

ROYAL ARTILLERY QUAYS (RAQ)

SARK TOWER (E)

GRANARY MANSIONS (F)

FIRE RISK APPRAISAL OF EXTERNAL WALL CONSTRUCTION

PROJECT NUMBER 21-1194

REVISION R00

REPORT DATE: 29TH JULY 2022

**URBAN
CHANGE**



DOCUMENT CONTROL

URN	Author	Checker	Approver
220729 FRAEW Report Sark and Granary RAQ 21-1194 R00	GWJ	PMC	PMC

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EXECUTIVE SUMMARY

Following the discovery of combustible materials within the external wall construction of the blocks at Royal Artillery Quays (RAQ) and the signing of the Government's 'Developer Pledge' by Barratt Homes (East London) Ltd (the original developer), Urban Change has been instructed to complete a Fire Risk Appraisal of the External Wall Construction (FRAEW) for the 2No. multi-occupied residential blocks now owned by Blackpen Limited.

Our holistic appraisal considers a range of risk factors (performances of façade materials, façade configuration and building design) to establish the risk to relevant persons associated with external fire spread. Our appraisal adopts the performance criteria and methodology presented in the recently released PAS9980 (2022) specification.

The outcome of the appraisal for each block is outlined below:

FRAEW Outcome				
Block Name	Address	Postcode(s)	Fire Risk	EWS1 Results
Sark Tower	1-66 Sark Tower, Erebus Drive, London	SE28 0GG	High	B2
Granary Mansions	1-57 Granary Mansions, Erebus Drive, London	SE28 0GH	High	B2

The High Risk identified for both blocks is primarily due to poor workmanship in the installation of the external wall insulation (render) system (Wall Type 1), the predominant wall type across the blocks. In addition, a lack of closure at the head of masonry walls in the small single stair accommodation wings and the use of combustible insulation within spandrel and infill panels of Wall Type 3 increases risk in specific areas.

Given the level of fire risk, we have recommended short-term (interim measures) and long-term remediation to safeguard Relevant Persons from harm. This includes the full replacement of the EWI system across all blocks, targeted replacement of certain insulated panels and internal fire-stopping enhancement to ensure potential masonry wall defects do not result in harm to escaping occupants.

In the interest of proportionality and in response to the originally specified EWI system achieving a BR135 classification, we considered the potential for undertaking supplementary fire testing of the as-built EWI system (to BS8414-1) to establish whether partial system retention was practicable. Unfortunately, due to the variability of the workmanship defects observed by the intrusive inspections, there is a high level of uncertainty that any test specimen defined using sample-based inspection would be representative of the reasonable worst-case installation. In our professional opinion, this has precluded the option of reduced / partial EWI system replacement.

1 APPRAISAL DETAILS

1.1 Property

Development Name	Royal Artillery Quays (RAQ)
Property Addresses	1-66 Sark Tower, Erebus Drive, London, SE28 0GG
	1-57 Granary Mansions, Erebus Drive, London, SE28 0GH
Client	Blackpen Limited c/o HomeGround Management Limited
Managing Agent	Rendall & Rittner
Year of Construction (Age)	2002
Inspection Dates (Refer to Annex C)	22 nd March 2022
	22 nd July 2022
Assessment Date	29 th July 2022

1.2 External Wall Assessors

Personal Details

Role	Lead Assessor	Assessor
Name	Gavin Jones	Paul Coyle
Qualifications	MEng (Hons) CEng MIFireE MSyl	BSc MSc AIFireE
Professional Registration	Institution of Fire Engineers Engineering Council UK	Institution of Fire Engineers
Registrant No	36205	39607

Competency Declaration

The assessors used to perform the FRAEW are fire engineers with extensive experience in fire safety design, construction and fire risk assessment of multi-occupied residential buildings and have the necessary knowledge, skills and experience to appraise external wall systems.

The Lead Assessor, Gavin Jones, is a Chartered Engineer registered with the Engineering Council UK via the Institution of Fire Engineers (Registration No. 36205) and has 18 years of relevant experience.

1.3 Property Identification

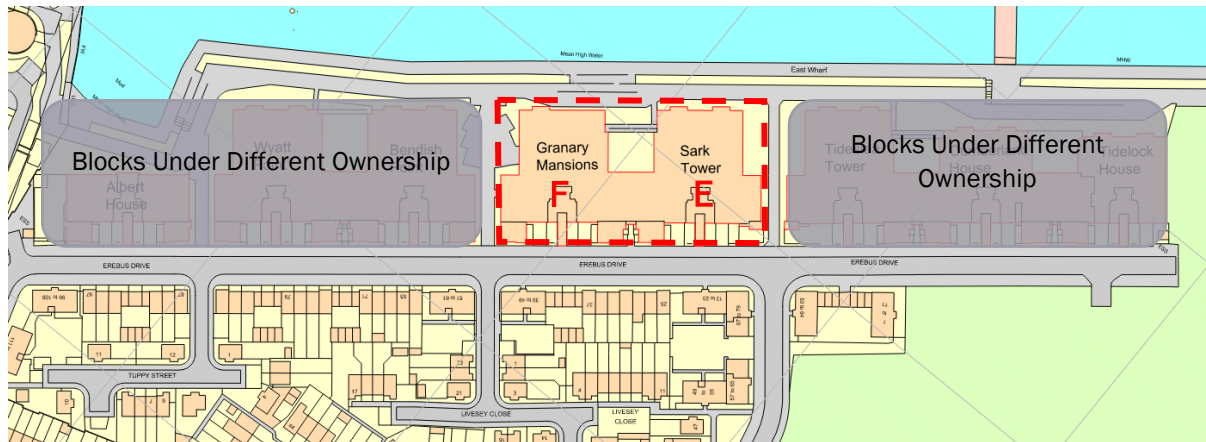


Figure 1 Royal Artillery Quays - Site

1.4 FRAEWC Validity

Unlike EWS1 Forms, a FRAEW does not have a specific validity period. In general, a FRAEW should be reviewed to ensure its conclusions remain valid in the following circumstances:

- a) if there are significant changes/repairs made to the external wall; and/or
- b) in the event of a fire incident, if the fire involves the external wall construction; and/or
- c) if there is any material change at the property or to the fire strategy of the property, e.g. the fire hazards increase, there are changes in the approach to fire risk management, there is a material change of use or a material alteration.
- d) if there is a change in knowledge or more definitive information becomes available in relation to the primary external wall materials, any proprietary systems or the performance of fire safety components, e.g. cavity barriers/fire stopping.
- d) at the request of a competent Fire Risk Assessor or the Authority Having Jurisdiction, e.g. Health & Safety Executive or the Fire & Rescue Authority (as appropriate).

Even if any of the above circumstances do not trigger a review, PAS9980 (2022) recommends that a property with a FRAEW result of 'Medium Risk' is subject to a periodic review.

Block	Periodic Review Date(s)	EWS1 Review ¹
Sark Tower	N/A – High Risk	Remediation required
Granary Mansions	N/A – High Risk	Remediation required

Note 1 – Current RICS EWS1 Form validity specified in Note 10 of the EWS1 Form is 5 years.

2 INTRODUCTION

2.1 Context

Urban Change has been appointed by Blackpen Limited (Freeholder) to undertake a Fire Risk Appraisal of the External Wall construction (FRAEW) for two multi-occupied residential blocks at the development.

In accordance with the guidance set out in PAS9980 (2022) and as required by the Fire Safety Order (2005), in setting out our recommendations for remediation, we have considered a range of risk mitigation options, not simply the wholesale removal of combustibles from the external wall construction, as this may be disproportionate in the circumstances and other options may deliver a reasonable level of safety with reduced negative impacts, e.g. reduced cost, reduced disruption, reduced health & safety implications.

Our recommendations are set out in Sections 8 & 9 of the report, and they should be considered in the context of the general Fire Risk Assessment (FRA) of each block.

2.2 Relevant Legislation, Standards & Guidance

Regulatory Reform (Fire Safety) Order 2005

As existing multi-occupied residential buildings, the Royal Artillery Quays blocks are subject to the Regulatory Reform (Fire Safety) Order 2005. As such, the Responsible Person must:

- take such general fire precautions as will ensure, so far as is reasonably practicable, the safety of any of his employees; and
- in relation to relevant persons who are not his employees, take such general fire precautions as may reasonably be required in the circumstances of the case to ensure that the premises are safe.

This report should inform the general fire risk assessment of the buildings, as it provides a record of our significant findings regarding the fire risk associated with the construction of the external walls and specified attachments. The Fire Safety Act 2021 has clarified that these elements fall within the scope of the Fire Safety Order (2005).

Building Regulations 2000 & Statutory Guidance

It is understood that the blocks were constructed between 2002-2003. As such, the applicable fire safety legislation at the time was likely Part B of the Building Regulations (2000). The functional requirements relating to the fire performance of external walls were Requirement B3(4) and Requirement B4(1), and these remain relevant today:

Schedule 1 Requirements of the Building Regulations 2000

- ❖ *B3(4) - The building shall be designed and constructed so that the unseen spread of fire and smoke within concealed spaces in its structure and fabric is inhibited.*
- ❖ *B4(1) - 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 position.*

In preparing our FRAEW, for the purpose of understanding recommended good practice in the design and construction of external walls at the time of development. We have referenced Approved Document B Fire Safety 2000.

Please note that it is not the aim of this report to confirm compliance with the Building Regulations 2000

Regulation 7 - Building (Amendment) Regulations 2018 (SI 2018/1230)

A significant change to legislation relating to new buildings was made in December 2018 by the enactment of the Building (Amendment) Regulations 2018, which introduced a ban on the use of combustible materials in the external walls and specified attachments of Relevant Buildings (with minor component exceptions).

If constructed today, both blocks would be classed as Relevant Buildings and would attract the requirements of the combustibles ban, as their highest occupied floors are more than 18m above fire service access level.

MHCLG Consolidated Guidance

In January 2020, and supplemented in November 2020, the Ministry of Housing, Communities & Local Government (MHCLG) released consolidated guidance relating to fire safety in existing residential buildings, titled: '*Advice for Building Owners of Multi-storey, Multi-occupied Residential Buildings*'. This guidance was applicable at the time of the earlier external wall investigations but was withdrawn in early January 2022 and replaced by PAS9980 (2022).

EWS1 Process

EWS1 is a cross-industry initiative led by the Royal Institute of Chartered Surveyors (RICS) and endorsed by UK Finance, the Building Societies Association (BSA), the Institute of Residential Property Management (IRPM) and the Association of Residential Managing Agents (ARMA).

