

# Grenfell Tower Fire

Preliminary Report

Head of Grenfell Tower Investigation and Review  
Team

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2<sup>nd</sup> April 2019

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## Chapter 1 – Introduction

### Background to the Brigade's investigation and review

- 1 The fire at Grenfell Tower on 14<sup>th</sup> June 2017 took the lives of 71 people, with a further fatality on 29<sup>th</sup> January 2018, and left hundreds more with both physical and psychological injuries. Whilst fire and rescue services are trained to respond to fires in residential high rise buildings, the incident on the 14<sup>th</sup> June 2017 was of a scale and rapidity that was exceptional; preceded and precipitated by a complete failure of the building's fire safety measures to perform effectively. Those failures created a set of conditions not previously experienced by the Brigade and provided a unique challenge for the Brigade and its partner emergency services who responded on the night.
- 2 There is much to be commended in the multi-agency emergency response, and many emergency service personnel demonstrated bravery and selflessness during the night in the pursuance of preserving life. There can be little doubt that every member of the Brigade and those from the other agencies who attended, did so with the express aim of saving life and protecting property.
- 3 The courage of the residents, who, on the night had to endure punishing and terrifying conditions to escape the building as it became engulfed in fire is recognised and cannot fail to be admired by all. Similarly, the ongoing fortitude of the families and friends of those residents who were unable to escape and perished during or shortly after the fire is to be commended.
- 4 Like all incidents, large and small, there will be learning to be identified and it is acknowledged that any lessons to be learned and any good practice identified will undoubtedly apply not just to the London Fire Brigade, but nationally and possibly internationally.
- 5 The office of the London Fire Commissioner has a statutory duty to review the performance of the organisation and ensure all learning from incidents is identified, disseminated, and acted upon where appropriate.
- 6 This report is a product of the Brigade's investigation and review but should be considered a preliminary output only as there is a need for the Brigade and others to conduct further investigations, in order to achieve a full understanding and reach conclusions.
- 7 Such was the scale of the incident at Grenfell Tower, a dedicated team within the Brigade, the Grenfell Tower Investigation and Review Team (GTIRT), was established to understand the circumstances of the incident and what happened on the night, identify lessons to be learnt, and

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when all the evidence is available, provide an unfettered and comprehensive evaluation of the Brigade's response to this unprecedented incident. This investigation has and will continue to work alongside the statutory processes being undertaken by the Grenfell Tower Inquiry and Metropolitan Police Service (MPS), whilst acknowledging the primacy of those processes.

- 8 GTIRT reserves the right to amend any information contained within this report if further evidence becomes available.
- 9 The Brigade has sought to support the aim of the Inquiry and MPS in placing the bereaved, survivors, and residents at the heart of their investigations through the provision of relevant information, including the products of its own investigations, to ensure the fullest understanding of the events of the night is achieved for those most directly affected. The internal investigation team also recognises the traumatic experiences of the Brigade's staff and their need to understand the events of the night, and has sought to ensure its own activities and that of other statutory processes have due regard to the wellbeing of staff.
- 10 Eighty-three Brigade staff and five staff from other fire and rescue services provided oral evidence during the Inquiry's Phase 1 hearings and more than 650 staff have provided voluntary witness statements to the MPS.

### **Grenfell Tower Investigation and Review Team: Terms of reference**

- 11 This section sets out the terms of reference and investigation methodology already known to Brigade's principal officers to reflect the likely wider interest in the Brigade's internal investigation and its outputs.

#### Aim

- 12 Develop the fullest possible understanding of the circumstances of the Grenfell Tower fire to support the identification of lessons to be learnt, and evaluate the adequacy and effectiveness of the Brigade's emergency response on the 14<sup>th</sup> June 2017.

#### Rationale

- 13 In order to meet its statutory duties under Health and Safety legislation, the Brigade investigates all accidents and near misses (collectively known as safety events). The fire at Grenfell Tower on 14<sup>th</sup> June 2017 was unique in its scale, rapidity and loss of life and as such justified the formation of a dedicated team to ensure these duties were carried out effectively and efficiently, and support the Inquiry and MPS investigations.

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### 14 Objectives

- To set-up robust systems to capture all relevant information (documents, witness statements, emails, images, etc.) and any physical evidence associated with Grenfell Tower and Brigade's response to the fire.
- To develop and implement a storage and indexing solution for all the information relating to the Grenfell Tower investigation.
- In conjunction with the General Counsel's Department support the Brigade's participation in the Inquiry and establish a 'disclosure' management protocol to support the evidence submissions.
- To analyse all relevant and available information to develop a clear understanding of the Brigade's involvement with Grenfell Tower prior to the major fire that occurred on 14 June 2017.
- To investigate and establish the most likely cause of the fire and the factors that influenced the rapid fire spread in conjunction with external advisors.
- To undertake a comprehensive review of the Brigade's operational response to the incident including all the relevant aspects of the operational support and strategic co-ordination arrangements.
- To undertake a comprehensive review of Brigade Control's response to the incident.
- To undertake an assurance review covering all the actions taken by the Brigade in responding to the Lakanal House fire which occurred on 3 July 2009, including those instigated in response to the Rule 43 recommendations arising from the Coroner's Inquest.
- To carry out and maintain effective governance and relationships with all relevant external partners and agencies through the use of Memorandums of Understanding and Working Protocols.
- To work closely with all appropriate Brigade departments to develop an organisational action plan relating to any lessons learnt arising from the investigation or from recommendations delivered by the Inquiry

N.B. The report addressing the objective to undertake an assurance review of the actions taken by the Brigade in response to the Lakanal House fire has been completed and is appended to this report.

### Out of scope

15 The investigation or its outputs will not seek to examine or reach conclusions in relation to the following:

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- The cause of death of the people who died and any question of the potential survivability from the injuries of those who died.
- Any matters in relation to civil or criminal liability.
- Why the building became so vulnerable to the fire that occurred on 14<sup>th</sup> June 2017, save to use the conclusions reached by the Inquiry's experts where they provide context to actions or decisions taken by the Brigade on the 14<sup>th</sup> June 2017.
- The activities or response of other agencies, save where they impact on the Brigade's response.

### Relationship with formal statutory processes

- 16 The Brigade's internal investigation is being undertaken whilst the Inquiry and MPS investigations are ongoing. In addition, the Coroner has opened and adjourned inquests into the deaths resulting from the fire and it is anticipated that the Inquiry will attempt to address the matters normally dealt with by the Coroner in the course of the Inquiry's proceedings.
- 17 The Brigade has engaged extensively to ensure its actions do not in any way undermine or prejudice the other statutory processes. In respect of the MPS investigations, ways of working have been formalised through a Memorandum of Understanding and an Information Sharing Protocol. The Inquiry has published a number of documents setting out how its terms of reference will be delivered and as a Core Participant, the Brigade is bound by and adheres to these protocols.

### **Investigation methodology**

- 18 The Brigade's internal 'safety and learning' investigation is being carried out in three stages;
- 19 Stage one is being carried out in two parts, the first being the gathering of information which has included the copying, recording and referencing of information relating to the incident. The second part is the use of the Sequential Time Event Plotting (STEP) process to record a timeline of the actions undertaken at the incident and remotely at Brigade Control.
- 20 The second stage of the investigation is running concurrently with stage one, and involves the investigation team building an understanding of what happened at the incident and how it happened. This understanding of the first seven hours of the incident has developed into the factual narratives presented in the 'Operational Response Report Volume 1' and the 'Actions by Brigade Control Report'. Both documents are appended to this report.

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- 21 The third stage is an analysis to identify those areas that do not align with the expectations of policy, national guidance and / or training and determine the immediate and underlying reasons for this, to support improvements and / or avoid a reoccurrence. It is intended to undertake the majority of stage three of the investigation prior to and during phase 2 of the Inquiry and present internal findings on the adequacy and effectiveness of the Brigade's response at the end of the Inquiry proceedings, once all evidence is available.
- 22 However, as the internal investigation progresses, where a significant issue or concern is identified and verified which impacts on public or firefighter safety, and in the opinion of the investigation team requires action that cannot reasonably wait until the publication of reports, then these are communicated to the responsible department for consideration. The Brigade tracks and records any resulting actions taken through its Operational Improvement Process.
- 23 It is noted that the Brigade has also implemented a Grenfell Tower Fire Improvement Board to corporately consider operational learning identified by its internal investigation and recommendations arising from the Inquiry. The Board will direct the implementation of any improvement actions and assure the effective delivery and embedding of those actions.

