Publishable summary

October 2022 – September 2023

Real fires project

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Prepared for the Building Safety Regulator

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Contents

1. Annual report - publishable summary

1.1. What is the contract and how does it operate

The 'Real Fires' project is conducted on behalf of the Building Safety Regulator (BSR) for the purposes of informing positions on the effectiveness of the Building Regulations and associated guidance in England. The information collected is focused on building performance; its analysis includes discussion and conjecture which may not be directly relevant to all applications. This summary is provided for the purpose of learning and development.

Incidents are identified through media reports, contact from local fire and rescue services, or other government organisations. Therefore, recorded fires are selective, subject to reporting bias, and based on interest to the Building Regulations. The information and statistics should not be taken to provide a balanced or comprehensive list of all fire incidences.

OFR Consultants (the Supplier), in collaboration with DCCH Experts LLP, were engaged by the BSR (the Client) to deliver the 'Real Fires' project in support of fire safety technical policy, which commenced on 22nd of October 2021, and runs for three years, until September 2024. The collaborators will be referred to as the investigators throughout this summary.

The views and opinions expressed in this report are those of the authors and do not necessarily reflect the official position, policies, or views of the BSR.

1.2.What incidents are recorded and investigated

Incidents are recorded in three different categories, according to features of interest to the contract, and are considered against predetermined criteria defined by the contract:

Category 3: Includes incidents happening in England that report minor damage to buildings, do not report injuries or loss of life outside the dwelling of fire origin, incidents in building types not addressed by Approved Document B – e.g. prisons, involve vehicle fires that had an impact on nearby buildings, involve temporary buildings/caravans/derelict buildings/buildings under construction, deliberate fire ignition, and incidents that are reported overseas. These are regarded as incidents of low priority and are not the primary focus of the project but serve to inform trends.

Category 2 and Category 1: Incidents that meet one or more of the following parameters will typically be escalated to either Category 2 or Category 1 incidents; these are higher priority incidents, either necessitating a follow-up (typically via telephone and/or email correspondence) with the local fire and rescue service (Category 2) or attendance on site (Category 1). The parameters dictating this escalation are:

- fatal fire incidents with multiple fatalities in dwellings;
- fatal fire incidents in non-domestic premises;
- particular difficulties with fire brigade intervention;
- any incident that meets the description of fire of specific interest as described in the Department for Levelling Up, Housing and Communities (DLUHC - original precuring department of the contract) statement of requirements;
- all fires relevant to the Building Regulations and/or Approved Document B (ADB);
- fire incidents involving 'fire engineered' buildings;
- fires with significant implications regarding the Fire Safety Order (FSO) and/or interactions with the Building Regulations and the FSO; and
- fires of national importance.

Over the course of this annual reporting period (1st October 2022 to 30th September 2023) OFR have recorded 238 fire incidents. Of these, they were comprised of the following breakdown of investigation category:

- Category 1 – 3 incidents;
- Category 2 – 12 incidents; and
- Category 3 – 223 incidents.

As a reflection of the building type which typically records the highest number of fire incidents each year, fire incidents in residential dwellings reflected the purpose group that was the most commonly the subject of Category 1 and Category 2 incident investigations, in particular residential flats.

Listed below are the incidents that were followed-up as Category 1 and Category 2 investigations. To aid interpretation of the incidents listed below, buildings with a habitable floor up to 18 m above the fire and rescue service access level are described as low-rise, 18 m – 30 m above the fire and rescue service access level are described as medium-rise, and +30 m above the fire and rescue service access level are described as high-rise. The Category 1 and Category 2 investigations that the consortium has conducted in this reporting period for the BSR are:

Category 1 Incidents:

- Flat fire in a low-rise residential building – Hampshire;
- Balcony fire in a low-rise, residential building – Greater London; and
- Fatal fire in a low-rise, residential building – Cambridgeshire.

Category 2 Incidents:

- Fire in a high-rise residential building – Avon;
- Fire in a medium-rise residential building – France;
- Multi fatality, hotel fire in a low-rise building – Scotland;
- Fatal fire in a high-rise residential building – USA;
- Fatal fire in a medium-rise, commercial building – Scotland;
- Fire in a low-rise commercial premises – Avon;
- Balcony fire in a high-rise, residential building – Republic of Ireland;
- Fire in low-rise industrial buildings – Hertfordshire;
- Grounds fire affecting a low-rise educational premises – Greater London;
- Roof fire in a medium rise, mixed use building residential building – Greater London;
- Balcony fire in a low-rise, residential building – Greater London; and
- Flat fire in a high-rise, residential building – Greater London.