For lending purposes, EWS1 standardises the reporting of external wall assessments for existing residential properties that are known to have, or potentially have, combustible materials in their external wall systems or balconies. This standardisation is designed to improve the confidence of lenders, valuers, residents and the buyers and sellers in the fire safety of multi-occupied residential properties. The process was developed through extensive consultation with a wide range of stakeholders.

We have outlined the EWS1 result for each block, corresponding with the FRAEW results presented in this report.

As set out in RICS guidance, our EWS1 classification is for the sole and exclusive benefit of our Client, and no responsibility is accepted to any third party for the whole or any part of its contents. For the avoidance of doubt, the term 'third party' includes (but is not limited to): any lender who may see the assessment during the process through which they come to make a loan secured on any part of the subject address and any prospective purchaser who may see the review during the process through which they come to purchase an interest in any part of the subject address.

3 OUR FRAEW METHODOLOGY

3.1 Five-Step Approach

PAS9980 (2022) was released by the British Standards Institute (BSI) in January 2022. We have adopted the guidelines outlined within this new standard for reporting our findings and recommendations.

We have completed the following five steps to complete the FRAEW:

Steps	What we did	Report Section
Step 1	Confirm that a full FRAEW is required.	5
Step 2	Gather all necessary information to complete the FRAEW.	4 & Annexes B-E
Step 3	Identify and group factors that are significant in determining the risk rating.	6
Step 4	Consider each group of risk factors to determine their potential contribution to the overall risk.	6
Step 5	Review the risk factor analysis against the benchmark success criteria to determine an outcome.	7

3.2 Risk-based Appraisal

Our risk-based FRAEW considers a range of risk factors that influence the fire risk associated with external wall systems, that includes the following:

- **Fire performance** of the external wall construction and cladding.
- **Façade configuration**, i.e. features that may influence fire spread.
- **Fire safety design / fire strategy**, including consideration of fire service intervention.

This type of approach provides a greater degree of latitude than a compliance-based approach which is more suited to the design of new buildings. However, this approach is associated with the following limitations:

- it cannot provide certainty and will therefore include a degree of subjectivity.
- it does not necessarily offer any protection to firefighters, who are not relevant persons and whose actions will be influenced by the specific circumstances of an incident and by operational tactics, which may change over time.
- it is based on current guidance and available knowledge regarding the performance of external wall systems in fire, and more definitive information regarding fire performance is likely to come to light subsequently.

3.3 Benchmark Criteria

For our FRAEW, we have adopted the benchmark criteria in PAS9980 (2022) to determine the risk ratings awarded for each block. We have assessed whether:

- rapid external fire spread is likely to occur; and/or
- whether fire spread is likely to give rise to widespread secondary fires resulting in occupants being significantly harmed or prevented from escaping; and/or
- whether a fire is likely to spread in such a way that the communal means of escape will be compromised before occupants can safely use them to escape; and/or
- whether the fire and rescue services are likely to be able to intervene effectively to enable occupants to reach safety in time.

The assessment of these criteria results in the award of a Risk Rating from Low to High as described below:

Risk Rating	Description
Low	We have concluded that external fire spread via the external wall construction is likely to be within normal expectations.
	<u>What this means:</u> No remediation is required.
Medium	We have concluded that external fire spread via the external wall construction is likely to be more rapid than normally expected but tolerable in the circumstances.
	<u>What this means:</u> Periodic review will be required to ensure continued safety for relevant persons.
High	We have concluded that external fire spread via the external wall construction is likely to be more rapid than normally expected and is unacceptable in the circumstances.
	<u>What this means:</u> We have made recommendations for proportionate short-term (interim) measures and remedial action to offer a reasonable standard of safety for relevant persons.

4 PROPERTY DESCRIPTION

4.1 Block Characteristics

Block Ref.		Sark Tower (E)	Granary Mansions (F)
Building Type(s)		Residential	Residential
Occupancy Type ⁽¹⁾		GNH	GNH
Height (approx.) ⁽²⁾		46.6m	32.35m
No. of Floors	Tower	17 LGF, UGF+15	12 LGF, UGF+10
	Small Wing	3 LGF, UGF+1	3 LGF, UGF+1
	Small Wing	3 LGF, UGF+1	3 LGF, UGF+1
Flats	Tower	Flats 5-10, 15-20 & 23-66	Flats 6-11, 17-22 & 25-57
	Small Wing	Flats 1-4, 13 & 14	Flats 1, 3-5, 15 & 16
	Small Wing	Flats 11, 12, 21 & 22	Flats 2, 12-14, 23 & 24
Other uses ⁽³⁾ :		Ancillary	Ancillary
Cores	Tower	1	1
	Small Wing	1	1
	Small Wing	1	1
Structure		Concrete	Concrete
Notes:		1) GNH = General Needs Housing 2) Height information taken from construction sections prepared by Barratt Homes (East London) Ltd. 3) Ancillary use includes plant rooms and car parking located on Lower Ground Floor.	

4.2 Relevant Persons

Block	Sark Tower	Granary Mansions
Residents / Visitors	Familiar Sleeping Risk	Familiar Sleeping Risk
Staff	Site Staff: 8 (including site manager, 24-hour concierge) Concierge Office: Tideslea (Lower Ground Floor) Site Managers Office: Tidlock House (Lower Ground Floor)	

4.3 Fire Safety Information

Block Ref	Sark Tower	Granary Mansions
Fire Incident History	None	None
Date of last FRA	Feb 2022	Feb 2022
Enforcement action?	None Reported	None Reported

5 FRAEW REQUIREMENT

In accordance with PAS9980 (2022), as Step 1 of our appraisal, we considered whether the blocks at Royal Artillery Quays were in scope and whether a full FRAEW was required given the known construction of the external walls.

Block Name	Full FRAEW Required?	Justification
Sark Tower	Yes ☒ No ☐	Applies to both blocks: - Multi-occupied residential blocks - High Rise - External walls feature EWI render system known to incorporate expanded polystyrene insulation.
Granary Mansions	Yes ☒ No ☐	

6 RISK FACTORS

6.1 Introduction

In this section, the fire performance of the external wall materials, façade configuration and building fire safety design / fire strategy are considered in terms of their influence on fire risk. Information is drawn from Section 4 & Annexes B-E of the report.

6.2 Fire Performance Risk Factors

Risk Factor		Commentary	Positive	Neutral	Negative
a) Materials Combustibility	WT1	System BR135 classification achieved through BS8414-1 testing for the system as specified. Major workmanship defects not tested and anticipated to impact the rate of fire spread and the thermo-mechanical response.	☐	☐	☒
	WT2	Traditional Masonry Wall	☒	☐	☐
	WT3	Aluminium / Glass Panels	☒	☐	☐
b) External Surfaces	WT1	Thin coat acrylic render – Class C	☐	☒	☐
	WT2	Masonry	☒	☐	☐
	WT3	Aluminium / Glass	☒	☐	☐
c) Facings / Cladding Panels	WT1	As per risk factor B	☐	☒	☐
	WT2	As per risk factor B	☒	☐	☐
	WT3	As per risk factor B	☒	☐	☐
d) Panel Construction	WT1	N/A	☐	☒	☐
	WT2	N/A	☐	☒	☐
	WT3	N/A	☐	☒	☐
e) Cavities (Cavity Facings & Cavity Subdivision)	WT1	Direct fix EWI, but small cavities noted due to Dot and Dab application to a masonry substrate	☐	☐	☒
	WT2	Traditional cavity construction with Class A1 facings. Cavity head not closed and could impact means of escape corridors in small blocks.	☐	☐	☒
	WT3	N/A - Sandwich construction of panels	☐	☒	☐
f) Insulation (Outer Wall Construction)	WT1	Class E – EPS (Class E)	☐	☐	☒
	WT2	Airtec (Class F)	☐	☐	☒
	WT3	Aluminium – XPS (Class E) Glazed - 50mm PIR/PUR (Class C or worse)	☐	☐	☒
g) Substrate(s)	WT1	Blockwork	☒	☐	☐
	WT2	Blockwork	☒	☐	☐
	WT3	Blockwork or SFS with plasterboard (penthouses & stairs)	☒	☐	☐
h) Sheathing Board	WT1	N/A – Blockwork	☒	☐	☐
	WT2	N/A – Blockwork	☒	☐	☐

	WT3	Plasterboard (penthouses and stairs)	☒	☐	☐
i) Insulated Core Panels	WT1	N/A	☐	☒	☐
	WT2	N/A	☐	☒	☐
	WT3	See Risk Factor K	☐	☒	☐
j) ETICS – External Thermal Insulation Composite System	WT1	System as specified; system meets BR135 criteria. System as installed; performance unknown but thin coat render, combustible insulation, and defective fire barriers.	☐	☐	☒
	WT2	N/A	☐	☒	☐
	WT3	N/A	☐	☒	☐
k) Infill / Spandrel Panels	WT1	N/A	☐	☒	☐
	WT2	N/A	☐	☒	☐
	WT3	Combustible insulation, not fully encapsulated.	☐	☐	☒
l) Internal Linings	WT1	Dot and dab plasterboard with paint / wallpaper finishes	☐	☒	☐
	WT2	Dot and dab plasterboard with paint / wallpaper finishes	☐	☒	☐
	WT3	Blockwork or plasterboard with paint/wallpaper finishes	☐	☒	☐
Fire Performance Risk Factor Summary					
WT1 (EWI Render System)			2	6	4
WT2 (Masonry Wall)			5	5	2
WT3 (Spandrel / Infill Panels)			5	5	2
Overall Tally			12	16	8
Synopsis (see overleaf)					

Appraisal of fire performance of the external wall materials points towards a Medium to High-risk outcome for both blocks with similar construction.

Wall Type 1

The first stage result is primarily driven by Wall Type 1 (EWI system), which was not installed in accordance with the manufacturer's recommendations.

The observed workmanship defects listed below are serious, which means that the BR135 classification achieved from recent BS8414-1 testing, sponsored by the system manufacturer, cannot be relied upon to predict the as-built system performance.

