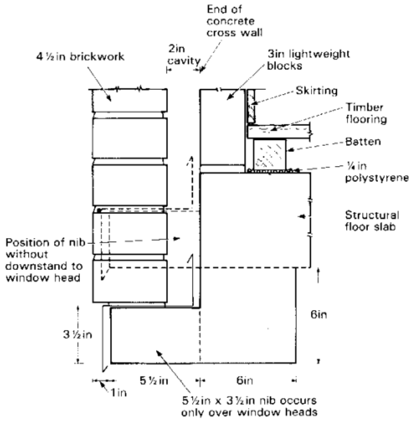

Figure 7. Typical brick on RC downstand

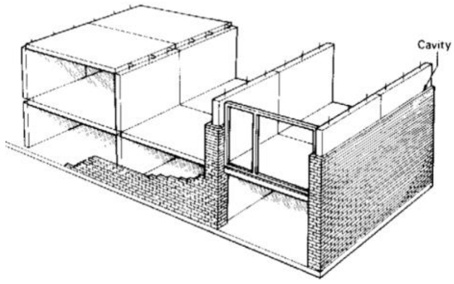

Figure 8. Typical brick façade to LPS

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.

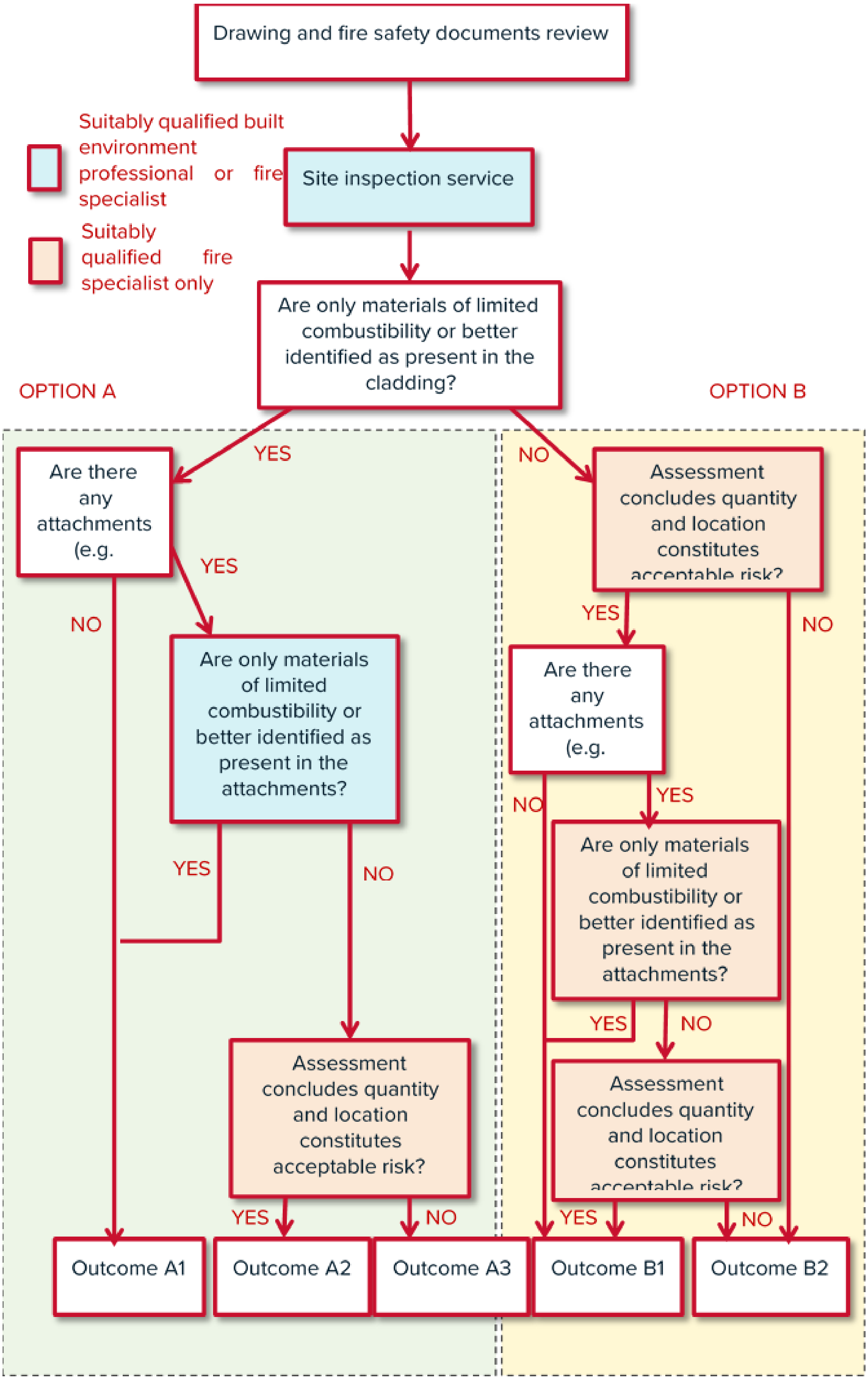

Figure 10. EWS1 Process

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.

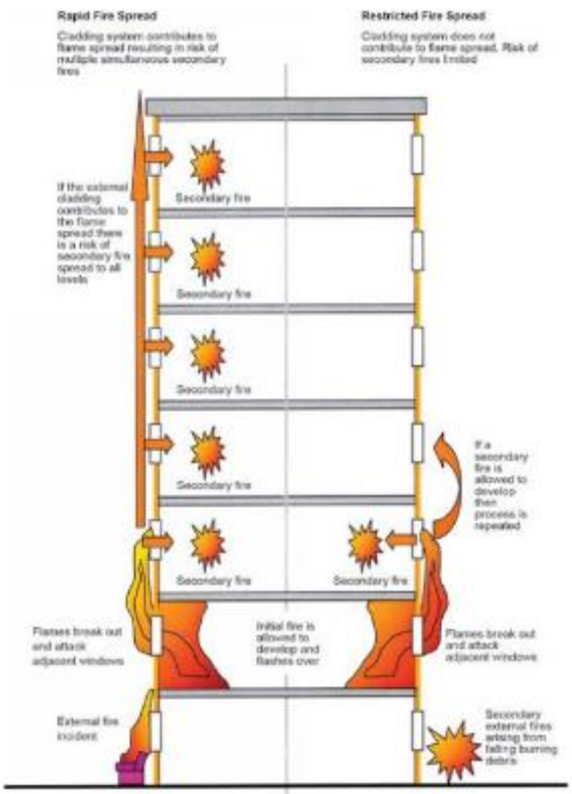

Figure 11. Mechanism for fire spread

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; James Groves and Stuart Morgan. 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 5 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

Location 1 was on the lower rear elevation at ground floor level where the cladding exists. The system was found to be:

- 10mm render
- 100mm PIR insulation Euroclass E combustible thermoset insulation
- 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 PIR 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. No cavity exists as part of this system.

Figure 12. View of location of render with PIR cladding system behind

Figure 13. View through system

6.3 Location 2

Location 2 was on the rear elevation of the tower block, at fourth 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 cladding and the window and the potential presence of a barrier around the opening.

Figure 14. Location on building

Figure 15. View of barrier not folded on the continuous cladding section, however the barrier has been folded at the area between openings.

Figure 16. View behind metal cladding **Figure 17.** Measurement of barrier

A horizontal cavity barrier was found in the inner cavity in this location behind the metal cladding, it was a reinforced mineral wool product. The barrier was found to be poorly fitted, it was not under compression or folded in place to fully fill the cavity, so it may allow fire to bypass the compartment line here, which is not permissible.

A horizontal cavity barrier was found in the cavity in this location. The horizontal barrier was in line with the compartment floor. 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 between windows, 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.