2. Items identified to the investigators for monitoring by the BSR

This section provides a place for reporting, comment and update on fire safety aspects that have been identified to the investigators by the BSR as being of interest to them and items that the investigators consider should be of interest to the BSR as emerging hazards. The BSR has asked the investigators to look out for and consider the contribution of the fire safety aspects listed within Table 1, should they feature in any of the incidents identified in the reporting period. Item 7 has been identified and added to Table 1 following a review of items following the 2021/2022 reporting period.

Table 1 – Items of interest

Item	Fire safety aspect	Summary of incident(s) involving the item	Building regulation requirement	Hazards associated with the item	Prevalence of item in the reporting period
1	Plastic based landscaping and building products	The BSR (DLUHC at the time) brought to the investigator's attention a previous incident (April 2021) that was reported in BRE's final quarterly report (Reporting period 1st April – 30th June 2021. Report dated October 2021). The incident involved the ignition of an extensive run of fence panels reported to have been manufactured from recycled plastic. As the panels became involved, the fire spread rapidly horizontally and developed to a significant size leading to several adjoining properties being affected by the fire that spread from outside to in.	B3 to B5	From the incidents reviewed by the investigators and historically by the previous operators of the Real Fires project, the hazards associated with these incidents reviewed are: - Potential for rapid horizontal fire spread; - The vulnerability of the eaves of a property to thermal assault from external fire spread; - The potential for multiple properties to be affected either in a short period or simultaneously; and - The operational demands for the responding fire and rescue service of multiple properties being threatened	Beyond the incident identified in the previous year's report, the investigators identified no further incidents directly attributed to these types of products. **OFR will continue to monitor and report on any future incidents for any characteristics of interest.**

Item	Fire safety aspect	Summary of incident(s) involving the item	Building regulation requirement	Hazards associated with the item	Prevalence of item in the reporting period
				by the fire spreading or affected simultaneously where they may not typically have been expected to.	
2	Laminated glass	A fire in a mixed-use high-rise building (investigated as a Category 1) provided valuable insight into the performance of laminated glass in fire with relevance to balcony balustrades. It is likely the laminate material present in the glass was polyvinyl butyral (PVB), as this has been the most common material used for this type of application. Although the thermal effects of the fire could be considered to be relatively severe, it appears the laminated glass performed as might be expected: the glass shattered but held in place; areas of the laminate burned and/or melted but did not promote fire spread beyond a localised area; the presence of a channel to mount the glass may have mitigated any dripping of laminate to lower levels.	B3 and B4	Following the fire at Grenfell Tower the Building Regulations in England were changed to address fire spread over external walls of high-rise residential buildings. These changes resulted in there being an effective ban on the use of laminated glass for balcony balustrades in relevant buildings. The BSR are interested in fires in which laminated glass is present to assess whether this product contributes to the spread of fire. Spread mechanisms may include upward development via flame extension and/or downward spread through the dripping of burning laminate.	Beyond the incident identified in the previous year's report, the investigators identified no further incidents directly attributed to these types of products. At the time of writing, a separate research project on the fire performance of balconies, spandrels and laminated glass on behalf of BSR has now largely concluded. **OFR will continue to monitor and report on any future incidents for any characteristics of interest.**

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3	Retrospective installation of spray foam roof insulants	The BSR (DLUHC at the time) have identified a trend of retrofitting dwellinghouses with spray applied roof insulation. Whilst potentially not building work in the context of the regulations, there is a concern that such products may worsen the fire performance of roofs, specifically with respect to Regulation B4(2). No previous incidents have been identified that have involved the retrofitting of spray foam insulation. NB: This topic is subject to a research project that has been reported on separately.	B3 and B4	The BSR relayed their observations that suppliers in industry were incentivising the use of retrofitted spray applied closed- and open-cell polymeric insulation to roof spaces, with the intent of improving thermal performance. As a retrofit, such works may be undertaken without needing to seek Building Regulations approval, as such activities may not constitute 'building work'. However, there is a concern that such a retrofit could constitute a worsening of the existing fire safety performance. This could be due to a change in the penetration performance of the roof (from outside-to-in) or through the introduction of additional (permanent) fire loading in the roof space.	No incidents directly attributed to these types of products were identified. **OFR will continue to monitor and report on any future incidents for any characteristics of interest.**
4	Industrial and storage buildings	The BSR (DLUHC at the time) have a research stream focussed on fire resistance and compartmentation, led by BRE. Industrial buildings can often sit at, or sometimes beyond, the compart-	B3 and B5	The observation that most of the incidents effectively resulted in a total loss of the premises is not unexpected. The reasons for the extent of the losses observed are considered to be a reality of the	12 incidents have been recorded in industrial and storage buildings in the reporting period of which one was investigated as Category 2.