### **Scope of this preliminary report**

- 24 This preliminary report predominantly covers the first seven hours of the incident up to 08:00hrs; the period of life saving activity and the focus of the Inquiry during its Phase 1 proceedings. The report also notes historical actions that are considered relevant or provide context to the actions / decisions taken on the night of the fire. In addition, observations that do not directly relate to the response on the night of the fire, but may be relevant when the Brigade is considering improvement measures, have been included to support continuous improvement.
- 25 The analysis to identify those actions or decisions or outcomes which are not aligned to the expectations of policy, national guidance and will take some time to complete. It will identify key lines of enquiry to be investigated to determine the immediate and underlying reasons for such discrepancies.
- 26 It follows that much of the work to identify, in particular, underlying reasons will lean heavily on examining the broader issues of policy and training, and identifying and understanding the systems and processes used by the Brigade to deliver its statutory functions.
- 27 In addition, there is a requirement to understand the events that led to Grenfell Tower becoming so vulnerable to the building wide fire that occurred on the 14<sup>th</sup> June 2017 in order to provide the



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context for the actions and decisions of those who responded to this incident. These are areas that the Inquiry will examine during its Phase 2 proceedings and the MPS will also examine as part of its own ongoing investigation.

- 28 However, there is learning that can and has been identified, acknowledged, and acted upon from the evidence available to date, even without fully identifying or understanding the underlying reason.
- 29 This report identifies those areas of operational learning within themes and are presented to the London Fire Commissioner and the Grenfell Tower Fire Improvement Board so that the Brigade can consider and implement any agreed corrective measures, if it has not already done so.
- 30 Recommendations that point to matters that the Brigade may wish to consider are provided to support its decision making have been included in this report.

## Chapter 2 - Summary timeline of events

31 This chapter provides a timeline of key events in the first seven hours of the incident. A minute by minute factual narrative of the events between 00:54:29hrs and 08:11:00hrs provided in the Operational Response Report Volume One and the Actions by Brigade Control reports (attached as Appendices A and B respectively). The entries presented below in italics denote messages.

- 00:54:29 Initial call to fire in flat 16, Grenfell Tower received
- 00:59:24 First appliance (G272) books 'in attendance' at Grenfell Tower
- 00:59:28 Second appliance (G271) books 'in attendance' at Grenfell Tower and Watch Manager (WM) Dowden assumes role as Incident Commander (IC 1)
- 01:00:28 H41S paged as Remote Monitoring Officer
- 01:07:21 Breathing Apparatus (BA) team One make first entry into flat 16 on fourth floor
- 01:08:06 Fire begins to break out of the kitchen window of flat 16 on east elevation
- 01:12:59 *Make Pumps 6, 1 Hydraulic Platform (amended to 1 Aerial at 01:13:41)*
- 01:14:21 *From G272, residential block of flats of 20 floors, 25 metres x 25 metres, five roomed flat on fourth floor, 75 per cent alight, high rise procedure implemented MDT in use, tactical mode Oscar*
- 01:16:05 G272 designated Initial Command Pump (ICP)
- 01:19:08 *Make pumps 8*
- 01:21:15 BA team One confirm fire is extinguished in flat 16
- 01:21:21 Fire has spread up external cladding to eleventh floor
- 01:21:24 First 999 call received from a resident inside Grenfell Tower (flat 195, 22<sup>nd</sup> floor)
- 01:24:09 *Make pumps 10*
- 01:24:33 *From G271, can we request attendance of the police for crowd control*
- 01:27:26 *Make pumps 15, Aerial Ladder Platforms 2*
- 01:28:12 *From G271, this is a persons reported fire*

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- 01:29:11 *Make pumps 20, Fire Rescue Units 2*
- 01:30 Fire in external cladding reaches top of the building and begins to spread laterally
- 01:30:48 First Command Unit (CU8) books 'in attendance'
- 01:31:30 *Make pumps 25*
- 01:32:08 First Station Manager (SM) (G22S) books 'in attendance'
- 01:33 G22S meets with IC 1 and takes over management of Fire Survival Guidance calls
- 01:36 First aerial appliance (A213) arrives on scene
- 01:40 H41S arrives at Grenfell Tower and takes over as IC 2 at around 01:50
- 01:54:30 First Deputy Assistant Commissioner (DAC) (E6) arrives at Grenfell Tower and takes over as IC 3 from H41S around 01:59
- 01:57:21 First Group Manager (GM) (E109) books 'in attendance' and proceeds to CU8 where he is informed he is the senior officer on scene and assumes command
- 02:03:13 *Make pumps 40*
- 02:06:03 *Major incident declared by Brigade*
- 02:11 IC 3 moves to CU8 and appoints E109 as Fire Sector Commander
- 02:15:49 *Make Fire Rescue Units 10*
- 02:34:03 40<sup>th</sup> pumping appliance now in attendance
- 02:35 Brigade Control Senior Operations Manager informs Control Room Operators (CRO) to begin advising callers to leave the building.
- 02:39:17 *From CU8, fire on all floors, from 2<sup>nd</sup> to 27<sup>th</sup> floor. Large number of persons involved. FSG calls being dealt with. Major incident declared. High rise procedure implemented, TL, ALP, EDBA, Main control, FSG, ground monitor, five jets, safety cordon in place. Tactical mode Oscar.*
- 02:43:51 First Assistant Commissioner (AC) (BM8) on scene assumes command as IC 4.
- 02:47 Decision to alter FSG advice from 'stay put' to 'get out' recorded in decision log.

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- 02:50:48 London Fire Commissioner (BM 1) books 'in attendance' as Monitoring Officer.
- 03:08 Bridgehead relocated to ground floor lobby due to deteriorating conditions.
- 04:03 External flame fronts converge at the south west corner of the building, totalling engulfing the building.
- 08:11 Last surviving resident (Mr Bonifacio) located in the Grenfell Tower is rescued from the 11<sup>th</sup> floor.

## Chapter 3 - Preliminary observations

- 32 This chapter presents observations themed into seven key areas following a review of the evidence held by the Brigade and that provided during the Phase 1 proceedings of the Inquiry. Each key observation is followed by the rationale for its inclusion in this report, together with any context provided by policy positions or historical actions.
- 33 The actions the Brigade has completed or are progressing in response to the learning identified to date are also presented at the conclusion of each key observation or at the end of the section.
- 34 Recommendations that point to matters that the Brigade may wish to consider are provided to support its decision making.

### Theme 1 – Observed failures of the building and its fire safety measures

- 35 This section of the report provides a summary of what GTIRT currently understands about Grenfell Tower, the fire safety provisions within the premises, the apparent failure of those provisions, and their impact on the residents and the Brigade's operational response.
- 36 It draws heavily on the Inquiry's expert witness reports, particularly that of Dr Barbara Lane, all of whom have undertaken a significant amount of work to identify how the building impacted on the events of the 14<sup>th</sup> June 2017. The expert witness reports provide significant context to the Brigade's operational response and the challenges it faced to deliver its key aims to save life, protect property, and protect the environment.
- 37 This report provides only a summary of those expert findings. The investigation will consider all the expert reports in detail during its analysis of the Brigade's operational response.
- 38 Grenfell Tower was a 25 storey (including basement and plant room) residential premises built in the 1970's. The premises is located on the Lancaster West estate within the Royal Borough of Kensington and Chelsea. The block originally contained 120 flats over 20 floors with the Ground and first three levels assigned to non-residential purposes.
- 39 During the refurbishment undertaken between 2012 and 2016, an additional nine flats were added within levels one to three, bringing the total number of residential units to 129. This refurbishment also included the installation of an external rain screen cladding system and works to the gas supply within the building.

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40 There is also evidence that lift replacement works were undertaken in 2005 and a flat front door replacement programme was completed between 2011 and 2012.

