EWS1 Report

1-44 Messer Court

30th April 2021

Croydon Borough Council

12125BB

Revision History

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Prepared by	**David Werran** **Meng (Hons) AIFireE** davidwerran@bbseven.com 0203 603 5535	BB7 NextSpace Antrim Enterprise Park 58 Greystone Road Antrim BT41 1JZ
Reviewed by	**James Groves** **MEng (Hons) CEng MIFireE** jamesgroves@bbseven.com 0203 603 5535	BB7 Fire Ltd 23 Star Hill Rochester Kent ME1 1XF
Prepared for	**Robert Hunt** 0208 726 6000 (ext 62045) Robert.Hunt2@croydon.gov.uk	The Mayor and Burgesses of the London Borough of Croydon Bernard Weatherill House, 8 Mint Walk, Croydon CR0 1EA

Contents

1. Introduction

BB7 have been appointed to conduct an intrusive survey and provide a comprehensive report forming an EWS1 assessment for the 1-44 Messer Court at The Waldrons estate, Croydon. This report outlines BB7's intrusive survey findings, analysis of the external wall systems, and conclusions. BB7 intrusively surveyed the building on 23rd March 2021; the survey was conducted by David Werran and Stuart Morgan.

The estate covers a large tower block building with a central core of stair and lifts. This tower block is a purpose-built development comprising 44 flats. The block is eleven (G+10) storeys high. The development, broadly speaking, is bounded by The Waldrons, and amenity areas.

Figure 1. Block overclad. Presumed circa late 1990's

This document and the associated EWS1 form are only applicable to 1-44 Messer Court. Please note that this document and associated EWS1 form is valid for a period not exceeding 5 years. In accordance with Note 03 of the EWS1 form, this report and the associated EWS1 form have been reviewed by a chartered registrant with the Engineering Council UK (Chartered Engineer) who is registered through the Institution of Fire Engineering.

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

2. Building Description

The building is 12 storeys (i.e., basement, ground plus 10 upper floors) and is served by a single stair core. The residential accommodation is from the ground to tenth floor with storage at the basement and plant space at the top of the building. There are 44 dwellings in total (4 per floor), and it provides general needs living accommodation.

There is also a bin chute that runs the height of the building which is accessed directly from the residential lobby. The bin store was provided with permanent ventilation by louvred doors. At the base of the bin chute, a fusible link damper was provided to prevent fire spread and there was a sprinkler head to suppress the potential fire size within the bin store.

The single stair core is separated from the common area by Georgian wire partitions. The common area from the stair was provided with an automatically opening vent (AOV) at every level. Smoke detectors were in the common area and are presumed to activate the ventilation. The travel distance was also restricted below 7.5m which would be in accordance with the standard design guidance.

There was also a dry fire main noted at alternate floor levels which would allow the Fire Service to connect at the base and then charge the main with water to the floor of fire origin or two floors below as per standard high-rise tactics. This is beneficial in a tall building as the fire service do not have to run numerous lengths of hose up the stair. Furthermore, at least one of the two lifts appeared to be usable by the Fire Service (i.e., an override was identified between the lifts) which will enable them to reach the floor of fire origin quicker.

At the base of the stair, the common area and final escape routes were clear and free of obstructions direct to outside. The stair discharges into the ground floor residential lobby past flats which is discussed further in Section 6.7. The flight of stair between the basement and ground floors is separated by what appears to be an FD30S fire door. The door is fitted with an electromagnetic lock which is assumed to disengage on activation of the fire alarm system. There is a separate final exit at basement level that should be useable in the event of a fire in a ground floor flat.

The ground floor final exit door had a security access system which is presumed to release on fire detection. There was an emergency override device adjacent to the main entrance door should the fire alarm fail to release the lock. The fire alarm panel was identified in the basement and the sprinkler stop valve was identified at ground floor. There is a clear route to access the building from outside from the main road.

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

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

The buildings were originally constructed circa 1964 – 1966 as part of the Waldrons (Wates Croydon III) redevelopment (REF: https://www.towerblock.eca.ed.ac.uk/development/waldrons-wates-croydon-iii) and the original construction was a large panel system. This style of construction is noted in Section 3 of this report.

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

BB7 have been provided with Fire Risk Assessments for 1-44 Messer Court dated 18th November 2019 was conducted by Ridge & Partners LLP. The findings are discussed in further detail in Section 7 of this report.

Figure 3 shows a site plan of building demonstrating the location of the building and the surrounding streets.

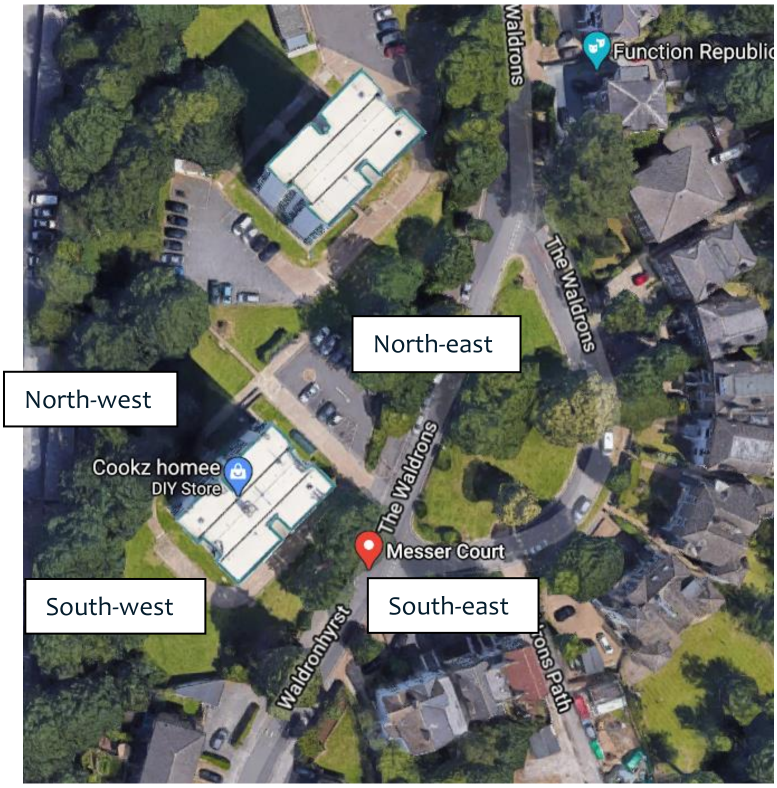

Figure 2. Ariel view of the development

3. LPS Construction

Large Panel System (LPS) construction is a form of construction where large, storey height, pre-cast Reinforced Concrete panels are assembled together on site to form the building's 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 Messer Court is substantially lower than this.