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		ment limit recommendations in ADB, where multiple storeys are present. However, from what the Real fires project investigators can deduct from the information available, none of the incidents exhibited unusual characteristics for single storey premises with respect to fire behaviour or building design. Most of the incidents effectively resulted in a total loss of the premises. The current guidance in Approved Document B places no compartment size limits on single storey buildings considered to be of the 'industrial' purpose group, but single storey buildings considered to be of the 'storage' purpose group are recommended to be compartmented when the floor area exceeds 20,000 m^2. Storage buildings also have similar spatial and structural features to industrial buildings and any incidents identified have been grouped under this item also.		guidance in ADB on building subdivision for such uses and the general adoption of simultaneous evacuation strategies continuing to achieve life safety objectives. Approved Document B does not address property protection objectives directly and fire and rescue service intervention is often challenging due to: - The potential for the seat of the fire to be remote from the building perimeter; - The potential for there to be multiple mezzanine or storage levels within a so called 'single storey building'. This can increase the complexity of the design, potentially impacting the scale of any loss and affect the ability of the responding fire and rescue service to offensively fight a fire. - The use of any hardstanding around such premises for storage of materials and products that impairs fire	**OFR will continue to monitor and report on any future incidents for any characteristics of interest.**

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				and rescue service access; and - The general absence of 'persons reported' scenarios in such incidents means that the motivation for the responding fire and rescue service to commit to entering such premises is diminished, with their focus often on containment to the building of origin.	
5	Lithium based battery incidents	The BSR (DLUHC at the time) have identified lithium-based batteries as a potential hazard to buildings occupants and the responding fire and rescue service. The investigators have recorded several fires that involve rechargeable lithium-based batteries in the reporting period which reflect an emerging trend in the increase of incidents as the number of appliances using lithium-based batteries increases. Nowadays many consumer items contain lithium-based batteries. OFR will continue to monitor the use of lithium-based batteries and the incidents that they have been	B1, B3 and B5	From the incidents reviewed by the investigators, the hazards associated are: - The failure of a lithium-based battery is often a rapid and potentially a violent exothermic event that can result in the rapid deterioration of conditions in the vicinity of the battery that has failed; - Lithium-based battery power devices such as e-scooters are typically stored in the entrance hall of dwellings or common areas in residential buildings. This presents the	28 incidents have been recorded in the reporting period where the cause of the fire was attributed to lithium-based batteries (including incidents attributed to batteries associated with e-bikes and e-scooters). Out of these, one incident was investigated as Category 1. **OFR will continue to monitor and report on any future incidents for any characteristics of interest.**

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		reported to be a feature of through this project. Incidents where a lithium-based battery has been attributed as the cause of the fire are often characterised by the sudden, rapid and energetic discharge of hot, toxic and flammable gases. These can ignite, resulting in a flame projecting from the battery pack or the rapid failure of the pack where components of the battery pack may be ejected, potentially aiding the spread of the fire. The rapid development of such incidents often results in occupants requiring assistance to leave a property or indeed rescue where their means of escape is rapidly obstructed by the resulting fire. Although fires involving these items is not currently explicitly addressed by the Building Regulations, or the guidance in the two volumes of ADB, there is considerable debate across the industry relating to the parking of alternative fuel vehicles (lithium-based battery based electric vehicles,		potential for a rapidly developing fire to immediately affect what is often the most familiar and only means of escape for occupants; - Some incidents have involved the lithium-based battery device being charged in a communal area of flat type accommodation. In the event of a battery failure, this results in the common area being directly affected by the fire and combustion products; and - The less predictable fire behaviour of lithium-based batteries can be a hazard to occupants and the responding fire and rescue service, both if the fire originated in a lithium-based battery or has spread to involve a piece of equipment that uses a lithium-based battery. With the increased use of lithium-based batteries, it is predictable	