41 On the 14<sup>th</sup> June 2017, the fire started in the kitchen of flat 16, on the fourth floor of Grenfell Tower. The flat is located on the north east corner with the kitchen window projecting onto the east elevation of the building.

42 The fire was discovered by the resident of the flat, Mr Behailu Kebede, in the corner of the kitchen adjacent to the east facing window. A fridge freezer was located in this area and the Brigade's fire investigation officers believe the fire most likely started in this appliance.

**Key observation 1.1 : The external cladding system installed on Grenfell Tower was not compliant with Regulation B4(1), contributing to the observed failure of the fire safety measures provided within the premises.**

### Rain screen cladding system

43 Dr Barbara Lane states in her report, dated 5<sup>th</sup> November 2018 that '*The rain screen system, installed during the refurbishment in 2012 – 2016, was non-compliant with the functional requirement of the Building Regulations.*'

44 Dr Lane further states in her report that '*the rain screen cladding assembly together with the insulation fitted to the existing external wall and the missing or defective barriers became part of successful combustion process. This created a condition (in the event of an internal fire, cavity fire or external fire) which connected every flat on a storey; and every storey from level three to the roof, which supported the spread of external fire back into the building , through windows, and created a series of internal fire events*'.

45 She concludes in her report '*I do not consider it reasonable that in the event of the installation of a combustible rain screen on a high rise building, the fire brigade should be expected to fully mitigate any resulting fire event. That is particularly so in circumstances where the fire brigade had never been informed that a combustible rain screen system had been installed in the first place.*'

46 Dr Lane noted in her report that she had found no evidence that the Brigade had been informed that a combustible rain screen cladding system had been fitted to Grenfell Tower and therefore had not had the opportunity to consider the appropriateness of its operational procedures in the event of a fire at the Tower.

Fire safety measures

47 Grenfell Tower was provided with a number of active and passive fire safety measures which were intended to create a layered safety system. They were intended to provide the means for early internal firefighting. This is achieved by providing the means to limit fire and smoke spread from a dwelling fire and create the high degree of compartmentation necessary to support the building owner's/Responsible Person's 'Stay Put' strategy, which was designated for this particular high rise residential premises.

48 Dr Lane in her report, dated 5<sup>th</sup> November 2018, states '*The high degree of compartmentation had suffered its primary failure, caused by the fire spreading through the rain screen system*'. She goes on to state '*The remaining active and passive fire protection measures within the Tower were required to mitigate the effects of the resulting fire and smoke spread from that rain screen system fire. These measures were required to mitigate those effects on many floors.*'

Evacuation strategy

49 The current statutory guidance does not require a residential high rise premises to be provided with an interlinked fire alarm system, as the guidance assumes that any fire will be confined to one flat. The guidance is Approved Document B 2013 states: "*The provisions for the means of escape for flats are based on the assumption that:*

- a. *the fire is generally in a flat;*
- b. *there is no reliance on external rescue;*
- c. *measures in Section 8 (B3) provide a high degree of compartmentation and therefore a low probability of fire spread beyond the flat of origin, so that simultaneous evacuation of the building is likely to be necessary; and*
- d. *although fire may occur in the common parts of the building, the materials and construction used there should prevent the fabric from being involved beyond the immediate vicinity (although in some cases communal facilities exist which require additional measures to be taken)."*

50 The definition of 'stay put' from BS 9991:2015 assumes the same; '*when a fire occurs in a flat or maisonette, the occupants of that dwelling evacuate, but occupants of all other dwellings can safely remain in their dwellings unless affected by heat or smoke or directed to leave by the fire and rescue service.*'

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51 Dr Lane concludes that the guidance in the UK does not require there to be any system or process to either automatically sound a fire alarm in every flat or to sound an alarm in the common lobbies outside each flat. Therefore, unless a resident communicates with the emergency services by calling '999', there is no other automatic or expedient means for operational staff attending an emergency incident to communicate with residents within the building.

### Protected lobbies and stair

52 The means of escape to the final exit at Grenfell Tower was a single staircase provided with a protected lobby at every storey. A smoke control system, an active fire safety measure, was provided to protect each lobby and in doing so protect the single escape stair.

53 Professor Torero notes in his report, dated 23<sup>rd</sup> May 2018; *'In the Building Regulations and guidelines applicable to Grenfell Tower there is **no** requirement for provisions that allow the occupants of more than the flat of fire origin to evacuate (Section 5.1.7[1]'*

54 The evidence from witnesses and the Inquiry's experts indicate that the lobbies and stairwell failed to perform on the night of the fire and became compromised by heat and smoke from some time between 01:21 and 01:40hrs. This created challenging conditions for firefighters and the residents seeking to self evacuate from the building.

55 There is evidence that heat conditions above 150 degrees centigrade were present in the stairwell between floors 13 – 16, probably some time around 02:00 – 02:30hrs. This is likely to have caused a physical and psychological barrier for those above 11<sup>th</sup> floor to escape around these times. It is conceivable that these heat conditions were, in part, a consequence of the lack of firefighting due to the finite limitations of the dry rising main (DRM) capacity. This may have enabled the fire to spread internally unchecked by firefighting activities that would be undertaken at a high rise incident that didn't involve this level of rapid fire spread.

56 Evidence available to date indicates there is a close correlation between the progress of the vertical fire spread and the presence of smoke in lobbies. Smoke is reported in 13 of 20 lobbies between 01:19 and 01:38hrs, increasing to 15 out of 20 lobbies by 01:58hrs. By 02:38hrs, smoke is reported in 19 out of 20 lobbies with severe temperatures on floors six to 10.

57 The failure of the protected lobbies is attributed by Dr Lane to flat front doors failing to control the spread of fire and smoke from flats into the lobbies and vice versa. This is attributed to a lack of performance, initially identified by a fire resistance test undertaken by BRE Global, on behalf of the MPS, on a sample door of the type fitted to the majority of flats within Grenfell Tower.



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- 58 Flat entrance front doors are considered an important element of the lobby enclosure as they provide protection to the lobby acting as a means of escape to occupants from a fire in an adjacent flat. All flat entrance doors are required to be fitted with self closing devices to ensure the door is closed after a person leaves their flat. Dr Lane was unable to confirm whether these devices performed as intended, but many witnesses stated in oral evidence that the self closer fitted to their flat did not work or was missing.
- 59 In regard to the protected stairs, Dr Lane has noted in her report, dated 5<sup>th</sup> November 2018, the following function described in BS9991:2015 *'Whilst a simultaneous evacuation is normally not necessary, there will be some occasions where operational conditions are such that the fire and rescue service decide to evacuate the building. In these situations, the occupants of the building will need to use the common stair, sometimes whilst firefighting is in progress. As such, the measures in this British Standard for the protection of common stair are designed to ensure that they are available for use over an extended period.'*
- 60 Dr Lane further noted in her report in relation to the stair doors; *'I observed no fire damage in the stairs consistent with the total failure of a stair door, allowing fire spread onto the stairs' but does note 'the non-compliances I have identified would have contributed to the failure to prevent the spread of smoke to the stair'.*

### Mechanical Smoke Control system

- 61 A replacement mechanical smoke control system was installed in Grenfell Tower during the 2012-2016 refurbishment, its purpose being to control the amount of smoke entering a lobby and therefore reducing the risk of smoke spread to the protected stair.
- 62 The smoke control system was intended to operate on one floor only, as per the requirements of Approved Document B, and was not expected or designed to operate on multiple floors simultaneously.
- 63 A smoke detector was present outside flat 16, the fire compartment of origin, and this detector should have activated the smoke control system on the fourth floor. There are no reports of smoke in any other lobby at this time. Evidence from residents report thick black smoke entering the stairs from the lobby on the fourth floor around 01:20hrs indicating the smoke control system was not operating as designed.
- 64 The smoke control system was installed with an override control located in the ground floor lobby. The control panel enabled the system to shut down or the floor on which the system was

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operating could be controlled. Photographic evidence indicates that the override switch had been turned from 'Auto' to 'On', enabling manual control of the system.

65 The smoke control system could also be operated on each floor using a key switch located in each lobby, enabling the system to operate on that floor. There is no evidence at the time of writing that any of the lobby key switches were operated successfully during the fire.