Figure 3. 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 Messer Court 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.

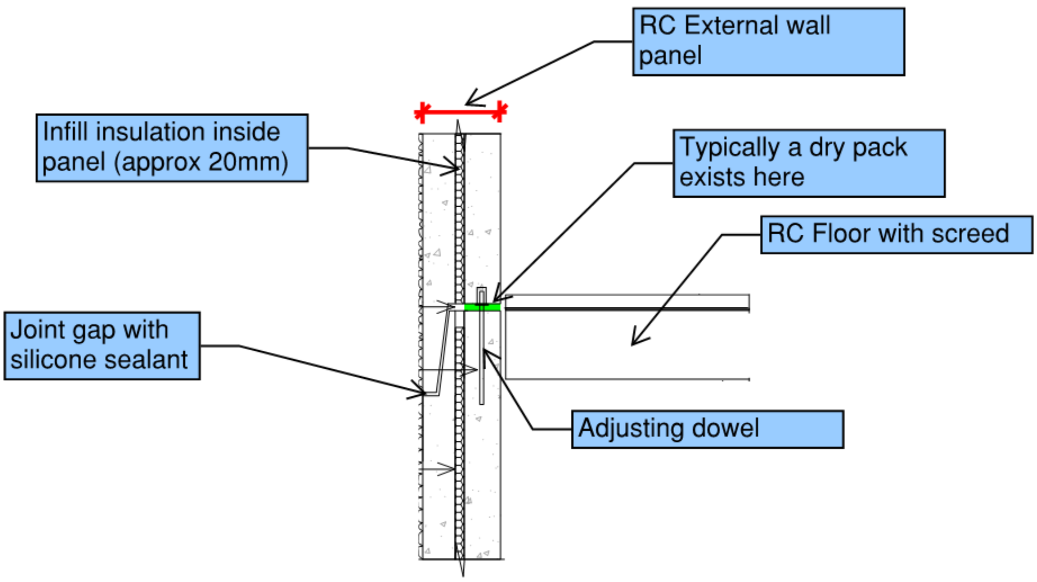

Figure 4. Typical composition of external walls

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

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

Due to the different types of structural wall present in LPS buildings (i.e. flank wall, side wall, etc) there are panels of different styles which have been noted. Typically, most panels are the same as that noted in Figure 4, 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 5 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 6.

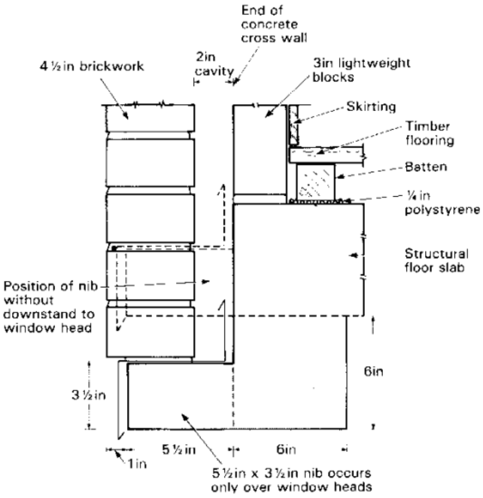

Figure 5. Typical brick on RC downstand

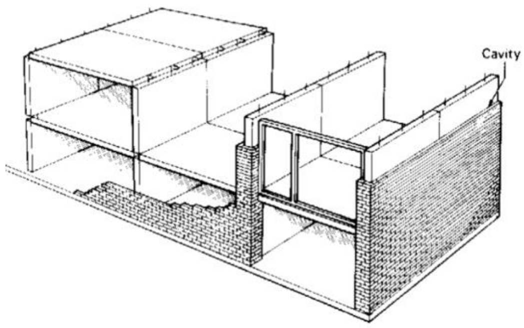

Figure 6. Typical brick façade to LPS

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 figure below shows one of the buildings which formed part of The Waldrons estate before it was re-clad. Whilst not identical to 1-44 Messer Court, it is representative of the construction and how the building would have looked prior to the re-cladding.

Figure 7. Example of typical building at The Waldrons estate

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 building specifically noted in Section 1 of this report.

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

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

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

4.2 Limitations

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

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

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

4.3 Relevant Legislation & Guidance

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

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

As part of that guidance, it states that, the Requirement B4 is clear and requires that "*the external walls of the building shall adequately resist the spread of fire over the walls and from one building to another, having regard to the height, use and location of the building. The need to assess and manage the risk of fire spread applies to buildings of any height*".

5. EWS1 Assessment Scheme

5.1 Requirements

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

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

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

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

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

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

5.2 Mechanism for Fire spread

When reviewing a building with combustible products on the façade, the EWS1 form asks for the following to be considered in accordance with note 9 of the aforementioned (as detailed under the scope Section 4.1 of this document.)

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

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

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

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

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

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

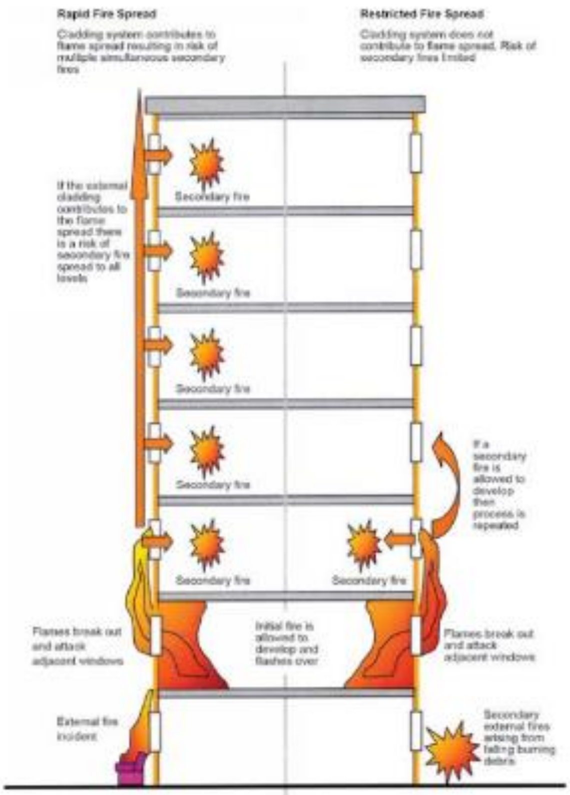

Figure 8. Mechanism for fire spread

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

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

This is detailed in Section 9: Analysis.