Notable workmanship defects:

- 1) **Fire Barrier Mechanical Fixing Spacing:** Fewer fixings than specified (specified maximum horizontal distance 400mm) and up to 1200mm observed on site.
- 2) **Fire Barrier Mechanical Fixing Type:** Steel pin with plastic washer, rather than steel washers as specified.
- 3) **Secondary Fixings:** Steel fire fixings were required at a rate of 1 per 1m² but not evidenced.
- 4) **Render Coat Thickness:** Specified thickness 7.5mm (6mm basecoat & 1.5mm topcoat). Observed typical thickness c.3mm-5mm.
- 5) **Insulation & Fire Break Adhesive Application:** Dot and dab application technique adopted, rather than full bead as specified, resulting in a small cavity between the system and its masonry substrate.

Fire testing to BS8414-1 has demonstrated that had the system been installed in accordance with the manufacturer's specification, the rate and extent of external fire spread would have pointed to a Low-Medium outcome, despite the use of combustibles, and subject to consideration of other risk factors.

In the specimen tested to BS8414-1, photographic evidence shows that horizontal fire breaks across the system were largely intact post-test, and mineral wool breaks, along with a thicker basecoat render, would have impeded fire exposure of EPS up the face of the specimen and hence the rate of vertical fire spread.

At the RAQ blocks, the combination of fewer and less reliable fixings (feature plastic washers), reduced render thickness and gaps to the rear of the fire breaks (due to the fixing method adopted) means there is potential for a greater rate and extent of fire spread. This could occur where a fire can attack the combustible insulation and fire breaks much earlier in the incident timeline and effectively bypass fire barriers. Such a scenario could also lead to inferior thermo-mechanical performance, such as system collapse.

As there was a margin of safety in the results of fire testing conducted to date, theoretically, there is merit in considering additional fire testing of the as-built condition. However, inconsistency in workmanship seen across sampled inspection locations means that extensive opening-up would be required across all elevations of the blocks (to increase confidence in the validity of any test specimen design). This makes a remediation approach based on supplementary fire testing impracticable.

With the current level of uncertainty over the quality of installation across the blocks, façade configuration and fire safety design risk factors become critical in determining whether there is any prospect, in the circumstances, of retaining all or part of the EWI system.

Wall Type 2: There is a low risk associated with the materials used in the build-up of Wall Type 2. However, intrusive investigations identified open cavities which have potential, due to the presence of combustible insulation and unrated cavity closers, to impact means of escape.

Wall Type 3: Spandrel and infill panels across the blocks contain combustible insulation. Generally, this is of limited concern, as panel surfaces are non-combustible and intrusive investigations have found evidence of fire stopping, albeit not to modern tested proprietary arrangements. Façade configuration has determined where it is appropriate to retain or replace these panels.

6.3 Facade Configuration Risk Factors

Risk Factor		Observations / Notes	Positive	Neutral	Negative
a) Building Heights	Both Blocks	>18m	☐	☐	☒
b) Height of cladding relative to ground level	Both Blocks	EWI <2m above podium level but no vehicular access to this level and limited other ignition sources	☐	☒	☐
c) Extent of Cladding	Both Blocks	Majority of tower external walls feature EWI	☐	☐	☒
d) Cavities	Both Blocks	Extent of masonry cavities is limited. Potential for extensive cavities behind EWI insulation due to the fixing method adopted. No fire breaks around window openings.	☐	☐	☒
e) Infill / Spandrel Panels	Both Blocks	Glazed spandrels in vertical alignment with windows on North Elevations.	☐	☐	☒
f) Setbacks	Both Blocks	Penthouses setback from principal elevations. Setbacks Level 4 or 5 south elevations.	☐	☒	☐
g) Overhangs / Projections	Both Blocks	Projecting concrete balconies offer the potential to deflect fire from a door/window opening away from the external wall. No other material overhangs.	☐	☒	☐
h) Accommodation Openings, e.g., windows/doors	Both Blocks	Continuous EWI between the majority of window openings.	☐	☐	☒
i) Relationship of combustibles with openings onto escape routes	Both Blocks	The EWI system runs from the edge of curtain walling of the single stair serving the towers	☐	☐	☒
	Both Blocks	The EWI system runs into the recess surrounding the final exit of each block. Alternative escape available via car park openings.	☐	☒	☐
j) Attachments	Both Blocks	Principally non-combustible balconies	☒	☐	☐
k) Services Openings, e.g., vents & flues	Both Blocks	Flues and vents penetrate all wall types. These feature combustible pipes with no fire breaks / wraps observed.	☐	☒	☐
l) The proximity of combustible elements to neighbouring buildings	Both Blocks	A fire within the tower or small single-stair wings has the potential to spread externally via the EWI system.	☒	☐	☐
Sark Tower			2	5	6
Granary Mansions			2	5	6
Synopsis (see overleaf)					

The façade configuration risk factors for both blocks tend towards a high-risk outcome and a requirement for external wall remediation.

The EWI system, with its noted defects, is present on all elevations and covers a significant portion of the external walls over the full height of the blocks.

The blocks feature extensive window and door openings, and Wall Type 1 is positioned near the single means of escape stair and common corridor windows.

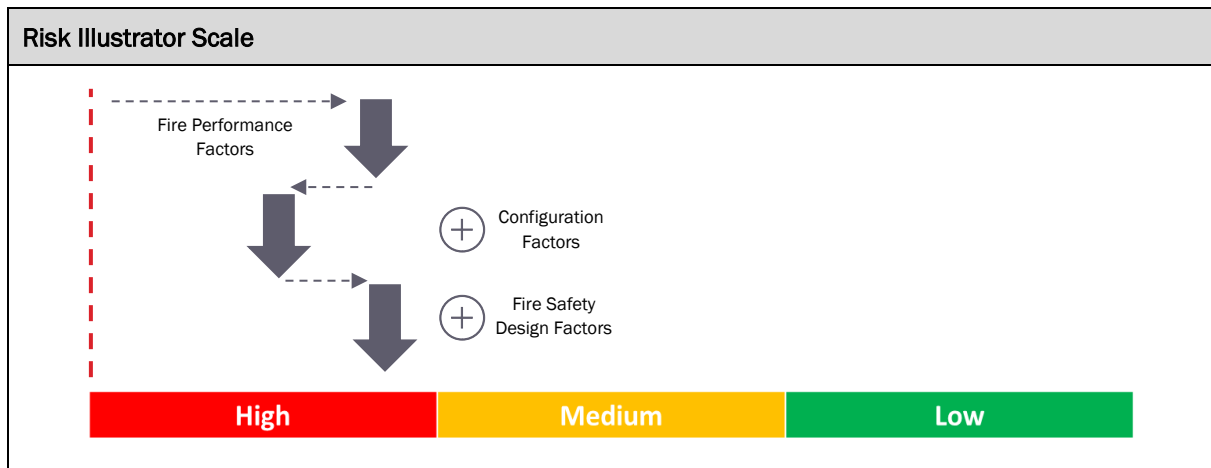
6.4 Fire Safety Design / Strategy Risk Factors

Risk Factor		Commentary	Positive	Neutral	Negative
a) Occupancy	Both Blocks	General needs housing.	☐	☒	☐
b) Evacuation strategy	Both Blocks	Stay-Put	☐	☒	☐
		Temporary Simultaneous. Intent is to return to the original strategy.	N/A	N/A	N/A
c) Escape route design	Both Blocks	Single stair arrangements – Limited travel distances	☐	☒	☐
d) Compartmentation	Both Blocks	Traditional robust construction using concrete and blockwork.	☐	☒	☐
e) Smoke control	Both Blocks	Towers - Natural AOVs to shaft with roof level discharge.	☐	☒	☐
		Small single stair wings – OVs within masonry walls	☐	☒	☐
f) Fire detection and alarm	Both Blocks	Smoke alarms in flats	☐	☒	☐
g) Fire suppression	Both Blocks	None	☐	☒	☐
h) Fire-fighting access	Both Blocks	Typical arrangements for high-rise residential. High-reach appliance access is limited to south elevations.	☐	☒	☐
i) Fire-fighting water, e.g., rising mains	Both Blocks	Dry mains in all blocks over 18m. No dry main in small wings.	☐	☒	☐
j) Fire-fighting lifts	Both Blocks	Suitable lifts present, subject to evidence of maintenance of ATS and secondary power supplies.	☐	☒	☐
Tally					
Sark Tower			0	11	0
Granary Mansions			0	11	0
Synopsis					
There are no bespoke features that either offset or heighten the external wall fire risk. The general fire precautions are typical for residential blocks of this height and age. Although the design of the podium areas restricts external fire appliance access to internal (courtyard) elevations, this is counterbalanced by these areas being largely hazard free, e.g. no vehicular access or parking adjacent to the blocks.					

7 FRAEW OUTCOME

7.1 Appraisal Risk Ratings

Block	Risk Rating	External Wall Remediation?	Short Term measures?
Sark Tower & Granary Mansions	High	Yes ☒ No ☐	Yes ☒ No ☐
The fire risk associated with external fire spread at the RAQ blocks is High because of poor workmanship in the installation of Wall Type 1 and the use of combustible insulation within spandrel and infill panels of Wall Type 3. As such, both short-term (interim) and long-term remediation are recommended to safeguard Relevant Persons from fire.			
Performance Against Individual Benchmark Criteria (PAS 9980, 2022):			
Conditions regarded as being demonstrably unsafe:	Result	Justification	
a) fire spread is likely to be extremely rapid.	True	The predominant wall type (WT1) features combustible materials and numerous defects against the manufacturer's specification. The combination of those defects means there is a high level of uncertainty in the ability of the system to suitably inhibit external fire spread. Fire performance test data obtained in accordance with BS8414-1 is not valid for the as-built condition due to variations in the test specimen.	
b) fire spread is likely to give rise to widespread secondary fires resulting in occupants being significantly harmed or prevented from escaping.	False	The external wall substrate to WT1 is blockwork, i.e. fire resisting. Apartments feature automatic smoke alarms to warn occupants of fire in the event of re-entry of fire to neighbouring apartments via openings.	
c) fire is likely to spread in such a way that the communal means of escape will be compromised before occupants can safely use them to escape.	True	Both the EWI system (WT1) and combustible aluminium spandrels (WT3) are located: - immediately adjacent to the single stair serving the towers of each block; and - the external walls on either side of the recess surrounding the block's final exits. As a result, a stay-put evacuation strategy could be compromised by fire break-out from an opening, spread over the surface of the block and re-entry to the single common means of escape stair or associated common corridors.	
d) the fire and rescue service are unlikely to be able to intervene effectively to enable occupants to reach safety in time.	True	Wall Type 1 and 3 are immediately adjacent to the only firefighting access stair serving each block. The blocks were designed based on internal fire intervention, using the firefighting lift, stair and dry main. If these precautions are not available in the event of fire re-entry to common areas (via the external wall systems), there is limited perimeter access due to the riverside location and podium courtyards. The footprint and height of the blocks mean that effective external intervention is unlikely using high-reach appliances.	