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		hydrogen fuel cells, etc...) in locations in the vicinity of buildings. Various stakeholders are producing guidance and standards related to this aspect reliant on varying levels of scientific rigor. Where there may be more impact on regulation and building design is the proposal to include battery based (including lithium-based batteries) energy storage systems into buildings. An example is the use of a battery pack connected to a solar energy recovery system. The investigators are aware that the Office for Product and Safety Standards are acting in response to lithium-based batteries and accessories from a product standards enforcement perspective.		that more fires are being observed in which they are involved. At this stage it is difficult to ascertain whether their involvement is disproportionate to the number of batteries in service, or whether the media has a focus on reporting these fires.	
6	External fires spreading to dwellings	OFR have noted several incidents where a fire has started externally within the grounds of a property, whether it be in vegetation surrounding a dwelling or in an outbuilding, that by virtue of it not being permanently occupied, heated, or being under 30 m^2 would not require Building Regulation approval. Unless contained to the external area, these	B3, B4, and B5	This item has been observed to be characterised by a fire that is reported to have originated externally that has gone on to spread to involve multiple adjacent dwellings, often simultaneously. The propensity for this type of fire to occur was seemingly	7 incidents were recorded in the reporting period where a fire started externally and spread to involve a dwelling. **OFR will continue to monitor and report on any future incidents for any characteristics of interest.**

Item	Fire safety aspect	Summary of incident(s) involving the item	Building regulation requirement	Hazards associated with the item	Prevalence of item in the reporting period
		incidents can involve the spread of fire to multiple buildings and rapid external fire spread in the open. The investigators have also recorded one fire event in the Southeast of England that was described as a fire in the open that started in low level vegetation, crossing the rural-urban interface, resulting in multiple properties being fire affected in a short period of time. The fire seemingly bypassed the space separation and compartmentation provisions that would be considered the primary ADB mitigation measures against building-to-building fire spread. It is of note that a number of these types of incidents are originating and developing in proximity to permanent buildings in a suburban or urban setting and are not happening exclusively because of a rural fire crossing the rural-urban interface. Based on qualitative observation, the investigators consider the prevalence of home offices and lightweight structures erected by homeowners for people to meet externally during		exacerbated by the record high temperatures witnessed in mid July 2022, combined with limited rainfall. This indicates that the potential for such incidents will depend on weather patterns, but the general trend of a warming climate and reduced summer rainfall will increase the likelihood of similar incidents. These incidents highlight how: - As outbuildings and denser vegetation tend to be positioned in proximity to a property boundary, their involvement in a fire can also place them close to similar features on neighbouring land, and in proximity to adjoining dwellings. - A fire starting externally in the grounds of a dwelling, can develop to an extent that it can break into the dwelling, e.g., via openings in the external wall, such as by open windows, soffit vents and timber in the eaves and soffits of roofs;	

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		the pandemic may have led to proliferation of combustible structures being erected in domestic gardens. This serves to increase the fire load and ignition sources external to a property. This has resulted in incidents in most parts of England where a fire originating externally has spread to several dwellings simultaneously.		- With sufficient fire load and (un)favourable weather, an external fire can overcome the mitigation measures recommended by both volumes of ADB, that generally serve to mitigate building to building fire spread across a relevant boundary; and - Responding fire and rescue services can be faced with the challenge of an extensive seat of fire externally, that can move rapidly if uncontained and affect multiple properties (both attached and detached structures).	
7	Exposure conditions to internal and external load-bearing walls	Both a recent CROSS-UK report (1116) on the topic of light-gauge-steel walls and the investigators' observations from past incidents, (two residential building fires in Greater London) highlighted a potential incompatibility between the exposure condition adopted in classification testing, how that exposure is represented in ADB, and	B3	In the case of internal load-bearing walls, these may be non-separating elements, such as those dividing rooms within a flat. These could conceivably become exposed to fire on two-sides simultaneously, with ADB guidance noting that these need only demonstrate fire resistance from each side separately.	The CROSS-UK report and observations by the investigators of an incident in this reporting period and one in the 2021/2022 reporting period triggered the BSR to commission a research project on non-separating Light Gauge Steel elements. At the time of writing, this research