6.4 Location 3

Location 3 was on the rear elevation bin chute of the tower block at the third floor, at this location the metal cladding section runs the height of the building as per Figure 19. The system was found to be:

- 50mm metal cassette panel cladding formed of 5mm aluminium.
- 40mm cavity
- 100mm mineral wool

- Blockwork substrate.

This location was surveyed due to the presence of the metal cladding, cavity barriers would be expected as there are compartment floor lines which exist. There is one cavity at this location. An outer cavity between the metal cladding and the mineral wool.

It can be seen that the construction of the refuse lobbies appears to be newer than the remainder of the building due to the presence of engineered brick and steel work. The steelwork appeared to be protected with an intumescent coating, however, this could not be confirmed.

Figure 18. View of location

Figure 19. Measurement of system

6.5 Location 4

Location 4 was on the East elevation at third floor level where the metal cladding system 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.

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

A horizontal cavity barrier was found in the cavity in this location. The horizontal barrier was in line with the compartment floor. 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. This location was surveyed due to the presence of the horizontal compartment line and corner of window.

Figure 20. View of location

Figure 21. Cavity barrier not folded next to correctly installed barrier

Figure 22. View behind mineral wool

Figure 23. Barrier incorrectly installed

6.6 Location 5

Location 5 was on the East elevation at 3rd floor level where the window and barrier 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.

This location was surveyed due to the presence cladding and the vertical and horizontal compartment lines, cavity barriers would not be expected at the window openings as they are not a requirement of the guidance at the time of design & construction. There is one cavity at this location. An outer cavity between the metal cladding and the mineral wool.

Cavity barriers appear to be present fixed to the mineral wool at compartment floor areas. The cavity barriers will inhibit uncontrolled fire spread within the cavity as they are folded correctly filling the full depth of the cavity.

Figure 24. View of location

Figure 25. View into opening

Figure 26. View around window

Figure 27. Poorly fitted cavity barrier under window

6.7 Infill panels

Infill panels are noted to exist on either side of the building forming the external wall system to the common areas. Figure 28 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 28. Infill panels

6.8 Internal survey

The common areas in 58-108A 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. A secondary escape stair is provided over levels 7-10 which appears to be used to ventilate the flat lobby.

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, based on other buildings and the famously low water pressure in Croydon it is likely that the sprinklers are tank fed.

The bin chute room is accessed from the lift lobby on the upper floors via a ventilated lobby separated with double door fire protection. There was external access at ground floor. The doors inspected appeared to be solid and robust with working self-closers. The bin store at ground floor was provided with a side mounted sprinkler head to reduce the potential fire size and a damper on a fusible link was provided at the base of the bin chute to reduce the chance of fire spread.

Figure 29. Damper & sprinkler

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.

6.9 Fire Risk Assessment

The following information has been provided:

- Fire Risk Assessment (RB-AMAS97) - Assessed 15-01-2020

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

ASSESSED PROPERTY	
PROPERTY NAME Regina Road (1-87) PROPERTY REFERENCE RB-KWUSI3	ADDRESS 1-87 Regina Road London SE25 4TW

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.

1. 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 each elevation to fight a fire.

Figure 80. 3D site plan

The development is bounded on one side by amenity land presumably managed by the Local Authority and the other three sides by hard standing or the towers carparking area to the front of the building. This provides reasonable fire service access to the majority of the development. Main access is provided via Regina Road with car parking available. However, Fire Service access should be assessed as part of a risk analysis of the building.

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

Internal Provisions

The building is provided with a dry riser. The riser inlet is provided in the lobby on the ground floor. Both flat lobbies and stair are provided with ventilation.

The building is presumed not to be provided with a firefighting shaft however the lift appeared to be usable by the Fire Service (i.e. an override was identified) which will enable them to reach the floor of fire origin quicker. The stairs are approx. 1100mm, which is sufficient width for a firefighting stair.