6. Survey findings

6.1 Survey

BB7 intrusively surveyed the building on 23rd March 2021. The survey was conducted by David Werran 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 contractor ahead of the survey. BB7 surveyed 4 primary 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 on the South-west elevation.

The system was found to be:

- 5mm solid aluminium cassette panel attached to aluminium rail system which prevents cavity barriers spanning the full width of the cavity at floor level.
- 100mm horizontal (floor level) mineral wool cavity barrier reinforced with wire. The cavity barrier sat on top of the insulation (i.e., did not break the insulation) and was not under compression.
- 60-70mm clear cavity.
- 100mm mineral wool insulation with plastic fixings.
- >100mm solid concrete. A hole was drilled through the concrete to determine the thickness, however, it could not be further determined what was behind the concrete without potentially compromising the integrity of the structure and causing damage internally. Please refer to Section 3 for further details.

Figure 9. Location 1 areas inspected

Location 1.1

Location 1.1. was at the second adjacent to a flat's window. There was no vertical cavity barrier around the window. However, this is as expected for a building re-clad in the 1990's because cavity barriers were not required around openings.

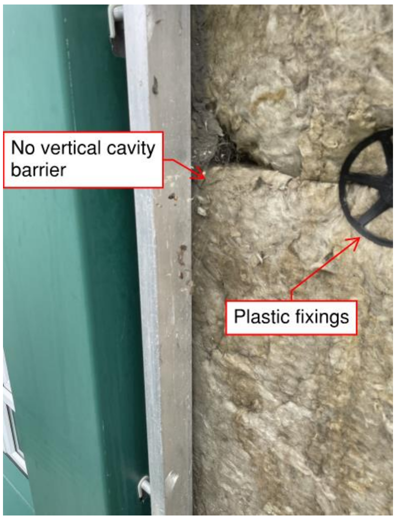

Figure 10. Location 1.1 no vertical cavity barrier

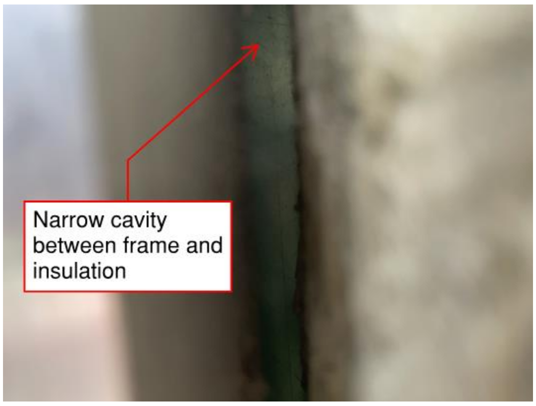

Figure 11. Location 1.1 cavity between insulation and cladding rails

Location 1.2

Location 1.2 was at the second floor slab level and a horizontal cavity barrier was identified. It was not continuous due to the cladding rails and it was not folded so unlikely to be under compression. As the cavity barrier is not likely to have been fitted under compression, a gap will exist between the over cladding and the insulation. This creates a potential path for fire to spread beyond the cavity barrier at the compartment line.

The cavity barrier is not continuous horizontally as it is interrupted by the cladding rails and is installed on the external face of the insulation.

Figure 12. Location 1.2 non continuous cavity barrier at floor level

Figure 13. Location 1.2 – Rough stone cladding behind insulation

6.3 Location 2

Location 2 was on second floor of the South-east elevation, facing the road.

The system was found to be:

- 5mm solid aluminium cassette panel attached to aluminium rail system.
- 100mm horizontal (floor level) mineral wool cavity barrier reinforced with wire. The cavity barrier sat on top of the insulation (i.e., did not break the insulation) and was not under compression.
- 60-70mm clear cavity.
- 100mm mineral wool insulation with plastic fixings.
- 100mm solid concrete. A hole was drilled through the concrete to determine the thickness, however, it could not be further determined what was behind the concrete without potentially compromising the integrity of the structure and causing damage internally. Please refer to Section 3 for further details.

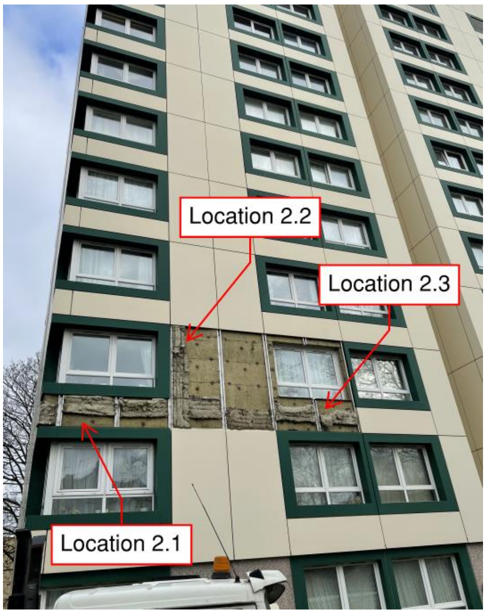

Figure 14. Location 2 areas inspected

Location 2.1

Location 2.1 was on the second floor below a window on the corner of the building. The windows have been installed into the original structural openings and, therefore, have not been moved to suit the cavity. Cavity barriers are not continuous either below windows or at slab level as they are interrupted by the cladding rails. The brackets centrally located along wider cladding panels, such as those under the window, are hidden completely, so are not open to the atmosphere. The cavity barrier is broken where the fixing bracket passes through it.

Figure 15. Location 2.1 horizontal cavity barrier around the corner

Figure 16. Location 2.1 horizontal cavity barrier is not continuous due to the aluminium rails and changes level under the window

Figure 17. Location 2.2 cavity barriers are not continuous below the window or at slab level

Again, 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 barriers were found in some cases 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.