7.2 EWS1 Results

The EWS1 result corresponding with the FRAEW outcome for each block is provided in the table below.

EWS1 Results			
Block Name	Address	Postcode	EWS1 Results
Sark Tower	1-66 Sark Tower, Erebus Drive, London	SE28 0GG	B2
Granary Mansions	1-57 Granary Mansions, Erebus Drive, London	SE28 0GH	B2

8 SHORT TERM (INTERIM) MEASURES

Based on the FRAEW findings, we recommend that the Responsible Person(s) seek a competent Fire Risk Assessor to review and update the general Fire Risk Assessments of the blocks. We recommend that due consideration is given to the following short-term interim measures:

Ref	Title	Recommended Action
ST1	Fire Risk Assessment (FRA)	Review and update the FRA of each block so that it captures the significant findings of this FRAEW.
ST2	Engagement with the Fire & Rescue Service	Given that a temporary simultaneous evacuation has been adopted at the blocks for some time, we assume that engagement with London Fire Brigade (LFB) has already taken place regarding the fire risk associated with the external wall systems at the blocks. Regardless, the results of this FRAEW and updated Fire Risk Assessment's should be shared as soon as reasonably practicable. The brigade will be able to advise on whether: - any familiarisation visits are required for operational crews - it would be appropriate to enhance the existing firefighting facilities, e.g., access to firefighting water supplies at podium level.
ST3	Evacuation Strategy & Management	The existing temporary simultaneous evacuation strategy should be retained until the recommendations set out in Section 9 of this report are completed. We understand that the role of the Waking Watch⁽¹⁾ in detecting and warning occupants of fire will be replaced by the landlord's temporary fire alarm system from 3rd August 2022 ⁽²⁾. the current waking watch cover should not be stood down without advanced notice to, and the agreement of, the LFB. This will allow LFB to update their premises information and notify local operational crews of the change in arrangements at the blocks. Please note that in accordance with the Temporary Simultaneous Evacuation guidance issued by the National Fire Chief's Council (NFCC) ⁽³⁾, appropriate resources should be retained to fulfil the role of Evacuation Management (Refer to Annex 5 Evacuation Management Role). This role is critical for a rapid, effective and coordinated evacuation and for liaising with the LFB to provide an essential link with them during operations.
ST4	Engagement with Residents	Ensure all residents: • are aware of the current evacuation strategy of the blocks • test their apartment fire alarms regularly • check that their entrance door is effectively self-closing and has no damage/defects • are familiar with the balcony fire safety policy • report any fire safety defects or concerns to the site management team. • Know to report changes in personal circumstances that impact their ability to evacuate the premises (site management team) so that the Personal Emergency Evacuation Plans can be developed or updated.

ST5	Personal Emergency Evacuation Plans (PEEPs)	1) The Responsible Person should ensure that any occupants requiring assistance in an emergency are identified. 2) For any occupants requiring assistance, a Personal Emergency Evacuation Plan (PEEP) should be developed by the Responsible Person, with appropriate input from the vulnerable person or any legal representative. 3) Any PEEPs developed for vulnerable persons should be implemented as soon as reasonably practicable, and information regarding the location and needs of the vulnerable persons should be kept (subject to appropriate data protection) within the Premises Information Box at the relevant block entrance.
ST6	Balcony Fire Risk Management	Despite the balconies being constructed on largely non-combustible materials, they are immediately adjacent to Wall Type 1. As such, the Responsible Person should, with immediate effect, implement a balcony fire safety policy at RAQ to prohibit the following activities: - BBQs - outdoor heaters - bulk storage of combustibles - combustible privacy screens, sheeting or similar - large items of upholstered furniture For successful implementation, the policy should be supported by the following procedures: - routine periodic inspections. - effective communication with leaseholders and other occupants of apartments, including signage at the premises. - appropriate enforcement actions for policy infringements. The policy should be simple, clear and concise. We recommend including a visual guide on what is acceptable (Do's) and not acceptable (Don'ts). As occupants are likely to use their balconies more often during summer, this action should be initiated immediately.
ST7	Lift & Essential Firefighting Equipment	The managing agent shall ensure all lifts and essential firefighting equipment are subject to monthly routine checks. Routine check means that each firefighting lift, smoke ventilation systems (AOVs), dry mains and landlord fire alarm systems are in efficient working order and in good repair. The checks shall be carried out per the relevant industry standard or any equipment manufacturer's recommendations within an operator's manual. Secondary (resilient) power supplies for each block's firefighting lift, and associated equipment, e.g. Auto Transfer Switches (ATS) and display indicating equipment, should be subject to planned preventative maintenance.
ST8	GF Escape Stair Protection (All Blocks)	None of the blocks has a fire door between the tower stair and the lift lobby (a typical entrance lobby is shown in Figure 2). As such, there is only single fire door protection between the stair and the car park. Despite the car parks being naturally ventilated, given the height of the towers and single stair condition, we recommend that lobby protection is introduced on the Lower Ground Floor, as per the original construction drawings (a fire doorset offering a minimum performance of FD30(S) is recommended as per the original construction floor plans. Due to the level of likely pedestrian traffic in this area, the Responsible Person may wish to

		consider using magnetic hold open devices linked to the common area fire alarm system.
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Notes

- 1) Waking Watch is currently achieved, at a development level, with external patrols only, and this is facilitated by:

Weekends & Nights: 2No. Fire marshals
Weekdays: 1No. Fire marshal.

This level of resourcing does not appear to be sufficient to facilitate:

- The early identification of a fire.
- Give warning to residents.
- Manage the evacuation (including calling the FRS and, where necessary, implementing agreed PEEPs),
- Take appropriate action as required by the management strategy, including meeting the FRS on arrival.

If the stand down of the waking watch is delayed beyond 2nd August 2022, we recommend revisiting the existing arrangements to ensure evacuation can be commenced within 10-15minutes of a confirmed fire.

- 2) We understand from R&R's site manager, that other than in the following properties, the landlord system is now installed and will be made operational on 3rd August 2022:

Block	Flats (Pending Fire Alarm Installation)
Sark Tower	17 (1 Bedroom Locked)
Granary Mansions	9 (1 Bedroom Locked)

Installation of the system in the remaining properties, which represents less than 10% of units, should be completed on a best endeavours basis.

- 2) Simultaneous Evacuation Guidance - Guidance to support a temporary change to a simultaneous evacuation strategy in purpose-built blocks of flats Issued on: 1/10/20.

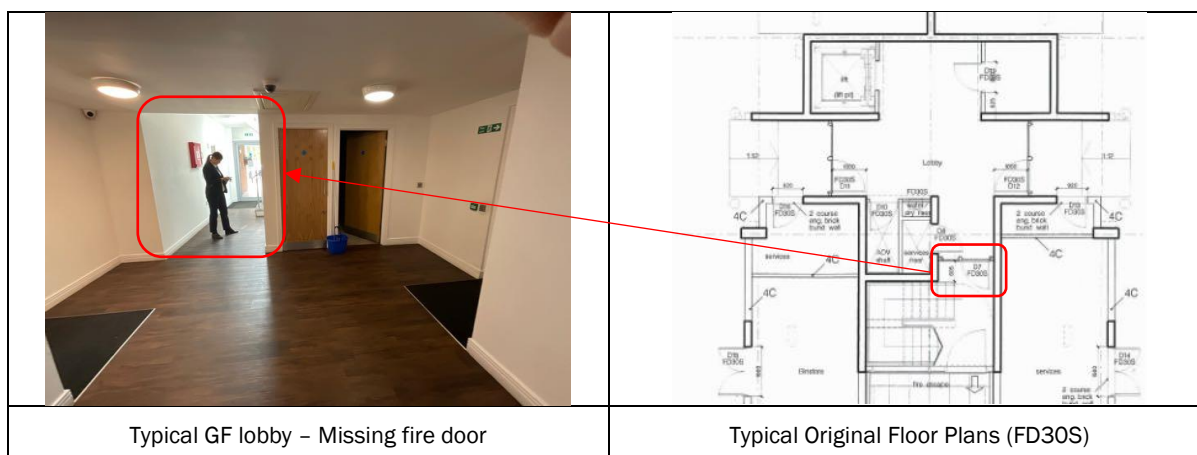


Figure 2 ST8 - Ground Floor Entrance Lobbies

9 REMEDIAL ACTIONS

9.1 Introduction

Given the findings of the FRAEW, we recommend that the Responsible Person(s) implement the following remediation recommendations at the property.

The recommendations outlined in this section should be implemented no later than **12 months** from the date of this FRAEW report or where this is not reasonably practicable, within a reasonable timeframe agreed with the Enforcing Authority (London Fire Commissioner).

Please note that our recommendations are limited to life safety only and represent the minimum level of remedial action we deem reasonable to safeguard relevant persons and, in doing so, meet the Responsible Persons' duties under the Regulatory Reform (Fire Safety) Order 2005.

The Responsible Person or relevant stakeholders (e.g. building insurers, resident association and freeholder) may wish to consider:

- alternative approaches to mitigate fire risk; or
- more extensive remediation on the grounds of other requirements and/or the age of the property and associated wall systems.

Further advice in relation to the above falls outside the scope of this FRAEW.

9.2 Recommendations

Ref	Title	Location	Recommended Action
R1	Wall Type 1: EWI System ⁽⁴⁾	Both Blocks	Replace the EWI system with a system achieving a reaction to fire classification of Class A2-s1,d0 (or better) in accordance with BS EN 13501-1 and fire safety features in accordance with the latest statutory fire safety guidance.
R2	Wall Type 2 (Masonry Wall)	Both Blocks	A 3rd party certificated passive fire surveyor should inspect the head of the blockwork wall of each stair enclosure in every small stair wing to verify appropriate compartment wall termination at the underside of the roof system (minimum fire resistance of 60min(EI). Any service penetrations should be appropriately fire-stopped to the same standard of fire resistance. Any new or remediated fire-stopping should be completed by a 3rd party certificated installer, using 3rd party tested and approved fire-stopping products.
R3	Wall Type 3 – Panel Type 1 (Glazed Vision Panels)	Both Blocks	No change.
R4	Wall Type 3 – Panel Type 2.1 (Opacified Glass Spandrel Panels)	Both Blocks	Replace the existing fire stopping with a proprietary fire stop between the concrete slab edge and the rear of the spandrel panel. The fire stop should be designed and installed to achieve a minimum fire resistance of 120min(EI).