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

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

8. Analysis

8.1 Overview

The external walling systems for the 1-87 tower block, there are a number of systems present each of which has variances. 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 render with possible PIR insulation.
- System 2 - Metal cladding mounted onto metal carrier system with 100mm mineral wool onto block work.

BB7 will analyse each system as outlined above.

- At compartment wall lines this would mean a fire stop spanning from the cavity face of the inner plasterboard to the internal face of the facing brickwork/block work.

8.2 Background issues

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

Large Panel System (LPS)

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

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

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

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

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

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

Cavity barriers

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

- Cavity barrier – 30 minutes integrity and 15 minutes insulation; and

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

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

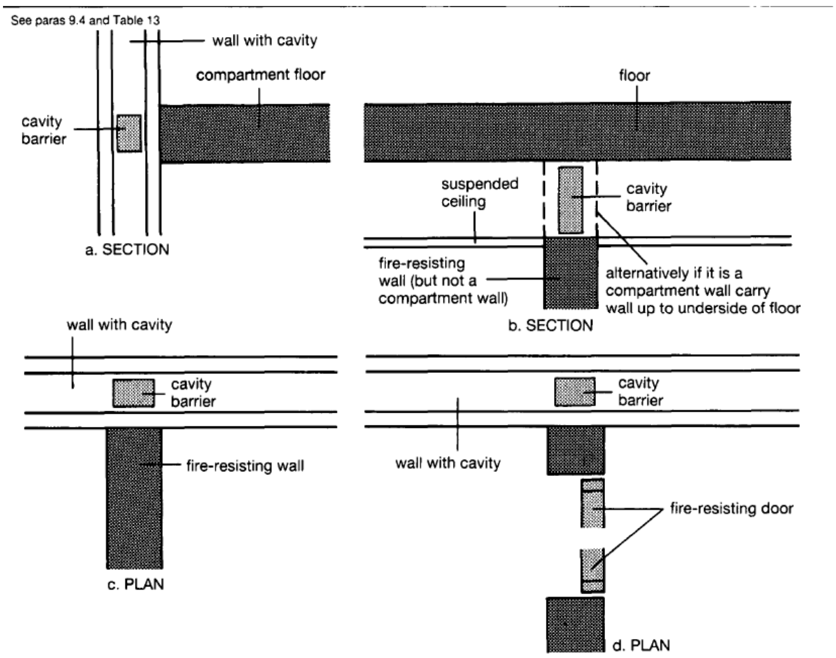

Figure 30. Diagram 27 ADB1992

B3

Openings in cavity barriers

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

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

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

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

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

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

Table 13 **Provision of cavity barriers**

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

Key x provision applies
- provision does not apply

Notes
1. The provisions in items 2,5 and 6 do not apply where the cavity is enclosed on the lower side by a fire resisting ceiling (as shown in Diagram 31) which extends throughout the building, compartment or separated part.
2. The provision of item 7 does not apply where the storey is sub-divided by fire resisting construction carried full storey height and passing through the line of sub-division of the corridor (see Diagram 30), or where the cavity is enclosed on the lower side as described in Note 1.
3. The classification of purpose groups is set out in Appendix D, Table D1.

Internal fire spread (structure) Approved Document
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Figure 31. Table 13 - ADB1992