Item	Fire safety aspect	Summary of incident(s) involving the item	Building regulation requirement	Hazards associated with the item	Prevalence of item in the reporting period
		the reality of how a load-bearing wall may present in a building.		In the case of external walls, ambiguity exists as to whether external walls form part of the structural frame, a load-bearing wall, an external wall, or all such definitions. This means guidance for external walls can be interpreted from one extreme of fire resistance from 'inside only' through to another of 'each exposed face'. Evidence from real fires, such a fire affecting a low-rises residential building in Greater London, suggests that buildings are being constructed where external walls only achieve fire resistance from inside to out. These are then affixed with non-fire-resisting cladding and cavity barriers to openings. Such structures are, therefore, vulnerable to fires originating outside of the envelope, such as on balconies, or those that project from openings and impinge on the façade.	project has now concluded and been disseminated. **OFR will continue to monitor and report on any future incidents for any characteristics of interest.**

3. Recommendations to BSR

Table 2 sets out the recommendations made by the investigators to the BSR from analysing the incidents that occurred in the reporting period. The recommendations are presented in the purpose group(s) within which the incident(s) occurred. Several incidents investigated had a finding that was common to other incidents. Where these incidents resulted in a recommendation, it is only presented once in Table 2. Reference is made in column 3 of Table 2 where multiple incidents have resulted in a given recommendation.

This should not be taken to mean that the recommendation only relates to that purpose group. Judgement will need to be exercised by the reader as to the full extent to which the recommendation may apply to other purpose groups. Actors within the industry should be aware of the matters raised and consider how they affect the design, operation, management of buildings under their control, and fire and rescue service response.

Table 2 – Recommendations made to the BSR

Item	Building regulation requirement	Issue/Observation	Recommendation
Purpose Group(s): Residential 1(a)			
1	B3 and B4	In a purpose-built block of flats, the fourth floor of the building stepped in from the predominant line of the building façade, relative to the levels below. This could give rise to an interpretation of guidance by relevant actors, who may view isolated areas of façade set back from the primary line of the external wall as worthy of separate consideration/fire safety provisions. This could result in a more relaxed view on the use of combustible materials in such instances when considering compliance with B4(1).	The Investigators recommended that Approved Document B Volume 1 is updated with a diagram, or enhanced definition to clarify how stepped building facades should be treated by designers.
2	B3 and B4	A fire occurred in a high-rise purpose-built block of flats. Where a façade configuration generates internal angles and a line of fire resisting construction intercepts the apex of that internal angle, it presents a condition which is vulnerable to the line of fire resisting construction being circumvented, as demonstrated by this incident.	The Investigators recommended that the guidance in Approved Document B Volume 1/2 is reviewed and updated so that it not only addresses the potential for lines of fire resisting construction to be circumvented with respect to recessed or projecting protected stairs, but also to address the potential for the circumvention of lines of fire resisting construction with respect to

Item	Building regulation requirement	Issue/Observation	Recommendation
			guidance given in relation to Regulation B3(2) and B3(3) to maintain fire separation between dwellings.
3	B1 and P1	A fire occurred in a low-rise, residential block of flats, on the ground floor of a maisonette. The availability of UK '3-pin' type plug sockets in the entrance halls of domestic dwellings; both in single private dwellings and purpose-built blocks of flats can mean that the entrance hall becomes a frequent location for personal light electric vehicles (PLEVs) to be charged. The opportunity for PLEVs to be charged in part of the dwelling that is key to the means of escape for occupants increases the likelihood of escape being compromised rapidly should a PLEV suffer a thermal runaway.	The Investigators propose that removing the opportunity for PLEVs to be charged in the entrance halls of domestic dwellings reduces the likelihood of a PLEV suffering a thermal runaway event in a critical area for means of escape. This may be achieved by omitting the provision of '3-pin' type sockets within entrance halls, thus encouraging occupants to charge in a room off the entrance hall.
4	B1 and B3	A fire occurred in a low-rise, residential block of flats, on the ground floor of a maisonette. Communal cycle stores that feature PLEV charging are not currently identified as a place of special fire hazard within the guidance.	The Investigators propose that dedicated charging rooms for PLEVs should be provided, which are fire separated from the means of escape and provided with permanent ventilation (both to address any overpressure event and the ejection of toxic gases from a battery pack). Such a measure would help protect occupants in the initial phase of a thermal runaway incident by separating occupants from the charging of a product. It would also reduce the likelihood of a non-battery fire within the building spreading to involve lithium-based battery products. Such a scenario could become a hazard to occupants or the responding fire and rescue service. BS 9991 currently includes recommendations for storage and charging of electric wheelchairs and mobility scooters, this could be extended to include PLEVs and incorporated into the Approved Documents.