			Replace the spandrel panel rigid board polymeric insulation with an insulation achieving Class A2-s1,d0 (or better) in accordance with BS EN 13501-1.
R5	Wall Type 3 – Panel Type 2.2 (Opacified Glass Infill Panels)	Both Blocks	Penthouse (Party Wall Lines – See Figure 4) - Install proprietary fire stopping at the junction of the party wall and the rear of the remediated infill panels. The fire stop should be designed and installed to achieve a minimum fire resistance of 120min(EI). Replace the existing rigid board polymeric insulation with an insulation achieving Class A2-s1,d0 (or better) in accordance with BS EN 13501-1. Other Penthouse panels – No change. Below Balconies - No change.
R6	Wall Type 3 – Panel Type 3.1 (Aluminium Corner Infill Panels)	Both Blocks	At Penthouses – No change. Small Single Stair Wings – No change. Tower Escape Stairs – As a minimum, replace the panels over a 2-storey height immediately above the southern roof terraces (See Figure 3) with replacement panels constructed with materials achieving a Class A2-s1,d0 (or better) in accordance with BS EN 13501-1.
R7	Wall Type 3 – Panel Type 3.2 (Infill Panels Below Windows)	Both Blocks	No change.
R8	Wall Type 3 – Panel Type 3.3 (Aluminium Infill Panels Between Windows)	Both Blocks	No change.
R9	Wall Type 3 – Panel Type 3.4 (Aluminium Spandrel Panels)	Block E	At Penthouses (Party Wall Lines – See Figure 4) - Install proprietary fire stopping at the junction of the party wall and the rear of the remediated spandrel panels. The fire stop should be designed and installed to achieve a minimum fire resistance of 120min(EI). Replace the existing rigid board polymeric insulation with an insulation achieving Class A2-s1,d0 (or better) in accordance with BS EN 13501-1. At Penthouses (Not on party wall line) – No change. Small Single Stair Wings - No change.

			Tower Common Corridors (See Figure 5) - Install proprietary fire stopping between the concrete slab edge and the rear of the replacement spandrel panel. The fire stop should be designed and installed to achieve a minimum fire resistance of 120min(EI). Replace the existing spandrel panels with replacement panels constructed with materials achieving Class A2-s1,d0 (or better) in accordance with BS EN 13501-1.
R10	Fire Safety Documentation	Both Blocks	As the recommendations above would not remove all combustible materials from the external walls of the blocks, it is important that as part of the remediation project, alongside provision of Regulation 38 information for the scope of the remedial works, elevation drawings are produced to highlight the locations of each new and retained wall and panel type.

Note 1: We have not provided an option for partial retention of the EWI system. This would be reliant on further laboratory fire performance testing of the existing system installation using BS 8414-1. This decision has been made due to the type and sporadic nature of the workmanship defects identified across the blocks by intrusive investigations completed by Barratt Homes (East London) Ltd, Capital Property & Construction Consultants Ltd (CPCC) and Weber Saint Gobain. This variability of defects makes sampling an invalid technique upon which to define a representative fire test specimen(s) for further fire testing. In the absence of a representative test specimen(s), in our professional opinion, full replacement is the most appropriate course of remedial action.

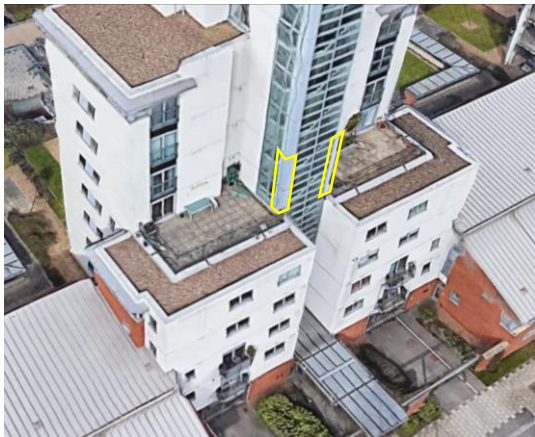
			
Block Ref.		Sark Tower	Granary Mansions
Panels for Replacement		5 th & 6 th Floor	4 th & 5 th Floor

Figure 3 Extent of Corner Panel Replacement (Panel Type 3.1)

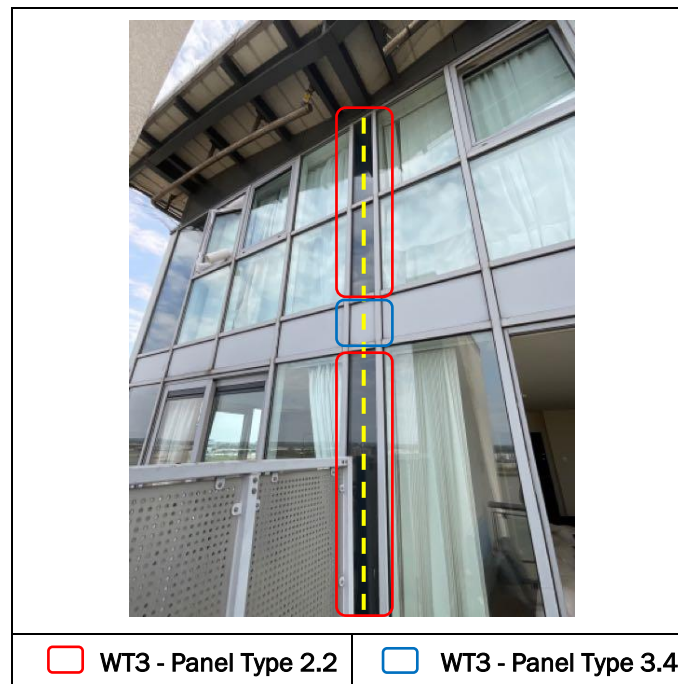


Figure 4 Penthouse Apartment Party Wall Junction



Figure 5 Typical Common Corridor Aluminium Spandrels (Panel Type 3.4)

9.3 Important Information

Building Regulations 2010 (as amended)

Some of the proposals outlined for remediation will constitute Building Work as defined by the Building Regulations 2010 (as amended). As such, prior to commencing any works, the client or their appointed representatives should engage with the Local Authority Building Control or an Approved Inspector to confirm the requirements for Building Regulations approval for the proposed scope of work.

A significant change to the Building Regulations was made in December 2018 by the enactment of the Building (Amendment) Regulations 2018, which introduced an effective ban on the use of combustible materials in the external walls and specified attachments of Relevant Buildings (with some minor component exceptions). As such, any alterations / additions to the external walls may only utilise materials of Class A2-s1,d0 (or better), as defined by BS EN 13501-1.

Construction (Design & Management) Regulations 2015

As some of the proposals set out in this report will constitute construction activity, prior to commencement of the works, the client has a duty to:

- 1) Make suitable arrangements for managing a project, including making sure:
 - a. other duty holders are appointed as appropriate.
 - b. sufficient time and resources are allocated.
- 2) Ensure:
 - a. relevant information is prepared and provided to other duty holders.
 - b. the principal designer and principal contractor carry out their duties.
 - c. welfare facilities are provided.
- 3) Maintain and review the management arrangements for the duration of the project
- 4) Provide pre-construction information to every designer and contractor either bidding for the work or already appointed to the project.
- 5) Ensure that the principal contractor or contractor (for single contractor projects) prepares a construction phase plan before that phase begins.
- 6) Ensure that the principal designer prepares a health and safety file for the project and that it is revised as necessary and made available to anyone who needs it for subsequent work at the site.

For notifiable projects (where planned construction work will last longer than 30 working days and involves more than 20 workers at any one time; or where the work exceeds 500 individual worker days), commercial clients must:

- notify HSE in writing with details of the project.
- ensure a copy of the notification is displayed in the construction site office.

ANNEX A – FRAEW DISCLAIMERS & LIMITATIONS

A1) Documented Information

We have used information provided to us by Rendall & Rittner (managing agent). The list of the documents referred to during our assessment is outlined in Annex B.

A2) Materials Identification and Testing

The materials present within the external wall construction of the block were identified based on visual inspection and as-built information. To the best of our knowledge, no laboratory materials testing has been completed as part of this or previous external wall assessments.

A3) Sample-based Approach

Refer to Annex C for details of inspections conducted by Capital Property & Construction Consultants Ltd.

The inspections relied upon in completing this FRAEW did not include 100% of the external wall systems of each block, and as such, we cannot rule out latent defects or inconsistency in materials in areas not subject to inspection.

A4) Life Safety

Our assessment relates specifically to fire life safety only and excludes any consideration of property protection or any other enhanced performance requirements.

ANNEX B - SUPPORTING INFORMATION

Documentation	Details	
Fire Safety Strategy	None	
Floor Plans & Elevations	Barratt Building Plans 1-50	
	Barratt Building Plans 51-100	
	Barratt Building Plans 101-155	
	Barratt Building Plans 156-177	
General Fire Risk Assessments		
Sark Tower	Type 1 FRA, Project No. 164506 Ark Workplace Risk, 25/02/2022	
Granary Mansions	Type 1 FRA, Project No. 164501 Ark Workplace Risk, 25/02/2022	
External Wall Investigation Reports	EWI System	Capital Property & Construction Consultants Ltd: - RAQ - Inspection Report No.5a (8th Nov 2020) - Sark Tower - RAQ - Inspection Report No.8 (8th Nov 2020) - Granary Mansions
	Aluminium Spandrel / Infill Panels	Detailed within Tender Document: Capital Property & Construction Consultants Ltd Royal Artillery Quays - Tender Document (17th Nov 2020)
	Masonry Walls	RAQ - Brickwork Investigations Client Report (6th July 2021)
	Glazed Spandrel / Infill Panels	Capital Property & Construction Consultants Ltd 957 RAQ Glazing investigations 040422
Fire Testing Reports		
Classification Report	BRE Global Classification Report Classification of fire performance in accordance with BR135: 2013 P119603-1001 Issue 1 BRE Global Ltd	
Fire Test Report	BRE Global Test Report BS8414-1:2015+A1:2017 P119603-1000 Issue 1 BRE Global Ltd	