Location 2.2

Location 2.2 was on the second floor between two windows of the same compartment. There is one vertical cavity barrier around the edge of the window. There are two horizontal cavity barriers that are not continuous due to the cladding rails and the cavity barriers appear to be staggered at different levels.

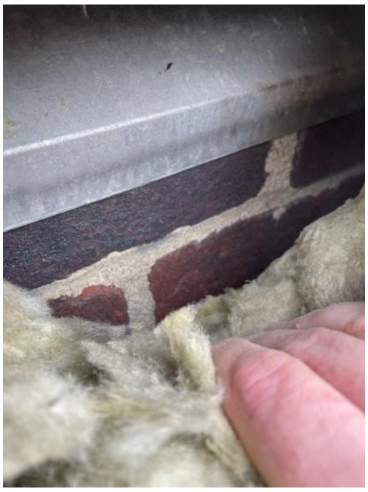

Figure 18. Location 2.2 original brickwork external wall and metal coping

Figure 19. Location 2.2 vertical cavity barrier around the window

Figure 20. Location 2.2 horizontal cavity barrier at approximately slab level. The cavity barrier has not been folded and was not installed under compression.

Location 2.3

Location 2.3 was the area around the window at second floor. The windows have been installed into the original structural openings and, therefore, have not been moved to suit the cavity. It was also noted that a high degree of silicone sealant had been used around the openings which, as discussed in Section 3, is a risk, however, is considered to be low risk in terms of fire spread.

The original external wall changes between brickwork and solid concrete and stone cladding.

Again, 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 barriers were found in some cases 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.

Figure 21. Location 2.3 exposed brick and mastic surrounding the window frame

Figure 22. Location 2.3 foldedhorizontal cavity barrier approximately below the window. Letterbox of removed insulation

Figure 23. Location 2.3 original rough stone concrete behind the insulation

Generally all cladding rails are considered to be outside spaces because the inside of the "C" shape takes the cladding returns and sits exposed to the open air. The rear of the rails sits against the insulation and the cavity barriers sit between rails. Between windows on different floors is a central rail which is not open to fresh air and forms a cavity between compartments. This will be addressed in Section 9.

6.4 Location 3

Location 3 was on the ground floor below the building at a raised section of the building due to the local topography.

The system was found to be:

- Solid concrete structural beam and floor.
- 80mm EPS insulation and stone render.

EPS Insulation was found at the ground floor of the building of all elevations. The insulation was installed over the original masonry external wall system, as shown in Figure 26, with a rendered stone finish. Small areas of this render were damaged prior to the inspection which BB7 removed for further inspection. EPS has a Euroclass E rating meaning that it is a highly combustible material.

Figure 24. Location 3 structural beam

Figure 25. Location 3 area below slab

Figure 26. Location 3 EPS behind stone cladding system. The original RC structure can be seen at the rear of the cavity

Figure 27. EPS removed from system

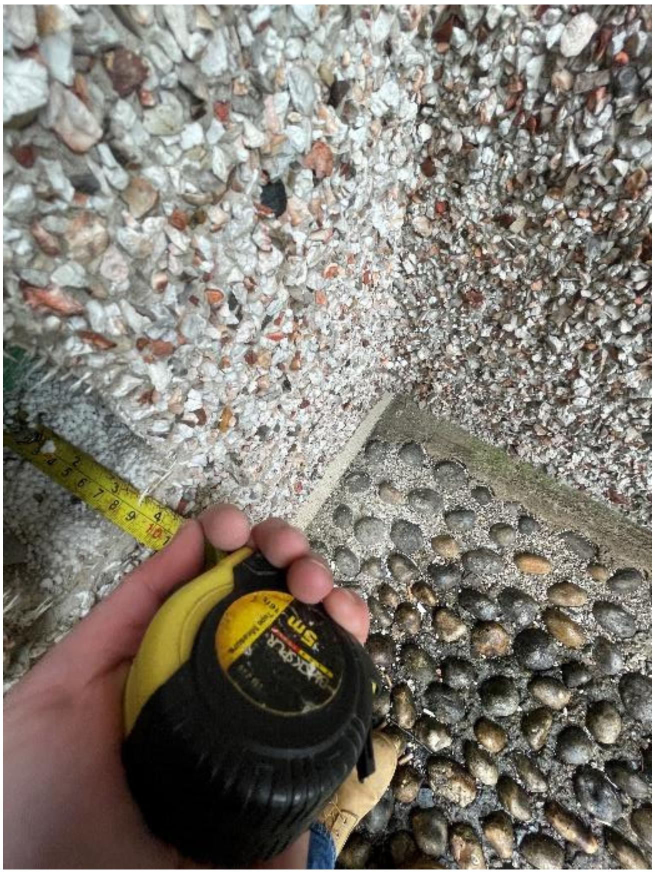

Figure 28. Location 3 shows 90mm depth of EPS system at ground floor

6.5 Location 4

Location 4 was on the South-west elevation at a compartment line between two flats on the third floor.

The system on the side was found to be:

- 5mm solid aluminium cassette panel attached to aluminium rail system which prevents cavity barriers spanning the full width of the cavity at floor level.
- 100mm horizontal (floor level) mineral wool cavity barrier reinforced with wire. The cavity barrier sat on top of the insulation (i.e., did not break the insulation). The vertical cavity barrier was folded and therefore appears to be installed under compression. The horizontal cavity barrier was not installed under compression.
- 60-70mm clear cavity.
- 100mm mineral wool insulation with plastic fixings.
- 100mm solid concrete. A hole was drilled through the concrete to determine the thickness, however, it could not be further determined what was behind the concrete without potentially compromising the integrity of the structure and causing damage internally. Please refer to Section 3 for further details.

Although a compartment line exists here between two flats, one vertical cavity barrier was observed around the window opening only. There was no vertical cavity barrier at the compartment line or around the adjacent window opening. However, it is considered reasonable to assume that the single vertical cavity barrier was not intended to perform as a cavity barrier around the window opening but as a cavity barrier along the compartment line instead. This approach is not considered to pose a significant fire risk to occupants as the barrier does divide the cavity between the compartments and is fitted under compression.

A horizontal cavity barrier was also observed at slab level.