### Fire lifts

66 Evidence available to date indicates the lifts provided with Grenfell Tower were consistent with the requirements of a 'fire lift' as described in the original design guidance at the time of construction, rather than a 'firefighting lift' as described in Approved Document B.

67 A 'fire control switch' was provided at ground level and CCTV footage confirms that Brigade personnel attempted to secure the lift using this fire control switch but the switch failed to engage. This resulted in the lifts continuing to operate as normal lifts but not under Brigade control.

### Dry rising main

68 Grenfell Tower was provided with a DRM to support internal firefighting operations. It is noted that this does not comply with the current guidance which includes for the provision of a Wet Rising Main in buildings over 50 metres. Prior to 2006, only buildings above 60 metres were required to have a wet rising main.

69 Dr Lane has stated in her report, dated 5<sup>th</sup> November 2018, that she believes the DRM was non-compliant with the original design guidance due to the building height of 67.30 metres. It is believed the original guidance allowing for a DRM in buildings under 60 metres measured the height of a building from the DRM inlet to the top of the building. There were no dry rising outlets on the second and third floors but these were added during the refurbishment when residential units were added to these levels.

70 However, Dr Lane notes that to comply with the guidance available (Approved Document B) at the time of the refurbishment, Grenfell Tower would have required the provision of a wet rising main. In her report, she notes the mechanical and electrical sub contractors stated in correspondence to RBKC; *'We are not increasing the high [sic] of the existing riser but we are adding two additional floors at low level which were previously walkways. We understand the existing riser is above the current permitted height of 50m, we would therefore need to discuss*

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*the proposed modification and what measures we need to take to gain approval for the new system'.*

71 RBKC Building Control responded by advising; *'Essentially the building regulations cannot require you to improve the existing floors above 50 metres. The regulations only apply to the work being carried out and additionally you must not adversely affect the existing building'.*

72 Dr Lane, therefore, concludes that no works were undertaken as part of the refurbishment to upgrade the rising main from a dry system to a wet system.

73 Evidence to date indicates that the DRM failed to provide a sufficient number of firefighting jets to combat the fires present across multiple floors, and the jets established failed to provide sufficient pressure and flow, presumably because the number of jets connected to the dry rising main exceeded the capacity of the main.

74 Professor Jose Torero in his expert report, dated 23<sup>rd</sup> May 2018, states *'Firefighting protocols for response to high rise building fires are intimately linked to a single floor fire. Furthermore, for residential buildings, the firefighters should find, on arrival, a single unit fire'.* Professor Torero goes on to state *'Fighting provisions, such as water supply, are also dimensioned under the expectation of a certain magnitude event. If vertical flame spread occurs this will require the drastic modification of firefighting protocols and advance planning'.*

75 Further investigation of the non-compliances identified within Grenfell Tower by the Inquiry's experts and the impact they had on the spread of fire and the operational response will be undertaken by the Inquiry's expert witnesses in phase 2.

### Sprinklers

76 Grenfell Tower was not provided with any fire suppression system such as sprinklers but it is recognised that there is currently no regulatory requirement for such provision in a building of this type and age.

**Recommendation 1** - The Brigade should continue to work with all stakeholders to identify and deliver improvements to the regulatory regime to prevent a re-occurrence of the Grenfell Tower fire and increase the safety of the public and firefighters.

**Recommendation 2** - The Brigade should continue to campaign vigorously for the provision of sprinklers in residential high rise and other types of buildings in order to improve public safety.

### **Actions by the Brigade since the fire**

- 77 In the week after the Grenfell Tower fire the Brigade's Fire Safety Regulation (FSR) department established a High Rise Task Force (HRTF) to review the risks associated with high rise residential premises within the Brigade's area.
- 78 The Brigade's FSR department has responsibility for both the delivery of the regulatory fire safety function and community safety activities.
- 79 Through an on-going proactive programme of prevention activity targeting and supporting the most vulnerable members of society, it leads the Brigade's aim to continue reducing the number of people who are injured or die in fires.
- 80 The department's Fire Safety Inspecting Officers (FSIO) carry out risk based, targeted audits and inspections of premises under the Regulatory Reform (Fire Safety) Order 2005. Where non-compliance by the person responsible for the premises is identified appropriate enforcement action can be taken to ensure any fire safety deficiencies are addressed.
- 81 FSIOs also respond to consultations from building control bodies under the Building Regulations. They also provide general fire safety advice as required under the Fire and Rescue Services Act 2004.
- 82 This team has conducted in excess of 1,500 activities related to residential high rise premises, including providing reassurance at residents meetings, co-ordinated visits with fire station based staff and the completion of over 1,100 premises visits.
- 83 Since the fire, the Brigade's officers have also consistently engaged with local councils via the London Councils Fire Safety Group forum. This has enabled the Brigade to share information, advice and good practice on a range of issues such as Aluminium Composite Material (ACM) cladding, fire doors and buildings designed on the basis of a 'Stay Put' strategy. This engagement has enabled a consistent fire safety message and helped to maintain links between local councils and the Brigade's Fire Safety Teams and Borough Commanders. In addition it has helped the Brigade to provide community re-assurance, particularly to those people living in residential high rise buildings. The relationship between the Housing Act, the Housing Health and Safety Rating System (HHSRS) and the Regulatory Reform (Fire Safety) Order 2005 (RRO) have also been discussed at this forum, as have topics such as Person Centred Fire Risk Assessments and Personal Emergency Evacuation Plans.

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84 A number of additional FSR posts have been established as a result of the funding secured from the Mayor of London, following the Grenfell Tower fire, to enhance the Brigade's inspection regime. This has included development officers, quality assurance officers and the re-engagement of previously retired Inspecting Officers to create a new 'Specific Projects Group'. This new group is tasked to focus on high risk property types and complete a more thorough inspection as a result of the learning from the HRTF inspections.

85 The Brigade's FSR department has also undertaken the following:

- led on assisting the Ministry for Housing, Communities and Local Government (MHCLG) in producing guidance for buildings that have partial cladding;
- provided subject matter expertise to assist Home Office and MHCLG in implementing the Dame Judith Hackitt recommendations. The Brigade's officers hold prominent positions on all the working groups established to deliver the Hackitt recommendations;
- designated a Brigade officer to lead the work on reviewing the competency of Brigade's Fire Safety Enforcing Officers;
- embedded a Brigade officer as a part of the Ministerial task force dealing with remediation of private tower blocks;
- provided, through the FSR Fire Engineering team, assistance to several other fire and rescue services to help them deal with ACM clad buildings (peer review);
- provided, and are continuing to offer, expertise to Home Office, MHCLG, the Expert Panel and the Dame Judith Hackitt review workstreams. This includes the additional engagement following the concerns raised over fire doors since it was reported that a door from the Grenfell Tower block failed the fire spread test;
- providing advice and support to London local authorities through regular monthly meetings of the London Councils Fire Safety sub group. One of the outcomes for which has been a proposal with the Local Government Association (LGA) and London Councils for a joint inspection team to deal with uncooperative landlords.

### **Theme 2 – Operational pre-planning**

#### Identification of risks

86 A range of legislation, including the Health and Safety at Work etc Act 1974 and the regulations made under that Act, place responsibilities on employers to ensure the health and safety of staff and others and involves obligations to identify and assess risks arising from work activities and to take all reasonably practicable measures to manage them.