ANNEX C – BUILDING INSPECTIONS

C1) Urban Change Site Inspections

Date	Inspection Purpose	Personnel	Other Attendees
Visit 1 – 22nd March 22 9:30 am	Familiarisation with property layout, the general fire precautions, and adjacent wall systems	Gavin Jones	Laziz Rabbimov - R&R Estate Manager
Notes:	• Non-intrusive. • Dry and sunny. • Stair ceiling void accessed in Bendish Point (Block G).		
Visit 2 – 22nd July 22 9:00 am	Non-intrusive inspection	Gavin Jones	Laziz Rabbimov - R&R Estate Manager
Notes:	• Non-intrusive • Dry & overcast • Common areas – Towers only • Penthouse – Sark Tower (F)		

C2) Intrusive Inspections (by others)

Ref	Inspection Purpose	Company
1	EWI System Inspections	Capital Property & Construction Consultants Ltd
	Notes: Conducted 4 th -5 th November 2020	
2	EWI System Inspections	Weber Saint Gobain
	Notes: Conducted January 2022	
	Granary Mansions - 4No. 2m*2m samples (over floor level fire breaks) at 3rd, 4th, 5th and top floors. Core samples from each block to verify build-up and materials supplied by Weber.	
3	Aluminium Infill / Spandrel Panels	Capital Property & Construction Consultants Ltd
	Notes: Conducted November 2020	
4	Brickwork Inspections	Capital Property & Construction Consultants Ltd
	Notes: Conducted June 2021	
5	Glazed Infill / Spandrel Panels	Capital Property & Construction Consultants Ltd
	Notes: Conducted 28 th March 2022	

ANNEX D - FIRE STRATEGY & FIRE SAFETY DESIGN

D1) Evacuation Strategy

The current and design evacuation strategies for each block are detailed below:

	Sark Tower	Granary Mansions
Current Evacuation Strategy ⁽¹⁾	TSE	TSE
Design Evacuation Strategy	Stay-put	Stay-put
Notes: 1) TSE - Temporary Simultaneous Evacuation. This is a short-term measure implemented following the discovery of combustible materials in the external walls of the blocks. Latest FRAs state that this is currently facilitated by waking watch, although we understand from the site manager that the newly installed landlord's fire alarm system in each block will be fully operational by 2nd August 2022. Following the completion of long-term remediation of the external walls, the intention is to return the blocks to a stay-put evacuation strategy as per the original fire strategy of the blocks.		

D2) Active & Passive Fire Protection Systems

General Fire Precautions	Description / Notes		
Automatic Fire Detection & Alarm (All Blocks)	Apartments		FRA's state smoke alarms in all flats ⁽¹⁾
	Common Areas	Design / Strategy	L5 BS5839-1 to operate corridor and stair AOVs
		Current (Temporary Situation)	L5 BS5839-1 designed to NFCC guidance ⁽¹⁾ to facilitate TSE.
	Ancillary (e.g. plant rooms) & Commercial Accommodation		Manual BS5839-1
Means of escape - Within Apartments (Both Blocks)	T.D within Accommodation <9m T.D within protected entrance halls <9m		
Means of escape - Within Common Corridors / Lobbies (Both Blocks)	Tower: T.D <7.5m		
	Small Single Stair Wings: T.D c.4.5m		
Means of escape - Car park & Ancillary at GF/Mezz. (Both Blocks)	Single direction means of escape: <25m Alternative means of escape: <45m		
Means of escape (Vertical)	Number of escape cores:		
	Sark Tower		3 (Single stair arrangements)
	Granary Mansions		3 (Single stair arrangements)
	Smoke & Heat Ventilation Arrangements:		
	Towers (All Blocks)		>1.5m ² natural smoke shaft serving lobbies 1m ² OV at the head of FF stair
	Small single stair wings		Openable windows onto stairs
Stair Final Exit Locations	Sark Tower	Main Tower	South Elevation
		Single stair wings	East & West Elevations
	Granary Mansions	Main Tower	South Elevation
		Single stair wings	East & West Elevations
Emergency Lighting	BS5266-1		
Emergency Signage	BS5499		
Internal Fire Spread (Linings)	Painted plasterboard linings (dot and dab onto blockwork inner leaf)		

Structure & Compartmentation	Structural Frame		Concrete	
	Floors		Concrete	
	Walls		Blockwork	
	Firefighting Shafts		Concrete shaft construction	
	Fire Doors (Entrance doors)		FD30S	
	Fire Doors (Common areas), e.g. stairs, service risers.		FD30S	
	Car Park Doors (LGF)		FD60S	
Automatic Fire Suppression	None			
Fire Service Access	Refer to Section D4.			
Internal Fire-fighting Provisions	Block	Core	Provision	Floors Served
	Sark Tower	FF Stair	Yes ☒ No ☐	All
		FF Lift ⁽²⁾	Yes ☒ No ☐	All
		Dry Riser	Yes ☒ No ☐	All
	Granary Mansions	FF Stair	Yes ☒ No ☐	All
		FF Lift ⁽²⁾	Yes ☒ No ☐	All
		Dry Riser	Yes ☒ No ☐	All
Fire Hydrants	2 No. located on Erebus Drive 1 No. located on the Livesey Close footpath near Pier Way			

Note 1) Simultaneous Evacuation Guidance - Guidance to support a temporary change to a simultaneous evacuation strategy in purpose-built blocks of flats, Issued on: 1/10/20.

Note 2) Both blocks incorporate a FF lift with primary and secondary incoming mains power supply; located in separate electrical plant rooms on either side of the entrance lobby. A power supply status indicating panel is located adjacent to the landlord's fire alarm panel adjacent to the main entrance. We have not seen any evidence of ongoing maintenance of the power supply or ATS equipment. OTIS, the current lift maintenance contractor, confirmed that their lift maintenance contract does not include the power supplies.

D3) External Fire Spread Between Buildings

The risk of fire spreading between buildings falls outside the scope of this FRAEW. The fire strategy records the assessment conducted at the design stage, which utilised the BR187 methodology.

D4) Firefighting Access

D4.1 External Firefighting Access

Figure D1 shows each block's vehicular / fire appliance access route and the position of dry rising main inlet breaching valves. Due to each block featuring a podium, vehicular/fire appliance access is only available to the south elevations of each block. From Erebus Drive, high-reach appliances could access the southern part of the east and west elevations, although the main tower elevations would be inaccessible due to the footprint of the blocks. Appliances can park within 10m of the single stair accommodation wing entrances shown in Figure D2.

Bollards prevent ready access to the hard-surfaced riverside walk. This route could provide fire appliance access, although the north elevations of the blocks are setback from this route by c.9-21m, and there are no dedicated turning points.

Block Name		Sark Tower	Granary Mansions
Vehicular Perimeter Access	Approx. %	30%	30%
	North	☐	☐
	East	☐	☐
	South	☒	☒
	West	☐	☐

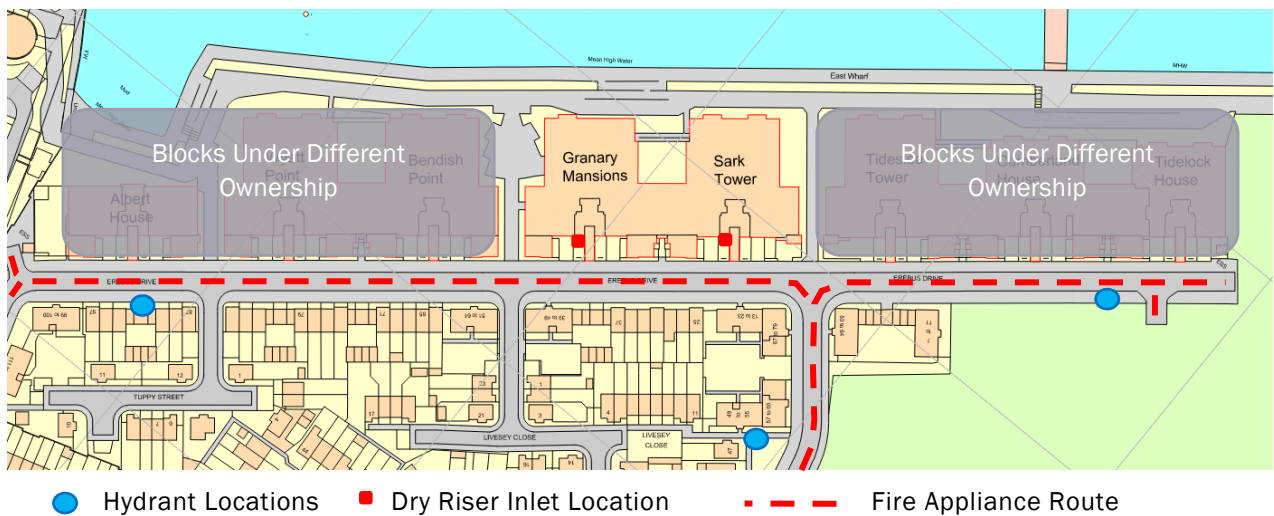


Figure D1 Emergency Vehicular Site Access

D4.2 Internal Firefighting Access

Each of the blocks is served by a dry rising main that features landing valves on all above-ground floors of the central towers. The small single stairs, which feature separate entrances and common stairs (see Figure D2), do not feature dry mains but are limited to three storeys in height (<18m).



Figure D2 Typical Core Arrangement

ANNEX E) EXTERNAL WALLS & SPECIFIED ATTACHMENTS

E1) Introduction

This section of the report details the findings of our desktop review of the external wall systems information outlined in Annex B, our site visits, and the findings of the intrusive inspections. We have provided a record of the materials, wall build-ups and any noteworthy fire safety defects observed.

E2) Elevations



Figure E1 Elevations

E3) External Wall Types

Table E1 identifies, for each principal elevation, the location and approximate coverage of each wall type. We have expressed the coverage as an approximate percentage (%). Please note that this data should not be used for pricing / QS purposes, and there are minor variations between each block.

Although there may be minor variations in build-up within each wall type (by location), it is reasonable to assume for appraisal purposes (based on as-built information and intrusive inspection results) that the descriptions are representative of the overall external wall construction.

Table E1 - Principal Wall Types

Principal Wall Types ⁽¹⁾	Approx. Coverage of Elevations (%)			
	North	East	West	South
WT1 - EWI System	50%	50%	50%	50%
WT2 - Masonry Wall	10%	15%	15%	20%
WT3 - Curtain Walling & Windows	40%	20%	20%	30%

Notes

1) Due to their limited extent and location, we have not included roof-level panels / fascias as a principal wall type.