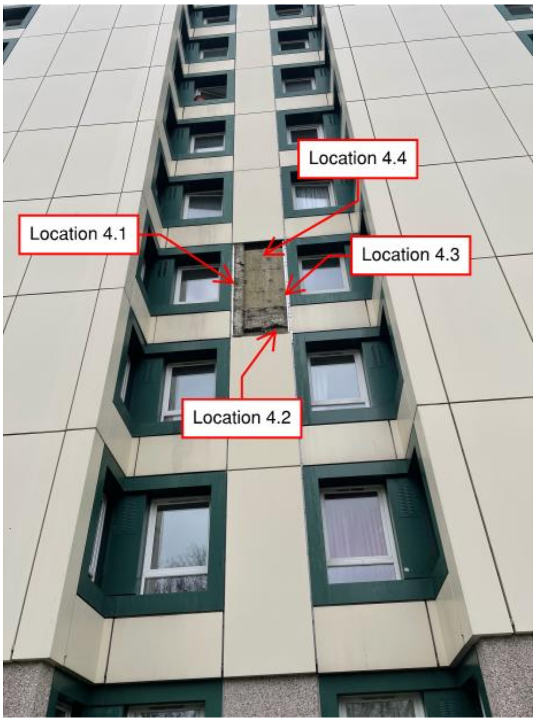

Figure 29. Location 4 areas inspected

Location 4.1

Location 4.1 shows a folded, vertical cavity barrier around the window. It appears to serve dual purpose in dividing the cavity between the two flats as discussed above which is considered reasonable.

Figure 30. Location 4.1 vertical cavity barrier around window and between two flats

Figure 31. Location 4.1 cavity barrier compressed against insulation

Location 4.2

Location 4.2 at third floor slab level showed a horizontal cavity barrier that was not folded and was not continuous due to the aluminium rails. The barrier exists between rails. Although the horizontal cavity barrier was not fitted under compression, the junction between horizontal and vertical cavity barriers appears complete which should limit the spread of fire within the cavity.

Figure 32. Location 4.2 / 4.3 horizontal cavity barrier at slab level only. There is no vertical cavity barrier around the right hand window.

Figure 33. Location 4.2 junction of horizontal and vertical cavity barriers

Location 4.4

Location 4.4 is the central area behind the cladding panel. The location is a compartment line between the two flats on the south-west elevation.

The mineral wool insulation does not fully cover the original external wall system as has been seen in other locations. This exposes the join line between the panels (see Section 3). The join line indicates these are LPS construction. However, Figure 37 shows the panels are not two 100mm leaves of RC either side of 20-25mm EPS or XPS as discussed in Section 3.

Due to the significantly reduced depth of these panels compared to other locations, the element that was drilled through appears to be one of the different methods of LPS construction discussed in Section 3.

The insulation in Figure 34 is fixed by plastic clips and the panels do not appear to consist of EPS or XPS. Considering the predominant use of non-combustible materials, the panels, join, and plastic fixings are not considered to pose a significant risk.

Figure 34. Location 4.4 where the cavity is not fully filled with insulation

Figure 35. Location 4.4 portion of the original external wall not concealed by insulation

Figure 36. Location 4.4 cavity between the original external wall and the aluminium cladding / rails

Figure 37. Location 4.4 drill hole through the stone cladding system

Figure 38. Location 4.4 close-up of the drill hole through the stone cladding system

6.6 Location 5

Location 5 was the infill panels below windows of the common lobbies of each upper residential storey. BB7 did not intrusively survey these panels, however, they have been 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.

The panels are formed of thermoplastic materials and are recessed from the main building elevations. There are no window openings from flats that open / face onto the infill panels.

The refuse chute is accessed from the common residential lobby and passes the thermoplastic infill panels on either side of the chute to the refuse store at ground floor.

The refuse store is sprinkler protected and there is a damper operated by a fusible link across the base of the chute which should prevent vertical fire spread up the chute towards the infill panels.

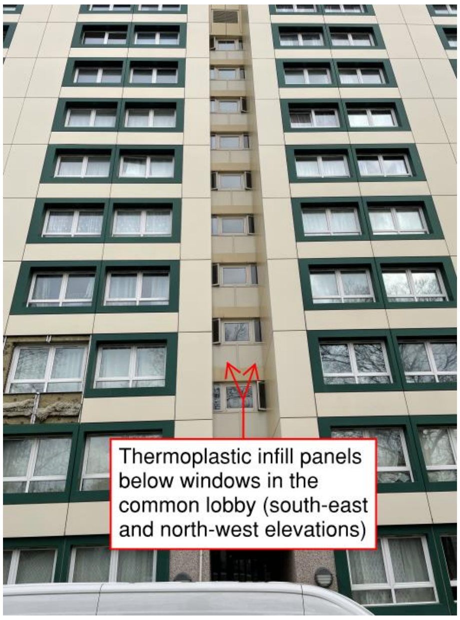

Figure 39. Lobby windows and infill panels within recessed portion of the elevation

Figure 40. Lobby windows and infill panels (internal view)

6.7 Internal survey

The common areas in Messer Court were reviewed internally on a selection of typical floor levels to determine if there are any building features which impact on the external walls.

The block is served by a single stair and there were four flats per upper floor level. The FRA document, discussed in Section Figure 7, states that the stair is currently ventilated through the roof space. The FRA recommends a survey by a smoke ventilation specialist is carried out due to the potential of a fire in the roof space to allow smoke spread into the stair via the vent.

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.