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- 87 The Fire and Rescue Service Act 2004 places a duty on the Fire Authority (in London the Fire Authority is the London Fire Commissioner) to make arrangements for obtaining information to make provision in respect of firefighting, road traffic accidents and other emergencies.
- 88 The Fire and Rescue National Framework for England places a duty on fire and rescue authorities to identify and assess the full range of foreseeable fire and rescue related risks their areas face, make provision for prevention and protection activities and respond to incidents appropriately.
- 89 The Framework does not provide any further definition to 'foreseeable' but directs authorities to consider its Local Resilience Forum Community Risk Register and any other local analyses to ensure all foreseeable fire and rescue related risks are identified and included in their integrated risk management plan. The Brigade delivers its responsibilities for an integrated risk management plan through the publication of its London Safety Plan.
- 90 To determine the foreseeability of an event, it is necessary, as described in the National Framework, for a fire and rescue service to identify the risks in its local area and assess the likelihood of those identified risks materialising and the severity of the consequences. Those events which are deemed to be reasonably foreseeable are those which the fire and rescue service must adequately plan, train and equip to respond to.
- 91 Having identified a range of risks, the assessment of likelihood invariably involves considering the regulatory controls undertaken or administered by others which impact on the scale and likelihood of any event occurring. Building regulations are an effective example of this in regard to buildings, whether in the context of fire or any other matter which may impact on their safety. Similarly, Department of Transport regulatory rules are provided to control the safety of the country's transport network and these serve to reduce the risk of an incident or limit the scale of an incident.
- 92 One of the key factors which fire and rescue services must consider when assessing and identifying risk in the built environment is the extent to which statutory controls are already in place to regulate the risk. Fire and rescue services necessarily rely on the existence of such controls when making provision for the carrying out of their functions<sup>1</sup>.

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<sup>1</sup> Part 2 of the Fire and Rescue Services Act 2004 ss 6-20

***Key observation 2.1 : Any knowledge concerning the risks associated with cladding systems may not been recognised and communicated effectively across the Brigade.***

- 93 Evidence adduced in Phase 1 of the Grenfell Tower Inquiry, such as that contained in the 'Tall Buildings' presentation<sup>2</sup> suggests that the knowledge cladding systems may have presented a risk was fixed, if not completely understood, within some sections of the Brigade.
- 94 The risks identified in the presentations were not solely focussed on the combustibility of cladding systems but also addressed the impact that such systems might have on fire behaviour, including elongation of flames behind rain screen systems and / or unseen fire spread in any cavities behind or within the cladding system. Similar information is contained within the BRE Global publication 'BR 135', issued in March 2013, which also discusses the fire performance of external thermal insulation for walls in multi-storey buildings.
- 95 The knowledge contained within the 'Tall Buildings' presentation was developed and used within the Brigade to educate Fire Safety Inspecting Officers, Fire Engineering staff and operational Senior Fire Safety Officers (SFSOs).
- 96 Fire Safety Inspecting officers are responsible for the Brigade's fire safety enforcement duties, primarily in respect of the Regulatory Reform (Fire Safety) Order 2005 (RRO), seeking guidance when necessary. They carry out fire safety inspections/re-inspections and audits of all premises types to assess the risks and the adequacy of their fire precautionary arrangements.
- 97 LFB Fire Engineers undertake casework on projects where fire engineering has been utilised as either part of the design for new/refurbished buildings or existing solutions for a building. Their primary role is to review fire engineering design submissions received as part of the Building Regulations consultation process. Through this role they provide technical support to area fire safety teams, Fire Engineering Liaison Officers (FELOs) and act as subject matter experts at internal and external meetings. They may provide representation of technical opinion through committee representation for fire safety engineering technical documents such as new and revised British Standards, Approved Documents, Industry guidance and Codes of Practice.
- 98 SFSOs provide an emergency response role. They are mobilised in line with Policy Note (PN) 412 Mobilising policy. Their role includes a range of advice and support to Incident Commanders

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<sup>2</sup> LFB00003521

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during the response phase of an incident. They can advise on what passive and active fire safety facilities might be in a building and how these may assist with operations.

99 It is clear from evidence provided to the Inquiry by Brigade witnesses and the Brigade's internal investigation that information such as that contained within the 'Tall Buildings' presentation and BR 135 was not communicated effectively to those concerned with the development of operational policy and training.

100 Cladding is mentioned in both the 2014 and the earlier 2008 version of Generic Risk Assessment (GRA) 3.2 'Firefighting in high rise buildings' which informed the Brigade's local high rise firefighting policy, PN 633, and in both documents, cladding is mentioned in the 'Planning' section, as an example of a building construction feature that should be included as part of the information a fire and rescue should gather about high rise buildings.

101 The Brigade had a significant role in reviewing GRA 3.2 as it had identified and was in the process of implementing a number of lessons learnt from the high rise fire which had occurred at Lakanal House in July 2009. This incident had led to a significant loss of life and a range of learning had been identified through the Coroner's Inquest and the internal investigations which had preceded it. The Brigade's learning from this fire was incorporated into the Lakanal House Case Study, which was implemented as mandatory training for all operational staff in 2014.

102 The Brigade's recent report<sup>3</sup> into national guidance and local policy for high rise firefighting, commissioned by the Operational Policy and Assurance (OPA) department following the Grenfell Tower fire states the use of the phrase 'such as' in 2014 version was intentional and indicative of the fact that the building features listed were not meant to be either definitive or prescriptive, but were offered as a guide to the kind of information fire and rescue services should consider gathering about high rise buildings.

103 The report noted that cladding is not identified as a specific hazard in the 'Hazard and risk' section of either version of GRA 3.2 and reflects on the fact that no reference was made to cladding in the responses that were made by any of the consultees who offered feedback regarding the development of the 2014 version of GRA 3.2. The report details that cladding was included within 'Planning' because, as an outer layer on one or more faces of a high rise building, it was understood that the use of this material would create a void which had the potential to promote an abnormal degree of external spread of fire or smoke, as referenced in BRE 135 and

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<sup>3</sup> GTIRT19-000737



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the 'Tall Buildings' presentation. As such, cladding was noted alongside timber-framing, surface-mounted trunking and voids as an example of a building construction feature that should be recorded within the information to be gathered by fire and rescue services in relation to high rise premises.

- 104 The Brigade's PN 633, reviewed in 2015 following the publication of the 2014 version of the GRA, does not include cladding as one of the eight examples of building construction features that may be found in a high rise building but it is noted that neither GRA 3.2 or PN 633 purported to list all of the building construction features that may be found in a high rise building and may be relevant to high rise firefighting.
- 105 More recently, the Brigade responded to a fire at Shepherd's Court in Shepherds Bush in August 2016 which originated in a two bedroom flat located on the seventh floor of the 20 storey purpose built block. The fire was of particular interest to the Inquiry due to the external fire spread which spread vertically from the seventh floor, after breaching a window, to the 12<sup>th</sup> floor and penetrated back into the building. It is noted, however, that the characteristics of the building were significantly different to Grenfell Tower. It did not have a rain screen cladding system fitted and the compartmentation within the building was maintained to a satisfactory standard, enabling the Brigade to deploy resources to contain and extinguish the fire on each floor.
- 106 The Brigade's fire investigation into Shepherd's Court determined that the external fire spread involved external panels fitted directly under and above the windows. Further investigation identified the panels were constructed with a plywood backing and an 1mm metal face, sandwiching a polystyrene foam. The investigation concluded that the fire attack on the panels, arising from flames breaching the window initially, was likely to have assisted the fire in spreading up the outside of the building.
- 107 It is noted that the result of this investigation was communicated to Hammersmith & Fulham Council and raised by letter with other borough councils and registered landlords to inform them of the potential risk and request that they include consideration of that risk in their fire risk assessment for premises within their respective property portfolios.
- 108 At this time, there is no evidence that the issue with the infill panels identified by the Shepherd's Court fire was communicated to those departments responsible for operational policy or training.

Other UK fires involving cladding

109 There have been other fires in the United Kingdom such as the fire at Garnock Court in Scotland in 1999, which led to the introduction of the Building (Scotland) Regulations 2004 which came into force on 1 May 2005. It contains the mandatory regulation: *'Every building must be designed and constructed in such a way that in the event of an outbreak of fire within the building, or from an external source, the spread of fire on the external walls of the building is inhibited.'*

110 At Westminster, the Select Committee on Environment, Transport and Regional Affairs examined the issue of fire spread in buildings via external cladding systems following the Garnock Court fire and concluded in December 1999; *'The evidence we have received during this inquiry does not suggest that the majority of the external cladding systems currently in use in the UK poses a serious threat to life or property in the event of fire. There have been few recorded incidents involving external cladding, and, although in our view any loss of life in incidents such as these should be prevented if at all possible, neither have there been many deaths (indeed, it is uncertain whether any of the deaths in the fires of which we have been informed can be directly attributed to excessive fire spread via the external cladding). Furthermore, the responsible attitude taken by the major cladding manufacturers towards minimising the risks of excessive fire spread has been impressed upon us throughout this inquiry.'*<sup>4</sup>

111 Historically, fire and rescue services have been provided with national guidance, in addition to the Generic Risk Assessments, through the following publications:

- Fire Service Circulars, issued by HM Government and replaced by Fire and Rescue Bulletins from August 2010
- Dear Chief Officer Letters, issued by HM Inspectorate of Fire Services up to June 2004
- Fire Service Manuals, issued by HM Government
- Manuals of Firemanship, issued by Home Office and replaced by the aforementioned Fire Service Manuals

112 The information provided by these publications was broad in scope, ranging from operational guidance, training requirements to notification of events or lessons learned that may impact on fire service operations or the safety of personnel, both nationally and internationally. It is noted

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<sup>4</sup> <https://publications.parliament.uk/pa/cm199900/cmselect/cmenvtra/109/10907.htm>

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that the different regulatory environments that exist in other countries often impact on the usefulness of any analysis of international fire events.