Item	Building regulation requirement	Issue/Observation	Recommendation
5	B1	A fire started in a low-rise, residential block of flats. It is noted that windows within habitable rooms on the first floor of the property may not have been escape windows.	Since 2002, replacement windows have been subject to Building Regulations. It is noted that under current guidance, only existing windows large enough to be used for escape purposes should either provide the same potential for escape, or, if larger, the opening can be reduced to meet escape window requirements. Consideration could be given to replacement of existing windows in properties (particularly maisonettes) which are smaller than those required for escape purposes, and how alternative forms of means of escape would occur from these habitable rooms. It should be recognised, however, that creating larger windows would require a larger structural opening and that may be considered disproportionate.
Purpose Group(s): Shop and commercial 4			
6	B3 and B4	Fire on the roof of a mixed-use, medium-rise office/residential building, comprising office space and flats. This fire incident highlighted known hazards associated with photovoltaic (PV) arrays, both in terms of the ignition and fire spread hazard they present, but also the challenge and hazard such installations present to the responding FRS. The geometry that arrays create can be conducive to significant thermal feedback from the PV module and a roofing substrate. PV arrays have been shown to promote fire spread over flat roof build-ups that have met recognised roof surface fire spread of flame performance criteria, such as B_{ROOF}(t4).	Existing academic studies should be reviewed. The investigators recommend that additional guidance should be provided in Approved Document B – Volume 1 and 2 to address the reality of the conditions that can be created between the upper surface of the roof and the underside of a PV panel array to mitigate rapid lateral fire spread. This may require that roof material classifications are uplifted to A1 or A2, where PV arrays are installed atop.
7	B3 and B5	Fire on the roof of a mixed-use, medium-rise office/residential building, comprising office space and flats. The responding FRS	The investigators recommend that additional guidance should be provided in Approved Document B – Volume 1 and 2 to support offensive firefighting operations on

Item	Building regulation requirement	Issue/Observation	Recommendation
		personnel reported difficulties in tackling the fire, due to the single point of access to the roof, with an unguarded edge.	roofs. This is to reduce the potential for building-to-building fire spread and internal fire spread (should a PV array fire become protracted and result in entry of the fire to the building below). Guidance should be expanded in support of FRS access, where known hazards are present on roofs (including PV arrays or other plant equipment installation which present a hazard or would promote rapid fire spread). This may include additional access points and edge protection where hazards are identified. It may also extend to recommending that roofs achieve specific fire resistance expectations where PV arrays or other such lightweight plant installations are present. A similar theme was highlighted in the investigators' recommendations following the investigation of a previous incident which was reported on the 2021/2022 annual report of the Real Fires contract.
8	B5	Fire on the roof of a mixed-use, medium-rise office/residential building, comprising office space and flats. Guidance in the current editions of the Approved Documents do not specifically address isolation of or cable runs associated with PV arrays.	The investigators recommend that there should be additional guidance in Approved Document B – Volume 1 and 2 given in relation to Regulation 38, specifically to address the hazard presented by PV arrays to assist responding fire and rescue services. Including: the location of an array, points of isolation of the DC supply to the inverters, points of isolation of AC supply to the building or export to the grid, and cable runs that may remain energised during daylight hours.
9	B3 and B5	Fire on the roof of a mixed-use, medium-rise office/residential building, comprising office space and flats. In ADB, it is not clear if PV arrays being installed either on a new or existing roofs are recommended to be supported by structure with a defined period	The investigators recommend that there should be additional guidance on the matter of the supporting structure to roof mounted PV arrays should be given in Approved Document B – Volume 1 and 2, not wholly to

Item	Building regulation requirement	Issue/Observation	Recommendation
		of fire resistance or an imperforate floor build-up with a defined period of fire resistance. This definition of “supports only a roof” in clause 7.3 of ADB also extends to modern technologies like green roofs and blue roofs, where the loading can be substantially higher than that of traditional roof construction.	address loading and collapse of a roof, but to support the activities of the responding Fire and Rescue Service to access isolation switches and de-energise PV arrays as far as is practicable. The investigators recommend that the BSR give thought to issuing an FAQ outlining what is intended by structure that only supports a roof and where modern technologies, such as green roofs and blue roofs, fit into that definition.