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

Double skin masonry systems

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

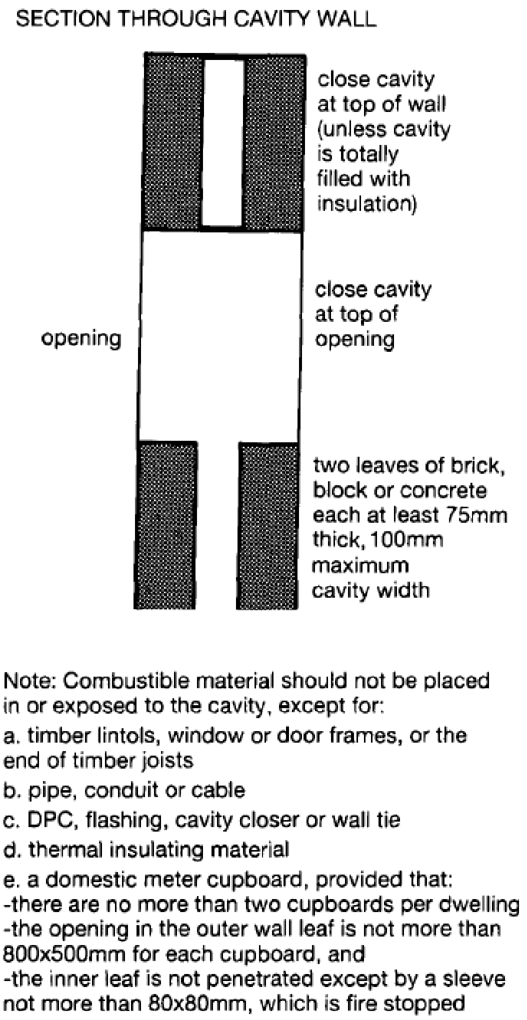

Figure 32. Diagram 28 – ADB 1992

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.

8.2.1 PIR Insulation

Two combustible insulants were found to be used. One insulation type was found on 1-87 Regina Road, but could not be confirmed on site on the day of inspection; however, based on the colour of the insulation it appeared to be similar to the Celotex SW3000 range.

Celotex have discontinued SW3000. However, it was described as *"a PIR board designed for external wall upgrade, usually used as a part of external wall insulation systems for ultimate external wall thermal performance. The board is coated with glass tissue facings which only improve its insulation value"*. Celotex SW3000 is a combustible material.