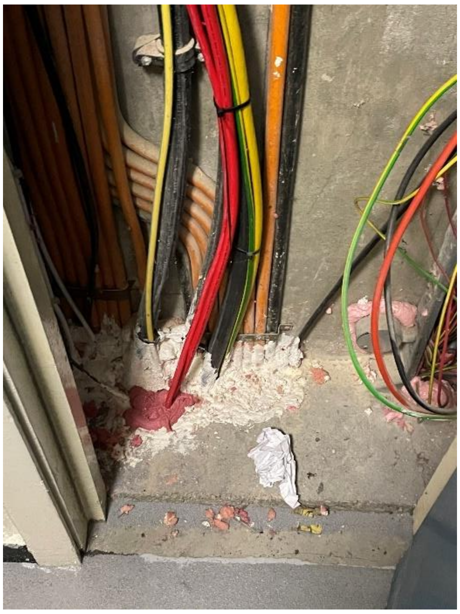

Figure 41. Poor fire stopping around service penetrations

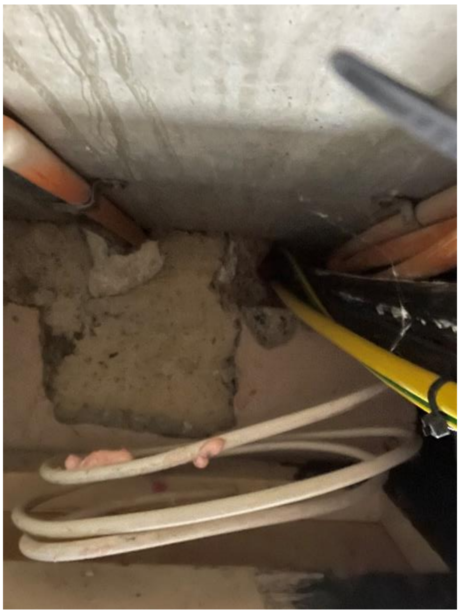

Figure 42. Poor fire stopping around service penetrations

The sprinkler stop valve was noted in the lobby of both buildings, there was no tank identified, but is likely based in the roof space, based on findings of other surveys. It could not be established the extent of the system as the flats were not reviewed internally.

The refuse chute is accessed directly from the stair lobby. The bin store is accessed from outside at ground floor only.

The bin store at ground floor was provided with a sprinkler head to reduce the potential fire size and a damper on a fusible link was provided at the end of the bin chute to reduce the chance of fire spread. This is shown in the following figure.

Figure 43. Bin chute fusible link

Figure 44. Bin chute accessed from stair lobby

The stair discharges at ground floor into the ground floor lobby. The lobby also provides access to four flats as per the upper floors. In the event of fire in a ground floor flat, the route from the stair to the building's main entrance / final exit would likely be compromised by smoke spread into the ground floor entrance lobby for occupants evacuating from the upper floors. Occupants of the upper floors may wish to evacuate the building during a fire event or may be direct to evacuate by the fire service during a fire event and therefore a clear route of escape is essential at all material times.

In the event of fire in a flat at the ground floor, the stair also continues to the basement as an alternative route of escape. The stair flight between basement and ground floor is interrupted by a door on the landing. The door is fitted with an electronic lock that should disengage on activation of smoke detection in the ground floor lobby. There is a secondary final exit at basement. Both ground and basement final exit routes need to be kept clear and useable at all material times.

Although the electronic lock on the landing door is understood to release on activation of smoke detection in the ground floor lobby, an emergency override device was not observed adjacent to the door. In the event the smoke detection system fails to release the lock, an emergency override device in accordance with BS 7273-4 should be provided to ensure the lock can be released.

The dry riser inlet is inside the building within the ground floor lobby; dry riser outlets were provided on alternate upper floors.

7. Fire Risk Assessments

The document *Fire Risk Assessment (RB-WLG7MF) - Assessed 2019-11-18 - For Messer Court (1-44) (RB-6221QW) (1)* has been forwarded. This includes Type 1 fire risk assessment and Type 4 fire risk assessment findings.

The following provides a review of the document 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.

The document is dated 18th November 2019 was conducted by Ridge and Partners LLP. The overall risk rating determined is provided in the following figure.

FIRE RISK RATING

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

Figure 45. Fire Risk Rating from Ridge & Partners LLP FRA

This rating was based on the assessment findings which were that there was storage in the stair lobby, issues with compartmentation and fire stopping, issues with fire door conditions, and no automatic smoke detection within flats identified. Additionally, although ventilation was identified in the stair and lobby, it could not be confirmed how these operated.

There are high-risk items detailed in the risk assessments which include 79 actions and 37 controls and these should be actioned to reduce the risk.

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

Both action plans are extensive and all action points should be completed. Until this is done, the building risk is increased.

8. Fire Service Access & Facilities

This section has been added to demonstrate the availability for a pump appliance to access the building. Subject to the carrying capacity, width, and turning circle of the road / track directly surrounding the property, further access may be available beyond the black dashed line.

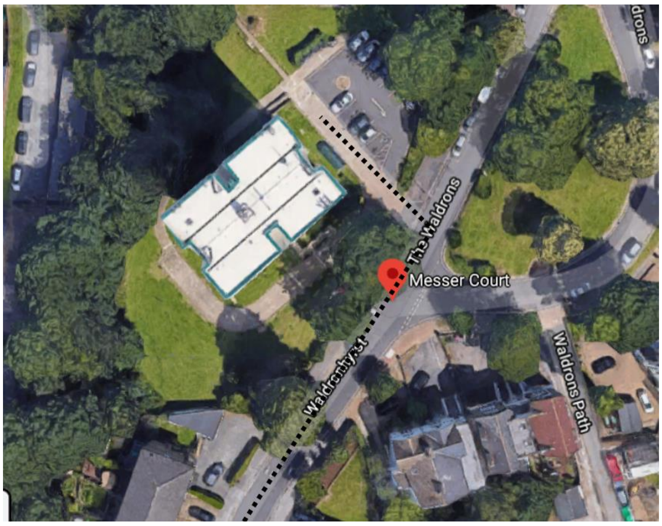

Figure 46. Site Plan

The building is bounded by one road only, The Waldrons, and the car park. This is considered to be limited vehicle access to the building's perimeter.

From The Waldrons or the car park entrance, the Fire Service can reach the front within approximately 18m.

Where access cannot be achieved by an appliance directly to the façade, there are pedestrianized routes 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.

Considering the limited vehicle access around the perimeter and the unlimited foot-access around the perimeter, the overall access to the lower levels of the building's façade is considered reasonable for firefighters.

However, the response time for high reach appliances in London is likely to be delayed and, as such, they cannot be relied upon for good vehicle access to the upper floors of the building. In this event, the materials used and the construction of the external walls and the internal provisions of firefighting equipment becomes more critical.

Internal Provisions

There are dry riser outlets provided on alternate floor levels within the stair lobby. The riser inlet is provided in the lobby on the ground floor.

Each stair lobby is understood to be automatically ventilated on actuation of smoke detection in the relevant lobby. However, this has not been confirmed.

The building is provided with at least one firefighting lift; a switch is located between the two lifts at ground floor.

The building is also provided with sprinkler protection which is likely to reduce the potential fire size and spread, although the extent of system coverage within all flats is not known.