113 Since 2018, the function of capturing operational learning from UK fire and rescue services and the wider international fire and rescue sector has been undertaken by the National Operational Learning (NOL) secretariat. Learning events are collated and analysed by the NOL secretariat, in partnership with experts across the fire sector and academia to check it against the guidance framework of hazards, control measures, strategic and tactical actions. The secretariat propose any recommended changes to guidance to the National Operational Learning User Group (NOLUG) who decide on the required actions.

114 NOLUG is a national group formed of strategic leads from across UK fire services, multi agency partners and representative bodies. It is the decision making body of national learning and sits within the National Operational Effectiveness Working Group.

### Operational Risk Information

115 The Brigade's PN 800 'Management of operational risk information' provides the policy framework and guidance for personnel on the Brigade's risk based approach to identifying, gathering and disseminating operationally important site risk information and recording it on the Operational Risk Database (ORD).

116 In April 2012, the Department for Communities and Local Government (DCLG) and the Chief Fire and Rescue Advisor's Unit (CFRAU) published the Fire and Rescue Service Operational Guidance - Operational Risk Information. The purpose of the guidance is explained as "*...robust yet flexible guidance on developing and maintaining a consistent approach to managing, processing and using strategic and tactical operational risk information that can be adapted to the nature, scale and requirements of the individual Fire and Rescue Service.*" and "*... to provide consistency of approach that forms the basis for common operational practices, supporting interoperability between Fire and Rescue Services and other emergency responders ... to support safe systems of work ... and enhance national resilience.*"

117 Following publication of this national guidance, the Brigade's Strategy and Risk department undertook a gap analysis to determine the extent to which the Brigade was compliant with the published guidance. The outcomes were presented to the Corporate Management Board on 6<sup>th</sup>

March 2013<sup>5</sup> and noted that the Brigade's system was robust and largely compliant with national guidance.

118 The Brigade's ORD replaced the previous Central Risk Register (CRR) in April 2011 and is the main database which holds location-based operational risk information. The primary purpose of the ORD is to record significant hazards and risks, including any less obvious hazards and any unique control measures in place, as well as any particular tactical plans or command and control procedures required. Appropriate information and a tactical plan, when required, is added to the ORD by station personnel via the Station Diary application and assured by Station Commanders.

119 The information held in the ORD is made available to crews via icons on maps displayed on appliance Mobile Data Terminals (MDTs) and can also be accessed by the subsequent ICs through the systems available on the CUs.

***Key observation 2.2 : The Operational Risk Database entry for Grenfell Tower was not populated in accordance with PN 800.***

120 Evidence provided during Phase 1 of the Inquiry indicated that the ORD entry for Grenfell Tower did not provide all of the information that may have been relevant to the premises, and provided some information that was inaccurate. This included the absence of an electronic Premises Information Plate (ePIP) which may have provided information to assist crews including dimensions and the basic layout of the premises, number of floors, details of available hydrants and the rising main, together with the locations of lifts.

***Key observation 2.3 : There is a lack of consistency in the standard of premises risk information held on the Operational Risk Database.***

121 Further investigations by GTIRT and the Operations Directorate have ascertained the lack of quality identified in the Grenfell Tower risk information is an issue replicated more widely in the location-based operational risk information held by the Brigade. This can include but is not limited to inaccurate information, incomplete tactical plans, and the absence of an ePIP for the premises.

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<sup>5</sup> 13-CMB043 Operational risk information – LFB response to national operational guidance

***Key observation 2.4: The Brigade has not undertaken Premises Risk Assessments for all residential high rise premises to determine the level of risk associated with these premises.***

- 122 The Lakanal House Incident Assurance Review report (Appendix D) identified the Brigade's intention, following the Lakanal House incident, to undertake a premises risk assessment (PRA) on all residential high rise premises to determine the level of risk associated with those premises.
- 123 A PRA is normally carried out by the operational staff in whose area the premises is located. In almost every case a site visit is required and the template provided in PN 800 'Management of operational risk information' assists in this process by identifying potential hazards and applying a score to that hazard. The template also identifies controls that reduce the risk such as the presence of a dry or wet rising main.
- 124 Using the identified areas of hazard on the PRA template, the visiting operational staff apply a risk assessment to the hazards and in conjunction with the local SM decide the level of risk within the premises and the resulting action to be taken.
- 125 The level of risk is applied to a risk grading matrix, which determines how often the premises should be visited, whether it requires an on site exercise, and whether hazard information or a full tactical plan needs to be recorded. It is noted that premises will not all meet the risk threshold to justify inclusion on the ORD, due to the absence of any premises based risks that may impact on a safe and effective operational response.
- 126 There are approximately 6900 residential high rise premises in London and it is noted that some boroughs have a disproportionately high number of high rise residential buildings and other premises that may require inclusion on the ORD. It is recognised that this presents a challenge for the Brigade to balance fulfilling the gathering of operational risk information in these areas with ongoing activities undertaken by crews in relation to community safety and training, in addition to providing a response to operational incidents.
- 127 Premises which meet the risk threshold to require inclusion on the ORD are then subject to a requirement for periodic 7(2)d visits, at a frequency determined by the risk rating applied to the premises as indicated by the PRA. The primary aim of 7(2)d visits is to assist crews to remain familiar with any specific risks associated with the premises and any unusual control measures not generally covered in policy and update or confirm any existing risk information. They are not the primary mechanism to initially identify the level of risk associated with a premises.

***Key observation 2.5 : There is an inconsistent level of knowledge and understanding amongst operational staff in relation to undertaking 7(2)d visits.***

128 A number of Brigade witnesses provided oral evidence to the Inquiry that demonstrated a good knowledge of the ORD and the purpose of 7(2)d visits, however this was not replicated by all witnesses suggesting there is an inconsistent level of knowledge and understanding amongst staff, despite the current training and guidance available.

129 Section 7(2)d of the Fire and Rescue Services Act 2004 places a responsibility on the Fire and Rescue Authority to make arrangements for obtaining information needed for the purpose of extinguishing fires in its area, protecting life and property in the event of fires in its area, rescuing and protecting people in the event of a road traffic accident, and rescuing and protecting people in the event of emergencies.

130 A Watch based training package on conducting 7(2)d visits was included as mandatory training in Operational News 24, issued in March 2013 and has been refreshed through station based training periodically. Operational risk information and 7(2)d visits are also addressed in the Lakanal House Case Study, issued as mandatory training for all operational staff in 2014.

131 In addition, there are a number of documents available on the Brigade's intranet providing guidance to staff on outside duties, including 7(2)d visits, and the ORD, together with advice for SMs on quality assuring ORD entries.

132 However, it has been observed that the information provided in the Brigade's policies and associated training packages in relation to undertaking 7(2)d visits is not completely aligned. PN 800 directs operational staff to pay particular attention to nine areas, whilst PN 633 Appendix 1 provides a list of 22 items for crews to consider and ensure they are familiar with.

133 The Fire and Rescue Service Operational Guidance – Operational risk information, provides no practical guidance on undertaking 7(2)d visits and focusses on the process for identifying premises which may become subject to 7(2)d visits.

**Recommendation 3** – The Brigade should consider reviewing its policies and training packages relevant to 7(2)d visits to ensure consistent guidance is provided to operational personnel.