E4) Wall Construction & Fire Performance Characteristics

For each principal wall type, Tables E2 to E4 list the primary materials used in the wall build-up and indicates the associated reaction to fire classifications based on BS EN 13501-1 for known products or a notional classification (where the specific product is unknown).

Wall Type 1 – External Wall Insulation (EWI)

Table E2 –Wall Type 1 Build-up

Components (Outside to inside)	Material thickness/ Product description	Euroclass Rating
System / Product	Webertherm XM PM018 ⁽¹⁾⁽²⁾	BBA 91/2691 PS 3 Class 0 BS 476-6: 1989 and BS 476-7: 1997
Surface (Top Coat)	Weberplast TF150 (1.5mm) – Acrylic Render (Class C-s1,d0)	
Primer	Weber primer PR310	
Basecoat	Weber.rend LAC (2-3.5mm)	
Mesh	Weber mesh (standard) - woven polymer-coated glass fibre reinforcing mesh	
Insulation	80mm Plain EPS (Class E)	
Adhesive	Weber.rend LAC	N/A
Cavity	N/A - Direct fix system, although minor gaps were noted in investigations due to the application of insulation adhesive in a dot and dab pattern	
Substrate	Blockwork or Concrete	A1
Linings	Ancillary spaces - None	N/A
	Flats – Plasterboard 12.5mm on spacers (with various finishes)	A2-s1,d0

Notes:

1) No publicly available classification to BS EN13501-1

2) The following deviations from the Weber system specification have been reported by CPCC Ltd (Chartered Surveyors) and Saint Gobain Weber (EWI System Manufacturer) following intrusive investigations:

- a. **Fire Barrier Mechanical Fixing Spacing:** Fewer fixings than specified (specified maximum horizontal distance 400mm) and up to 1200mm observed on site.
- b. **Fire Barrier Mechanical Fixing Type:** Steel pin with plastic washer, rather than steel washers as specified.
- c. **Secondary Fixings:** Steel fire fixings were required at a rate of 1 per 1m² but not evidenced.
- d. **Render Coat Thickness:** Specified thickness 7.5mm (6mm basecoat & 1.5mm top). Observed typical thickness c.3mm-5mm.
- e. **Insulation & Fire Break Adhesive Application:** Dot and dab application technique adopted, rather than full bead as specified, resulting in small cavity between the system and its masonry substrate.

Deviations from the Weber specification are sporadic in nature, and due to the adoption of sampling to confirm wall build-ups, there may be areas of the wall type that deviate further from the specification.

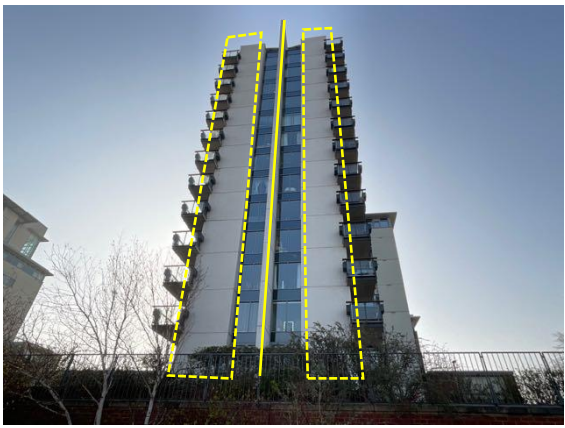
	
Typical Principal Elevation featuring EWI	Intrusive investigations reveal a fire break at a typical floor level. Plastic fixing washer visible.

Figure E2 Wall Type 1 – EWI Systems

Wall Type 2 – Masonry Wall

Table E3 – Wall Type 2 Build-Up

Components (Outside to inside)	Material thickness/ Product description		Euroclass Rating
Outer Leaf	Facing brick (100mm)		A1
Cavity	70mm		N/A
Insulation	Flats	Airtex thermal insulation (4mm)	F
	Ancillary spaces (e.g. car park)	None	N/A
Inner leaf	Concrete column or blockwork (>75mm)		A1
Linings	Flats	Plasterboard (12.5mm on spacers) and plaster Finishes (will vary by flat)	A2-s1, d0 Unknown
	Ancillary spaces (e.g. car park)	None	N/A

	
Masonry wall to flats	Masonry wall to ancillary accommodation
	
Masonry inner leaf visible from the car park	Airtec Insulation Layer, with inner leaf visible

Figure E3 Wall Type 2 – Masonry Walls

Wall Type 3 – Curtain Walling & Window Systems

Table E4 - Wall Type 3 Build-Ups

Components (Outside to inside)		Material thickness/ Product description	Euroclass Rating
Framing		Aluminium mullions & transoms	A1
Panel Types			
1. Vision Panels		Glass	NPD
2.1 Opacified Glass Spandrel Panels	Outer face	Glass (with film/painted surface)	NPD
	Insulation	Foil-faced polymeric insulation board – PIR/PUR (specific product/brand unknown) c.50mm thickness	Class C or worse
	Inner sheet	Aluminium (partial – not full encapsulation)	N/A
	Insulation	Loose mineral/glass wool roll	A1
	Other	Gypsum poured acoustic infill Fire stop: Foil-faced fire batt (mineral wool 50mm)	A1
	Outer face	Glass (with film/painted surface)	NPD

2.2 Opacified Glass Infill Panels	<i>Insulation</i>	Foil-faced polymeric insulation board – PIR/PUR (specific product/brand unknown) c.50mm thickness	Class C or worse
	<i>Inner sheet</i>	VCL (black plastic sheet observed, e.g. polypropylene)	Class E or worse
	<i>Insulation</i>	Loose mineral / glass wool roll	A1
	<i>Inner leaf</i>	lightweight steel framing	A1
	<i>Lining</i>	2No. layers (12.5mm) plasterboard	A2-s1,d0
3. Aluminium Infill Panels (See Figure E10)	<i>Outer face</i>	Aluminium sheet Polyester powder coating (brand unknown)	A1 A2-s1,d0
	<i>Insulation</i>	XPS insulation	E
	<i>Inner face</i>	Aluminium sheet	A1
	<i>Substrates</i>	Type 3.1 – Plasterboard on a lightweight steel construction	A1 A2-s1,d0
		Type 3.2 – Plasterboard on a lightweight steel construction	A1 A2-s1,d0
		Type 3.3 – RC column /shear wall or blockwork	A1
		Type 3.4 – None (Ceiling void / Concrete floor slab edge)	N/A



Vision Panels Stair & Common Corridor Curtain Walling (Type 1.0)



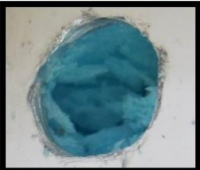
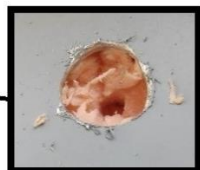
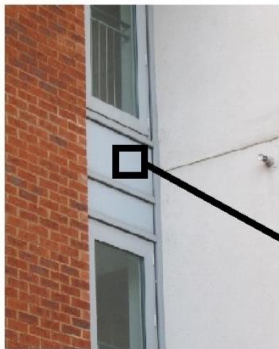
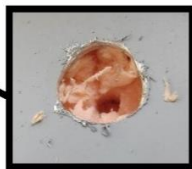
Opacified Glazed Spandrel (Type 2.1)



Exposed construction behind the glazed panel

		
Example @ Penthouses		Example Below Balcony Slabs
Opacified Glazed Infill Panel (Type 2.2)		

Figure E4 Wall Type 3 - Curtain Walling (Glazed Panels)

 CORE SAMPLE 	 SEE SPANDREL TYPE 3 
Panel Type 3.1 – Corner Panels	Panel Type 3.2 – Below Window Panel
	 
Panel Type 3.3 – Infill Panel	Panel Type 3.4 – Spandrel (@Small single stair wings)

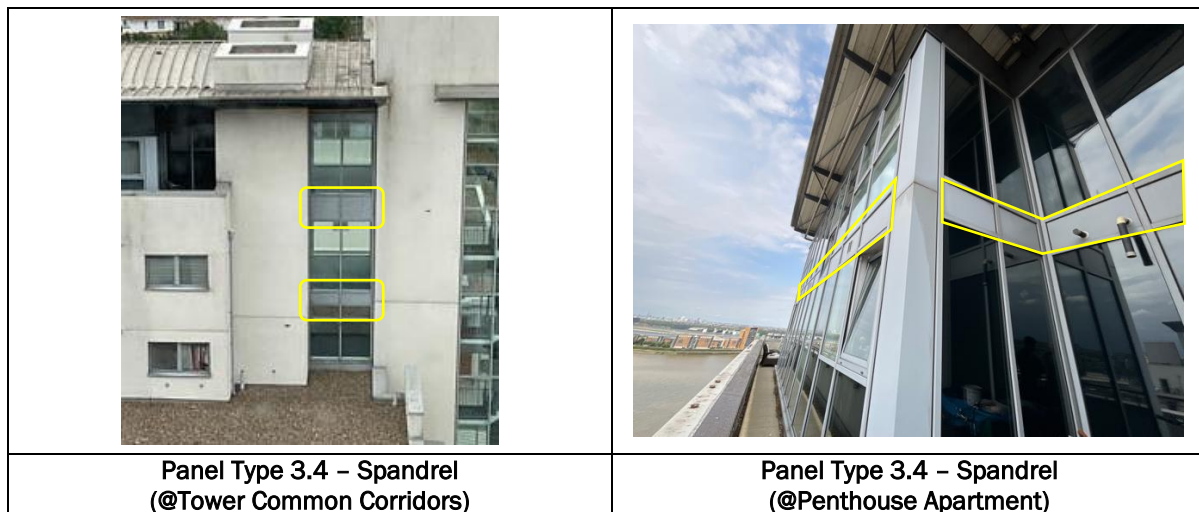


Figure E5 Wall Type 3 – Window Systems (Aluminium Panels)

E5) Cavity Barriers and Fire Stopping

Requirements

Building Regulations statutory guidance (Approved Document B) provides the following recommendations for the positioning of cavity barriers & fire stopping in external wall systems:

- at junctions of compartment floors and the external walls ^(Note 1)
- at junctions of compartment walls and the external walls ^(Note 1)
- at system edges, including around openings / penetrations

Note 1: In traditional masonry cavity wall construction, where leaf thickness is at least 75mm, cavities need only be closed at system edges, and this need not be with fire-resisting construction.

To maintain the continuity of internal fire compartment separation, fire stopping is required where fire-resisting elements (compartment walls & floors) meet with the external wall systems.