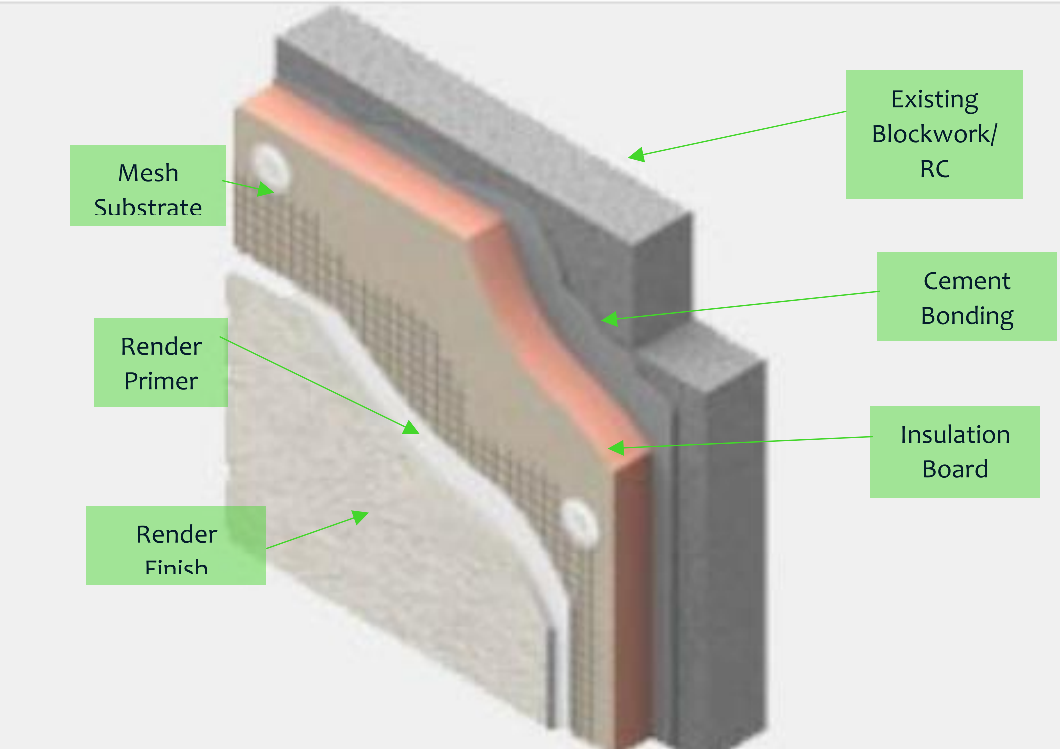

Figure 31. Image of PIR insulation system

The insulant was found to be used on a masonry cavity only where the leaf is >75mm thick. Combustible insulants have historically been permissible for use on masonry due to the dense, robust, inert and non-combustible nature of the masonry meaning that uncontrolled fire spread is a low risk. However, there is a higher risk when this is placed on the surface of the blockwork. Whilst we will work on the basis that the product is, from a risk perspective. the actual material is of little importance due to the location of the insulation found at the ground floor only.

In any case BB7 would recommend that the product is replaced to ensure life safety of the occupants. These systems are known to support fire spread so a risk does still remain.

8.3 System 1 – External Wall Insulation PIR

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.
Concrete / brickwork (outer layer)	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 PIR Board	Euroclass E to BS EN 13501-1	Low level to 1-87 block	High risk material and fire spread issues.
10mm assumed render	Unknown – combustible	Low level to 1-87 block	Testing of the render required to determine the risk.

As per section 6 of this report theinsulation type could not be determined based on a visual survey, however, it did appear to be a PIR based product. BB7 would recommend that the entire system is replaced to ensure life safety of the occupants. These systems are known to support fire spread so a risk does still remain.

8.4 System 2 Rockwool with cladding Panels

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

Material	Combustibility	Volume	Comments
Concrete / brickwork (outer layer)	Euroclass A1 to BS EN 13501-1	All locations	Due to the non-combustibility of the concrete / brick outer layer, BB7 consider that this item is low risk in terms of uncontrolled fire spread. It is acknowledged the RC construction may have a thin core layer of EPS / XPS, this is encapsulated by concrete which is considered the relevant material.
100mm mineral wool insulation	Typically, Euroclass A1 /A2 to BS EN 13501-1	All locations	Non combustible, low risk of fire spread in the cavity.
60-70mm clear cavity	N/A	All locations	No combustible components.
100-110mm reinforced mineral wool cavity barrier	Typically, Euroclass A1 /A2 to BS EN 13501-1	Compartment floors, party walls, around some windows	Locations and non-compressed installation of cavity barriers not strictly in accordance with ADB, however, generally adequate provision
5mm Solid aluminium cassette panel fixed to aluminium railing	Typically, Euroclass A1/A2 to BS EN 13501-1	All locations	Due to the non-combustibility BB7 consider that this item is low risk in terms of uncontrolled fire spread.

Behind the solid aluminium cassette panel was a 60-70mm cavity and 110mm mineral wool insulation mechanically fixed to the concrete panel system.

In the majority of cases, the mineral wool insulation was tightly fitted and abutted. Any gaps between the insulation were kept to a minimum and generally the installation was considered adequate. The non-combustible insulation is considered to reduce the possibility of uncontrolled fire spread.

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

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 as it is unlikely that a fire could flank the barrier and spread on the façade. Both materials are non-combustible and unlikely to contribute to fire spread. Although the cavity barrier does not go back to the substrate, the risk is considered to be low as the insulation is also non-combustible.

There were no cavity barriers around the flat windows, however, if a fire were to break out of a window, then it is unlikely to rapidly spread through the cavity and up the building due to the lack of combustible materials and the fact that the flame front will not have a substrate to continue the fire spread. Furthermore, the fire spread will be inhibited by the cavity barrier at floor level. The functional requirement of the building Regulations is to inhibit the unseen spread of fire and smoke in concealed spaces, which the barriers at compartment lines are considered to likely achieve.