9. Analysis

9.1 Overview

There were two systems present due to the original construction and the overcladding. Analysis of the build-up behind the original LPS RC-construction was not carried out on site as removing large panels could be potentially damaging to the building.

The cladding system was found to be:

- 5mm solid aluminium cassette panel attached to aluminium rail system.
- 100mm horizontal (floor level / around window openings) and vertical (party wall / around window openings) mineral wool cavity barriers reinforced with wire in sporadic locations only.
  The survey findings show these are not installed in all areas. The cavity barriers sat on top of the insulation (i.e. did not break the insulation), are interrupted by the over cladding rails. Some cavity barriers were fitted under compression and folded, other cavity barriers were not.
  As the rails sit atop the insulation and the cavity barriers abut the rails, it is considered that the intent of restricting unseen fire spread within the cavity is met, where cavity barriers are provided. The cladding rails interrupting the cavity barriers is not considered to pose significant fire risk.
- 60-70mm clear cavity.
- 100mm mineral wool insulation with metal fixings.
- Solid concrete / brickwork. A hole was drilled through to determine the thickness of the concrete; however, it could not be further determined what was behind without potentially compromising the integrity of the structure and causing damage internally. Please see Section 3 for further detail.

9.2 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

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 4 to Figure 6 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 leaves of RC which means it is offered a significant degree of protection.

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 fire resistance 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 throughout 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.

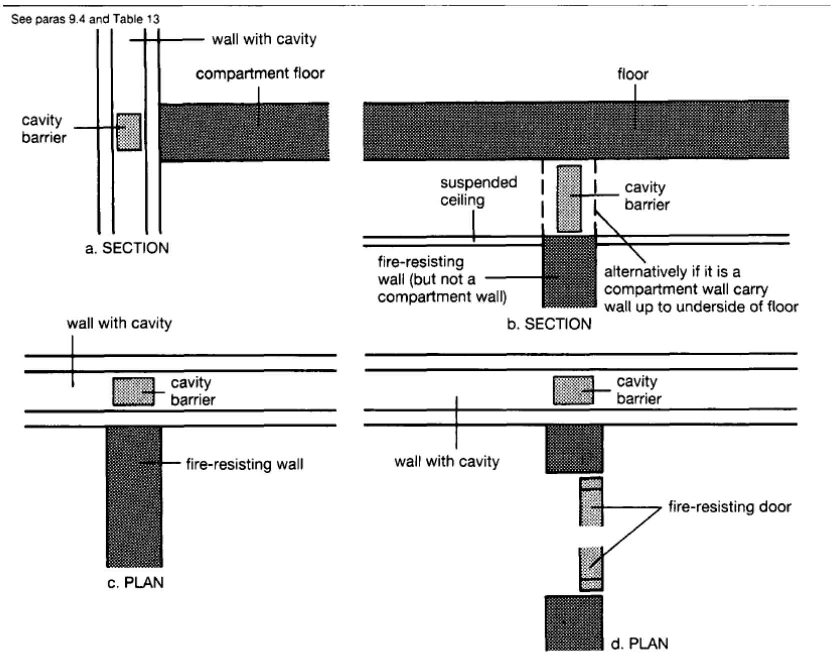

Figure 1. Diagram 27 ADB1992

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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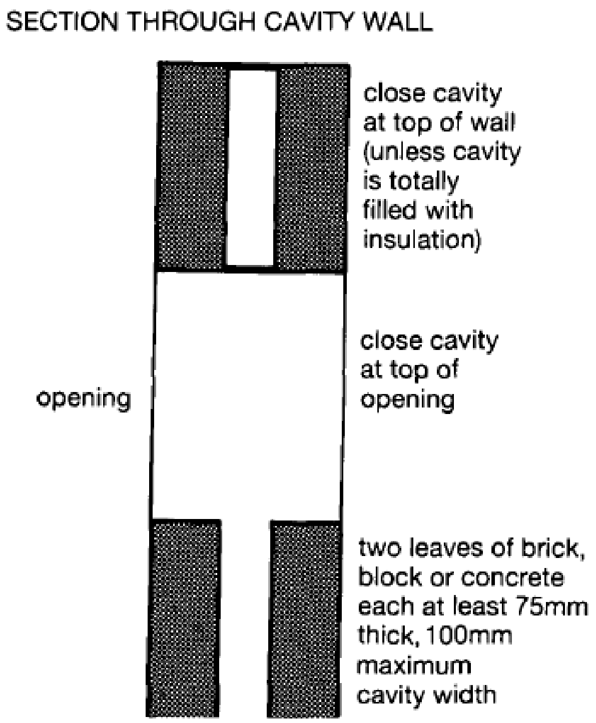
Figure 2. Table 13 - ADB1992

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.



Note: Combustible material should not be placed in or exposed to the cavity, except for:

a. timber lintols, window or door frames, or the end of timber joists

b. pipe, conduit or cable

c. DPC, flashing, cavity closer or wall tie

d. thermal insulating material

e. a domestic meter cupboard, provided that:
-there are no more than two cupboards per dwelling
-the opening in the outer wall leaf is not more than 800x500mm for each cupboard, and
-the inner leaf is not penetrated except by a sleeve not more than 80x80mm, which is fire stopped

Figure 3. 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.

9.3 System Analysis

System 1: Aluminium panel with mineral wool insulation

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

Material	Combustibility	Volume	Comments
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 100mm 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 and, in certain locations, around window openings and. due to the cladding rail system, they were not continuous horizontally at floor level.

The mineral wool cavity barriers (typical) were fixed on top of the insulation (i.e., the barriers were not continuous). In addition, not all cavity barriers were folded and therefore not fitted under compression. Without being fitted under compression, there is potential for fire and smoke to spread up the cavity as it has not been fully divided at the horizontal compartment line.

For the cavities to be divided at compartment lines, as was the design intent of guidance at the time of the over cladding, it is recommended to ensure horizontal and vertical cavity barriers are installed along compartment lines and are fitted under compression. Reference should be made to the relevant sections of ADB for materials, orientation, and fixings.

There were few cavity barriers around the flat windows and their intent may have been to divide the cavity at the compartment line. However, if a fire were to break out of a window, it is unlikely to rapidly spread through the cavity and up the building due to the lack of combustible materials 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 when these are retrofitted under compression. The Building Regulations are not applied retrospectively and so cavity barriers around window openings should not be required. This approach is further supported by ensuring suitable fixing of cavity barriers at compartment lines, the materials used in the external walls, and the sprinkler protection to flats.