Synopsis

Table E5 - Cavity Barriers & Fire Breaks

Wall Type	Provision	Description
Compartment Floors		
WT1	N/A	No cavity in system. EWI is a direct fix to a masonry substrate. EPS is broken by mineral wool fire breaks at compartment floors.
WT2	N/A	Traditional masonry cavity construction.
WT3	N/A	No cavity in systems.
Compartment Walls		
WT1	N/A	No cavity in system. EWI is a direct fix to a masonry substrate. No EWI fire breaks at compartment walls.
WT2	N/A	Traditional masonry cavity construction.
WT3	N/A	No cavity within build-up.
System Edges (Cavity top, bottom, sides, windows & door openings, and service penetrations)		
WT1	N/A	No cavity in system. Punched window openings with frames fixed into blockwork / concrete substrate. Prestressed concrete lintels at window heads.

		No EWI fire breaks around windows.
WT2	Yes (See Figure E11)	- Aluminium flashing detail or reconstituted stone capping at head/perimeters - Curtain walling / windows feature reconstituted stone, lintels and/or proprietary cavity closers (e.g. thermabate) and internal window boards; - No closure at the eaves / junction with the standing seam insulated roofing system on small single stair wings⁽¹⁾ - Plastic flue and ventilation pipes bridge cavity with joints closer with mortar or mastic.
WT3	N/A	No cavity within panel construction.

Note 1: Combined with a lack of common corridor fire stopping at the head of the common corridor walls, this defect has the potential to compromise the single means of escape from these low-rise accommodation wings. See Figure E12 for an illustrated route of fire and smoke spread. For further analysis, please refer to our previous memo '220328 Masonry Wall Remediation Royal Artillery Quays 21-1175 R00'.

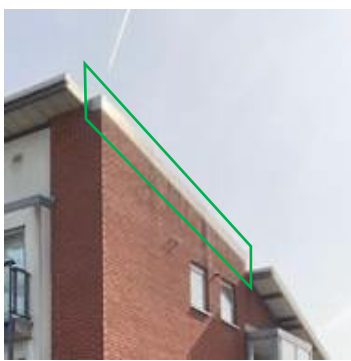
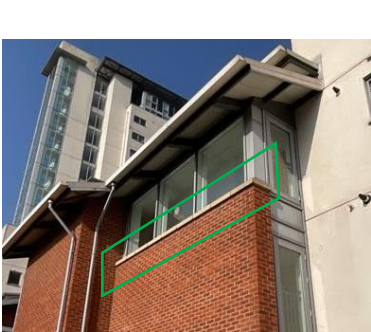
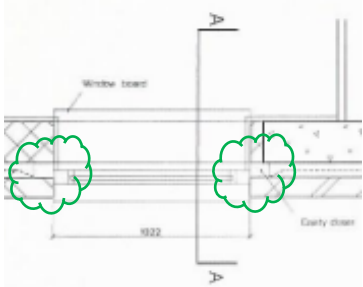
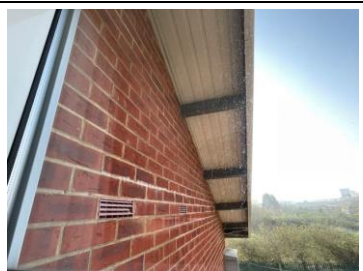
		
Perimeter Capping with closer and aluminium flashing	Curtain Walling Termination with reconstituted stone (Closed)	Recon Stone Capping (Closed)
		
Eaves Termination (Open)	Typical Window Detail	Visible opening closure
		
Car Park Ventilation Opening Closure	Typical Air Brick to Roof Void	Typical Boiler Flue Penetrations

Figure E6 Illustration of Masonry Cavity Closure (WT2)

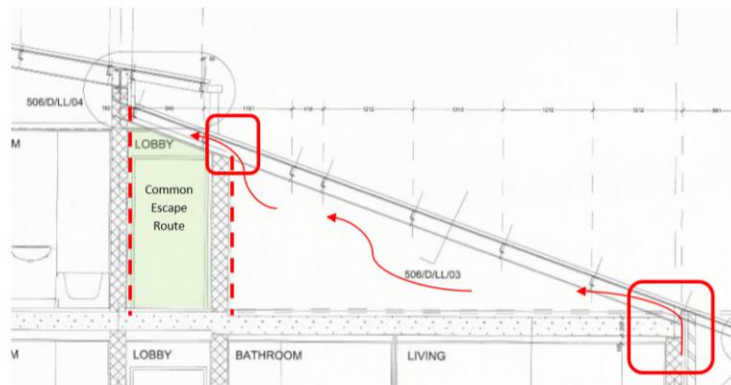


Figure E7 Small Single Stair Wing (Combined Internal & External Wall Defects)

Table E6 – Fire Stopping

Wall Type	Provision	Description
Compartment Floors		
WT1	N/A	Junctions with blockwork/concrete
WT2	N/A	Junctions with blockwork/concrete inner leaf
WT3	Yes	Panel Type 2.1 - 50mm ablative coated fire batt to the rear of insulated panels. Poured gypsum infill above.
WT3	N/A	Panel Type 3.4 - Panels are either located onto a small single stair arrangement or penthouse floor edge.
Compartment Walls		
WT1	Yes	Junctions with blockwork/concrete
WT2	Yes	Junctions with blockwork/concrete
WT3	Yes	Panel Type 3.3 - Party wall junctions with masonry inner leaf behind the insulated aluminium infill panel
	Unknown	Panel Type 2.2 & 3.4 - Intrusive investigations provide no evidence of fire stopping at the party wall junctions between penthouse apartments. See Figure E13 (Image taken at Sark Tower)



Figure E8 Example of Wall Type 3 (Panel Types 2.2 & 3.4) – Penthouse Party Wall Location

E6) System-Level Fire Performance Testing

Table E7 System-Level Fire Performance Data

Wall Type	Test Standard	BR135 Classification	Description / Notes
WT1	BS8414-1 (2015) + A1 (2017)	Yes ☒ No ☐	Single BS8414-1 test conducted in December 2021. Result was compliant with BR135 performance criteria. Refer to Table E7 for mechanical performance results that did not impact the system classification. Test sponsor (Saint Gobain Weber) developed a test specimen based on a replica of the build-up/materials supplied at the time of construction. Refer to Note 1 regarding the system application defects. BRE Global Ltd test report and classification report details are provided in Annex A.
WT2	N/A	Yes ☐ No ☒	None
WT3	N/A	Yes ☐ No ☒	None

Note 1: The installation defects noted in intrusive investigations have been

- Fire Barrier Mechanical Fixing Spacing: Original specification tested, i.e. defect not recognised.
- Fire Barrier Mechanical Fixing Type: Original specification tested, i.e. defect not recognised.
- Secondary Fixings: Original specification tested, i.e. defect not recognised.
- Render Coat Thickness: Original specification tested, i.e. defect not recognised.
- Insulation & Fire Break Adhesive Application: Original specification tested, i.e. defect not recognised.

Table E8 Thermo-Mechanical Performance in Fire

Wall Type	Test Standard	Observations	Details
WT1	BS8414-1 (2015) + A1 (2017)	Combustion post crib extinguishment	36mins (after ignition)
		System Collapse	Not observed
		Spalling	Not observed
		Delamination	7:40 to 13:20 from Ts
		Flaming Debris	Not observed
		Pool Fire	Not observed
WT2	N/A	No data	No data
WT3	N/A	No data	No data

E7) Specified Attachments

All blocks at the development feature balconies. Further details are provided below:

Table E9 Balcony Types

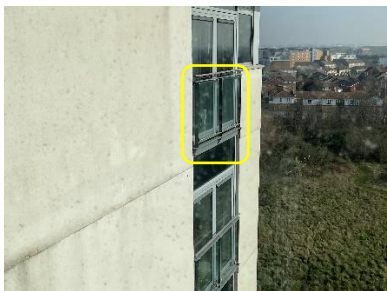
Type	Description	Locations	Design / Geometry	Observed Use
1	Projecting (Private)	All Elevations	Standard: c1.5m*1m Corner:	Lightweight outdoor furniture and planting. No bulk storage or BBQs observed.
	Example: 		Notes: Vertical stacking varies from a single balcony to a continuous run of 12 balconies.	
2	Juliet Balconies	South Elevations	c.1-1.5m width	None
	Example: 		Notes: None.	

Table E10 Balcony Construction

Type	Component	Construction details	Euroclass Rating
1	Floor	Concrete tile/slab finish over the slab	A1
	Structure	Concrete slab	A1
	Fascia	None or Metallic plate with fixings for balusters	N/A A1
	Balustrade	Toughened Glass	NPD
		Steel Balusters & railings (sides)	A1
		Timber handrail	D
	Soffits	Underside of concrete slab	A1
2	Floor	N/A	N/A
	Structure	Steel	A1
	Fascia	N/A	N/A
	Balustrade	Toughened Glass	NPD
		Steel Balusters	A1
		Timber handrail	D
	Soffits	N/A	N/A

E8) Terraces

The penthouses of each block and a small number of units on the southern elevations of each block feature roof terraces. These are the result of setbacks and reducing floor plate areas over the height of the building.

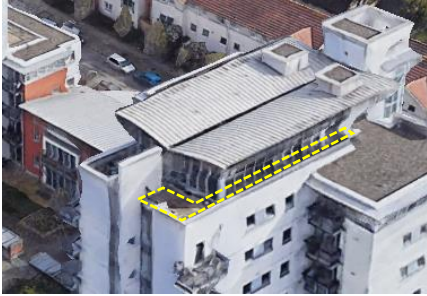
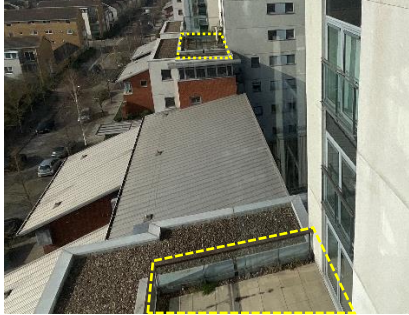
	
Typical Penthouse Terraces (Riverside) Block E & F	Typical Private Terrace (Roadside) 4 th Floor (Block F) 5 th Floor (Block E)

Figure E9 Private Terraces

E9) External Wall Condition (State of Repair)

We have not seen any evidence of an operational external wall system cleaning and maintenance regime at the property. Any instances of damage or disrepair observed during our inspections are noted below:

Wall Type	Location	Noted Damage / Disrepair
1	N/A	None
2	N/A	None
3	N/A	None