**Key observation 2.6 : There is no established means for crews providing an emergency response to premises outside of their own station areas to be aware of any fire safety deficiencies that may have been identified.**

134 The Brigade has an established process to ensure that local crews are notified when a premises in their own station area has been issued with a Notice of Deficiencies or an Enforcement Notice following a fire safety audit or notification of an Alleged Fire Risk<sup>6</sup>. This is to ensure crews are aware of any issues that may impact on firefighting operations and / or increase the risk to firefighters or members of the public.

135 During further investigation into the area of operational risk information, it is noted that the Brigade, necessarily, has a pan London approach to fire cover which on occasion may lead to non-local crews being the first attendance to a fire or other incident type. Currently there is no system to ensure information about any identified deficiencies in the fire safety provisions in a premises are available to all operational crews that may be required to provide an operational response.

**Recommendation 4** – The Brigade should consider how to ensure information relating to identified fire safety deficiencies in a premises is available to all operational crews.

#### **Actions by the Brigade since the fire**

136 The Brigade has instigated a corporate project to review and, where necessary, improve its system for the gathering, recording and dissemination of operational risk information. The objectives for the project are identified as:

- Review and rationalise current risk information systems to evaluate the current entries and carry out the necessary interventions to increase the underpinning knowledge and understanding of staff with these systems.
- To create a policy that encompasses understanding and identifying risk and provides a uniform approach to gathering, recording, prioritising and sharing of operational risk information.
- The relevant risk information will be easily available to the right people at the right time in a form that is easy to understand and use.
- Staff will have a better understanding of their role whilst assessing risks with regards to reducing the risks to firefighters and the risks to the public.

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<sup>6</sup> An Alleged Fire Risk (AFR) is a notification from an individual to the Brigade reporting their concerns about the fire safety arrangements at a particular premises.

- To ensure staff have a better knowledge and understanding of risk and their responsibilities of ensuring the data collected and entered is relevant and accurate.

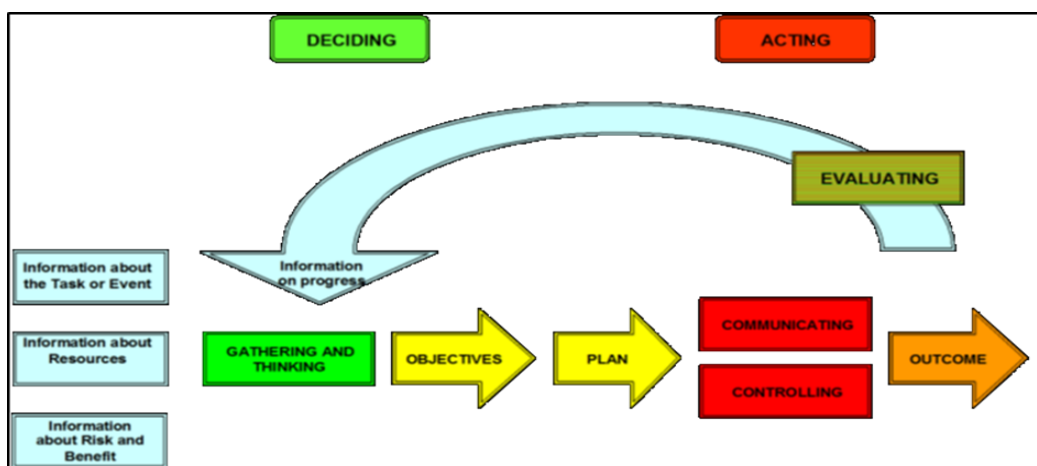
137 The project will link to and complement planned Information Technology (IT) system rebuilds, which aim to provide the data management framework and portal for an integrated approach to risk recording and notification across all the areas of service delivery.

### Theme 3 – Command and Control

#### Incident Command

138 The Brigade sets out its incident command framework through a series of policies owned by the OPA department. Those policies are broadly but not fully aligned to National Operational Guidance (NOG). The key difference is the Brigade currently continues to operate the Decision Making Model (DMM) it has used successfully for many years and has not adopted the Decision Control Process (DCP) included within NOG – Incident Command, published in 2016.

139 The DMM was included in the '*Incident Command, Fire and Rescue Service Manual*<sup>7</sup> to support commanders during their operational decision making. The model is a simple flow diagram which guides users through the decision making process in an organised way. The process aims to reduce the potential for information to be missed and requires objectives to be set and implemented. The DMM provides the framework to support Incident Commanders (IC) to manage operational incidents effectively and bring them to a safe satisfactory conclusion. A diagram is provided below for illustrative purposes.



<sup>7</sup> HM Government publication superseded by National Operational Guidance – Incident Command in January 2016



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140 The DMM is formed around two main activities, Deciding and Acting. Each stage identified in the model falls into one of these activities.

- *Deciding* - gathering and thinking about all available information; identifying appropriate objectives; defining a plan; and considering the results of evaluations.
- *Acting* - communicating the objectives and tactical plan; controlling the activity; and evaluating the outcome of the plan.

141 The model also serves as a golden thread through the Brigade's operational review and debriefing framework, including the Performance Review of Command (PRC) process.

**Recommendation 5** - It is recommended that the Brigade determines whether to retain the DMM or move to the DCP. It is acknowledged the Brigade needs to consider the challenges and benefits of implementing such a wider ranging and fundamental change to its incident command framework, at a time of significant organisational change and other improvement programmes.

### Human factors impacting on command and control

142 The following paragraphs provide a summary of information set out within NOG in relation to the impact of human factors on incident command and their relationship to the events observed during the Grenfell Tower fire. It notes that the influence of human factors on behaviour and performance at incidents should not be underestimated or overlooked when evaluating performance or effectiveness.

143 Human behaviour will influence individual activities in the operational environment of an incident in complex and significant ways. Whilst characteristics such as personality are fixed, others such as competence, skills, attitudes and beliefs can be enhanced, influenced and changed.

144 The guidance states that although personality, situation, and environment play an important role in behaviour, an individual level of risk acceptance dictates what this behaviour will be. Individuals subconsciously accept the level of risk they are comfortable with. In the operational environment of an incident, individual influences on behaviour will include issues such as personality, their attitude to safety and their risk perception.

145 NOG observes that stress will also adversely affect an individual's behaviour. Acute stress is a reaction to sudden, unexpected events such as those that may be experienced when working in a dynamic, high-risk environment when commanding an incident. Such stress will involve

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significant physiological and psychological effects akin to the fight, flight or freeze responses observed in animals.

146 There can be little doubt the personnel who attended the Grenfell Tower fire would have experienced acute stress to a greater or lesser degree, particularly those making risk critical decisions and those who entered the building to undertake firefighting, search and rescue operations. Many of those who attended the incident required counselling support afterwards and for some that support is ongoing, demonstrating the stress and trauma experienced on the night.

147 The guidance states that acute stress can adversely impact on incident command in a number of ways. It can impair situational awareness and decision making leading to a decline in individual and team performance.

148 Stress and anxiety take up part of a person's mental processing capacity and can distract attention from the situation and reduce available capacity to focus on and understand information. Failing to recognise important information or not processing it properly may lead to an inaccurate mental picture of the situation.

**Recommendation 6** - The Brigade should consider the extent to which human factors affecting command and control are addressed in policy and training.

***Key Observation 3.1 : The scale and rapidity of the incident, combined with human factors, impacted on the ability to maintain situational awareness.***

149 From approximately 01:20hrs on the night of the fire, as the incident began to develop rapidly, situational awareness amongst those in command roles became reduced in relation to what was happening within the building in regard to internal fires and the resulting conditions. From around this time, the situation escalated with a rapidity and scale not previously experienced by the Brigade, placing those in key roles under stress.

150 Brigade witnesses who performed command roles describe in their evidence the difficulties of gaining a clear understanding of the developing situation within the building. Around this time, it is evident that radio communications started to become problematic as discussed later in this chapter (Theme 6 refers). In addition, fire survival guidance (FSG) calls started to be received from 01:21hrs by Brigade Control and a large volume of information had to be transferred to and processed on the incident ground.