It was found in numerous locations that the cavity barriers at compartment floors were not fitted under compression meaning that there is potential for fire to bypass the cavity barriers. Whilst this would be considered to be low risk if limited instances were found, on this building BB7 did not find evidence of compartment floor barriers being folded and fully filling the cavity to the rear of the cassette panels. On that basis BB7 recommend that the cavity barriers are upgraded to ensure that they will inhibit the unseen spread of fire and smoke. This can be done in one of two ways:

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

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

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

8.5 Engineered brick and steel

System 2.1 formed the side elevations of the bin chute extension to the building and the cladding system is comprised of the materials in the table below:

Material	Combustibility	Volume	Comments
Engineered brick and steel beams	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. The beam appeared to be painted, however, it could not be determined if it was intumescent paint.
110mm 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.
5mm Solid aluminium cassette panel fixed to aluminium railing	Typically, Euroclass A1/A2 to BS EN 13501-1	All locations	Due to the non-combustibility BB7 consider that this item is low risk in terms of uncontrolled fire spread.

Behind the solid aluminium panel was a 60-70mm cavity and 100mm mineral wool insulation mechanically fixed to the brick which is the same as that covering the RC structure.

In the majority of cases, the mineral wool insulation was tightly fitted and abutted. Any gaps in the insulation were kept to a minimum and generally the installation was considered adequate. The non-combustible insulation and cladding is considered to prevent the possibility of uncontrolled fire spread.

There were no cavity barriers or breaks identified at floor level or vertically in the continuous strips of cladding that ran the full height of the building. BB7 recommend that barriers are provided in these locations to prevent the unseen spread of fire and smoke.

8.6 Infill panels

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

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

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

Therefore, the sprinklers would reduce the size of a potential fire and the shutter would reduce the spread of fire vertically. If a fire were to spread vertically, it would be contained to the bin chute extension as the elevation containing flats is stepped back and it is unlikely that there would be enough combustibles to fuel a fire to spread from this area to the adjacent cavity due to non-combustible elements within wall system 1, 2 and 3.

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

With regards to the panels on the section of façade connected to the common area serving the protected stair and AOV windows, although this is recessed from the elevation with flats, it is still connected to the area serving the single protected escape stair and escape routes.

It is recommended that all window infill panels are to be replaced for non-combustible alternatives on the common area sections.

Figure 34. Typical infill panel

8.7 Cladding Overhang

Access to the topmost 2 stories is by way of a secondary stair at Level 8. This stair therefore creates an overhang to the front elevation of the building. Due to it's location, BB7 was unable to access this location in order to establish what materials make up this area. However, based on the intrusive survey on the other locations on the building we can assume that this area has broadly the same construction. This area should be checked to ensure that cavity barriers are in place at compartment lines as the shape of this overhang could increase the chance of fire spread at this location. With the addition of a Georgian wire glass forming part of the enclosure also present, this could also prove to be a weak point, although it should attain some sort of fire resistance it will perform worse than the cladding in the event of a fire.

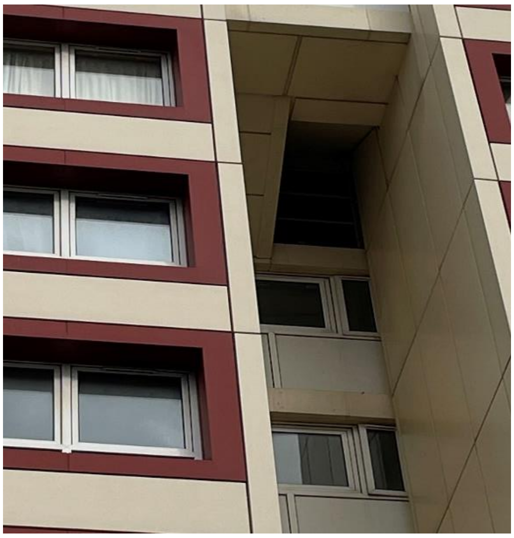

Figure 33. Overhang at front elevation

Figure 34. Overhang from inside block with Georgian wire glass

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 1-87 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, James Groves 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 PIR 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 (mostly monitoring), 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 PIR 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 PIR 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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