The cavity barriers at compartment lines were not continuous due to the aluminium rail system. This was identified horizontally and vertically. The risk of this is considered to be low as the gap was minimal. The fixing rails for the 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, BS 7974 recognises the benefits of the sprinkler installation 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 suppressed fire within the flat will be substantially less than a flashover fire and, ultimately, the severity of a suppressed fire on the façade, if it spreads that far, will also be reduced.

System 2: Infill panel

The infill panel systems were found on the façade enveloping the common lobby below the windows and AOV.

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

The system contains a small amount of combustible insulation within the infill panels.

On both sides of the building where the infill panels were present, the panels encompass the common lobby where a fire is unlikely to originate. The infill panels are located within a recessed portion of the building elevation on each side of the building where there are no flat openings facing the panels.

Although a fire in a flat is unlikely to involve the infill panels, a fire in the refuse store could involve the infill panels. However, the store is sprinkler protected and the base of the bin chute was provided with a fire shutter activated by a fusible link. This should reduce the potential fire size in the refuse store and limit vertical fire spread up the chute.

To further mitigate the risk, it would be recommended for doors to the bin store to be kept locked when not in use to limit unauthorised access.

It is understood that, although the council have been informed the risk is considered to be mitigated by the sprinkler head and the damper, the council's operational intent is for the use of combustible materials used in the external wall to be reduced where possible such as the infill panels. It is therefore recommended that all window infill panels are to be replaced for non-combustible alternatives on the common area sections as part of a medium-long term fire safety improvement strategy for the premises.

System 3: Rendered EPS (ground floor only)

System 3 was the predominant system around the ground floor elevations. It should be noted that this is from the original substrate outwards and behind the LPS was not reviewed.

Material	Combustibility	Volume	Comments
Masonry / blockwork (outer layer)	Euroclass A1 to BS EN 13501-1	All locations (confirmed in two locations on the building)	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.
80mm EPS	Euroclass E to BS EN 13501-1	Ground floor	Highly combustible, limited to low level
10mm stone render	Unknown – Likely Euroclass A, but TBC	Ground floor	Testing of the render required to determine the risk.

The original skin of the external wall, i.e., RC LPS construction, is considered to be a low risk item. The presence of the combustible EPS insulation over the masonry is considered to be of low risk of uncontrolled fire spread as the system was found at low level only at ground floor. However, to enhance the life safety to the occupants BB7 recommend replacement of the insulation for a non-combustible alternative.

10. Conclusions and recommendations

10.1 Conclusions

BB7 have been appointed to provide an EWS1 form for Messer Court located in Croydon, South London. This report has outlined BB7's intrusive survey findings, analysis of the external wall systems, and conclusions. BB7 intrusively surveyed the building on 23rd March 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.

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

10.2 Recommendations

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

10.2.1 Interim recommendations

The B2 designation is based on there being combustible materials present in the infill panels below windows opening to the common lobbies.

These are small areas of the façade which are recessed from the main elevation which predominantly consists of mineral wool insulation and cavity barrier provision. The risk of the combustible material is low as the infill panels are generally away from the fire source and it is unlikely that a fire will spread due to the non-combustible materials on the remainder of the façade.

Furthermore, the flats are provided with sprinkler protection which is considered to significantly lower the severity of a fire and reduce the risk of a fire actually breaking onto the façade.

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

As such, the risk is considered to be low, however, there is still a risk present to warrant remedial works whilst also considering the operational intent of the council regarding the use of combustible materials in the external wall system/s.

The B2 designation does not, however, mean that the building's evacuation strategy needs to change; it means that BB7 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.

Section 11 of the Governments Consolidated Advice Note provides guidance on this issue. As per this report, there are 79 actions and 37 controls on the FRAs which should be carried out, if not done so already.

There are a number of factors which can be considered:

1. Although the building is slightly more than 30m to the top finished floor, it is provided with a sprinkler system which can reduce the severity of a fire within a flat.
2. Fire Service vehicle access to the building is limited around the permitter but the perimeter has good personnel access on foot. The Fire Service would not likely experience an undue delay in getting water onto a façade fire at low level. However, a high reach appliance would

struggle to reach the full elevations. Furthermore, the response time for high reach appliances in London is likely to be delayed and, as such, they cannot be relied upon.

The average crew attendance time at an incident for Croydon FRS was 5min 03sec in 2020.

3. The outer face is solid aluminium and the insulation is non-combustible mineral wool throughout the main external wall system. This is unlikely to significantly add to fire spread up the external wall.
4. The cavity barriers were in place and although mostly not under full compression they will slow the progress of the fire by restricting the cavity width.

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

- The findings and recommended actions within the FRAs should be implemented.
- Residents should be informed of their responsibilities in terms of fire safety.
- Risers in the lobby and stair should be reviewed to ensure fire and smoke spread is limited into the escape routes.
- The local FRS will need to be informed of the assessment findings.
- Electronic locks require an emergency override device in accordance with BS 7273-4

10.2.2 Long term recommendations

BB7 make the following recommendations:

- Any infill panels with thermo plastic insulation should be replaced with a non-combustible alternative.
- Cavity barriers should be provided under compression horizontally at floor levels and vertically at compartment walls where they are not installed.
- The render system at ground floor should be replaced for a non-combustible alternative.
- The fusible link on the damper serving the bin chute should be inspected and serviced regularly.
- All points raised on the Fire Risk Assessment should be adhered to.

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LONDON AND THE SOUTH EAST
23 Star Hill
Rochester
Kent
ME1 1XF

NORTH EAST
Century Way
Thorpe Park
Business Park
Leeds
LS15 8ZA

SCOTLAND
Pentagon Centre
26-38 Washington Street
Glasgow
G3 8AZ

NORTH WEST
2 Jordan Street
Manchester
M15 4PY

NORTHERN IRELAND
Nextspace
Antrim Enterprise Park
58 Greystone Road
Antrim
BT41 1JZ

CENTRAL AND EAST
Castle Hill House
Huntingdon
Cambridgeshire
PE29 3TE

IRELAND
Unit G
Mountpleasant Business
Centre
Mountpleasant Avenue
Rathmines
Dublin
D06 K762

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