4. General observations from incidents recorded and investigated in the reporting period

As well as matters that may be of direct relevance to the Building Regulations and the guidance within the two volumes of ADB, the investigation of incidents also highlighted to the investigators aspects of fire safety that are not the primary interest of the project as they are not currently matters directly addressed via the Building Regulations and statutory guidance, but nonetheless, are considered noteworthy.

This section reports on observations that those tasked with managing fire safety in existing buildings, those involved in building design, fire and rescue services, other first responder agencies, residents and fire safety practitioners may find of value and interest. These are set out in Table 3. There is no inference that observations on matters that are considered to be outside the scope of the Building Regulations and/or statutory guidance have been investigated in totality, nor if adopted would be applicable to all situations. Sound professional judgement should still be applied as to the relevance of any of the observations and associated recommendations reported in this section.

Table 3 – Recommendations from general observations

Item	Issue/Observation	Recommendation
1	A fatal hotel fire indicated that an apparent lack of maintenance of general fire precautions contributed to the spread of smoke and fire, which in turn appeared to impact the occupant's ability to respond in a timely manner, potentially denying them the time to evacuate safely. This highlighted the importance of the Responsible Person (as defined by the FSO and equivalent legislation in Scotland and Northern Ireland) continuing to ensure that general fire precautions are always maintained in an effective state.	No recommendation – observation only.
2	A fire occurred in a common areas of a 1960's, high-rise, purpose-built block of flats. The design of the block featured breakout panels from certain flats. The break-out panels in this incident were reported to have allowed the spread of smoke into the flats and did not offer a suitable alternative escape route as they led to the stair which was involved in the fire. Break-out panels were a feature of	The investigators consider it of relevance to the ongoing operation of existing residential buildings, that the Responsible Person and the Accountable Person should have their attention drawn to the potential presence of breakout panels and the equivalent dependence placed on breakout panels to that of fire doors. Consideration should be given to broadening guidance on existing buildings, such as the HM Government fire risk assessment guides and the HM Government guide 'Fire safety in purpose-built blocks of flats'.

Item	Issue/Observation	Recommendation
	historical guidance, but are no longer considered a reliable/appropriate means of providing an alternative escape route from a flat. It was also inferred by the attending fire and rescue service's investigation that the breakout panels may have been overlooked for upgrade/refurbishment when a wider program of upgrade to the flat entrance doors was carried out. This meant that the breakout panels may not have been fitted with cold smoke seals that may otherwise have been considered if they had been identified and subject to refurbishment at the same time as the flat entrance doors. The Real Fires project's investigators noted that a high-level review of guidance on existing buildings does not address or draw attention to breakout panels comprehensively. With guidance on existing buildings not addressing breakout panels, the potential for their condition and potential for upgrade/replacement to be overlooked by the Responsible Person(s) and the Accountable Person(s) to be plausible and potentially made likely by their absence from guidance.	
3	An incident in a purpose-built 1960's residential tower block undergoing façade remediation work highlighted that combustible scaffold boards being used by the contractor were shown to have been involved in a fire that affected the building, contributing to the vertical spread of the fire and its severity. It is also considered by the investigators that the scaffolding sheeting potentially impeded the escape of occupants due to it preventing smoke venting from the existing open stair.	The Investigators recommend strengthening of the construction site guidance. This could be e.g., HSG 168, that could better address this hazard of the use of scaffolding when a building is still in occupation. It is also a condition that would likely have a bearing on a on a safety case for an Higher Risk Building, as defined by the Building Safety Act.
4	A fire occurred in a 1960's, high-rise, purpose-built block of flats. The rapid spread of fire vertically along the façade has been	The Investigators recommend that it should be ensured that it is clear in guidance on existing buildings, such as the HM Government fire risk assessment guides and the HM Government guide 'Fire safety in purpose-built blocks of

Item	Issue/Observation	Recommendation
	attributed to the expanded polystyrene (EPS) cladding within the stair core. The incident highlights the potential for significant reductions in fire spread performance of externally insulated external wall systems if the outer render deteriorates with time. Such deterioration can occur as a result of: impact damage, weathering, building movement, and the like. Classification testing of a system generally focuses on the best representation of construction under it being in a new condition and not aged.	flats', that there is a potential vulnerability of EPS based external wall render systems, where there is degradation of the outer layer of the system that would likely result in a reduced reaction to fire performance when compared to a non-degraded installation.