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- 151 The rapidly developing situation and the resulting human factors identified in the preceding paragraphs may have contributed to challenges in maintaining effective situational awareness. It is necessary to gather further information and review that evidence to develop a fuller understanding and reach a conclusion.
- 152 It is clear that reduced situational awareness can have a number of potential impacts on the command and control of an incident. The ability to identify and prioritise objectives and develop a tactical plan can be compromised by reduced situational awareness.
- 153 Effective incident command, particularly at large and complex incidents, requires the delegation of responsibility and authority through the process of sectorisation to limit the spans of control of one individual. NOG notes that excessive spans of control have the potential to adversely impact on the ability of an individual to manage an area of responsibility effectively.
- 154 Officers tasked with managing an operational or functional sector must be briefed so they fully understand their objectives, how these objectives fit into the tactical plan, and the parameters of their responsibility and authority. The evidence from many witnesses suggests that briefings included minimal information about the developing situation, hazards, risks, objectives, and priorities. It is likely those providing the briefings did not have the time or sufficient situational awareness to conduct a detailed briefing and therefore officers nominated for command and functional roles were often reliant on building their understanding on arrival at their respective scene of operations.
- 155 During the Grenfell Tower fire, the breadth and volume of information, even in the early stages, that needed to be understood by commanders to gain and maintain situational awareness was considerable. It included rapid external fire spread, fire penetration back into the building, the effectiveness of the internal compartmentation and its effect on internal fire spread, the ongoing self evacuation by residents and the FSG call information relating to those still located within the premises.
- 156 The scale of this challenge should not be underestimated, particularly in the context of an incident that was unprecedented in the experience of those attending the incident and it is also necessary to acknowledge the human factors described earlier.
- 157 NOG observes that human perceptual and memory systems are not infallible. A strong focus on one part of the situation, or element of the environment, can lead to other sources of information being neglected or missed resulting in reduced situational awareness. Impaired communication

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resulting from stress is likely to affect teamwork, leading to a lack of shared understanding about the situation, objectives and plan.

### Task focus

158 Analysis of the evidence suggests that many officers became, understandably, task focussed at stages during the incident. Becoming task focussed can lead to becoming unduly fixed on some elements of an incident, rather than looking at the incident or their area of operations as a whole.

159 In evidence many officers stated that they had often made assumptions that processes were working effectively and information was being communicated to those that needed to be updated. A number of witnesses described not having the time to assure themselves that things were being done effectively and stated they trusted subordinates were undertaking their roles and any actions effectively.

### Extended period undertaking tasks

160 A number of supervisory officers also provided evidence that they were overwhelmed by the scale of the tasks for which they were responsible. In some cases, these supervisory officers were not provided with further support or assistance and were often performing those roles for many hours.

161 In addition to welfare concerns related to undertaking an extended period in a dynamic and stressful role, NOG notes that ICs should be aware of the effects of fatigue on themselves and others, and ensure people are relieved appropriately. It also states that actions should be taken before fatigue begins to reduce performance.

## **Actions by the Brigade since the fire**

### Briefings

162 The Brigade has included an article on briefings at incidents in its latest Operational News publication (Ops News, Issue 36), published in February 2019. The article highlights the DMM (PN 341 refers) as the preferred tool to inform effective briefings.

163 Operational News is a six monthly publication provided to all operational LFB staff. It is one of Brigade's key mechanisms to raise awareness of good practice and areas for development, and are supported by links to training materials. The training that is attached to each subject area is categorised as either; mandatory for all operational staff, mandatory for specific staff groups, or to be delivered at the discretion of the WM dependant on current development needs. The training

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is completed by staff in accordance with the categorisation of the training intervention and recorded in the Station Diary<sup>8</sup>.

### New technology to support situational awareness

- 164 The Brigade has recognised that drones may provide officers on the incident ground a range of new capabilities that have the potential to improve situational awareness and decision-making at incidents. It commenced an operational trial in October 2018 to evaluate two different drones for a six month period. Each drone is operated by a minimum of two operational staff, one who pilots the drone and one who operates its on-board cameras. The two members of staff will operate from a Brigade vehicle in a safe area and will cordon off a small area to operate the equipment.
- 165 The drone team will attend a range of different incident types during the trial to establish exactly how drones can best serve the Brigade in future. The trial will assist to answer a number of questions, such as many drones are required to provide pan-London cover, call out times, which incidents to deploy them to, and many other practical considerations.
- 166 In addition to improving firefighter safety, the obvious benefit is that drones will provide an aerial view of an incident without reliance on imagery from a partner agency such as NPAS whose assets may be employed at another location.
- 167 The Brigade anticipates drones to be more useful at some incidents than others, such as large warehouse fires when observation by firefighters at ground level or from aerials is difficult or hazardous, or grass fires over a large area that may develop spontaneously in new locations.
- 168 The trial will evaluate the usefulness and effectiveness of the drones at residential high rise fires during the six month period but it is anticipated they will provide a useful tactical option in both the response and recovery phases. The Brigade has received permission from the Civil Aviation Authority to fly a drone throughout most of London at low altitudes and close to buildings.
- 169 The drone can remain in flight for up to one hour and has two cameras, a heat-sensitive camera that can 'see' through thick smoke and detect hot spots, such as the seat of a fire and members of the public who may be trapped by a developing fire. The second camera has 30x magnification and can read a number plate from some distance away, up to half a kilometre. The drones can

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<sup>8</sup> Station Diary is a software application provided to enable the effective management and recording of the activities of station based staff.

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also fly up to seven kilometres from the pilot, although it is noted that tall buildings may limit the distance in practice.

170 The footage shot by each camera is stored on a memory card that can be removed and the footage stored after each incident to assist with any post incident review.

### ***Key observation 3.2 : The rapid escalation of the incident impacted to a limited extent on command handovers.***

171 It is noted that the initial IC, a WM, was in charge of the incident from 01:00hrs until approx. 01:50hrs when the role was taken over by one of the two SMs mobilised at 01:15hrs on receipt of the 'make pumps six' message. Further SMs were mobilised to perform the roles of Press Liaison Officer (PLO) and SFSO, together with a GM. These mobilisations were all in accordance with the requirements of the Brigade's mobilising policy, PN 412.

172 Additional officers, including a DAC, were mobilised in accordance with PN 412 at 01:20hrs and 01:26hrs following the 'make pumps eight' and 'make pumps 10' assistance messages. This was followed by further officers, including an AC, following 'make pumps 15'.

173 The attendance times following mobilisation for all officers assigned to Grenfell Tower was broadly compliant with Brigade expectations i.e. SM on scene in 20 minutes after mobilisation, GM on scene in 30 minutes and DACs and above on scene in 60 minutes after mobilisation. The exception was the GM first mobilised, who was off duty, and had been mobilised in error and therefore understandably did not respond to his pager. The failure to respond by contacting Brigade Control was not noted by Control staff who were, at that time, inundated by emergency calls and did not follow up the 'failure to respond' or mobilise a replacement GM.

174 In the context of the rapid escalation of the incident from the predetermined (PDA) to 'make pumps 25' in less than 30 minutes, it is not surprising that a WM remained as the IC during this period and beyond.

175 There was an opportunity at around 01:40hrs for the first SM on scene to take over the incident but this was jointly rejected in favour of the SM taking over the coordination of the FSG calls being received, knowing that a second SM was en route and would arrive shortly. This decision suggests both officers considered that the FSG calls represented the greatest opportunity to save life.

176 The rapidity and scale of the incident also created a situation that led to two officers simultaneously performing the IC role for a short period, one located by the Tower and the

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second officer located in CU 8. This situation developed due to their different arrival points at the incident, with the first having to pass the current IC located on the south east corner of the Tower and leading him to immediately taking command of the incident. The second officer approached from a different direction and passed CU 8 and was informed he was the most senior officer in attendance and therefore took command. There is no evidence at this stage that this inadvertent situation had any adverse consequences on the command and control of the incident.

177 It is noted that the process of command handovers is often challenging during incidents that escalate very quickly, as identified by Her Honour Frances Kirkham during the Lakanal House Inquest. Following the Inquest, a Rule 43 recommendation was directed at the Brigade noting '*It is recommended that the Brigade review its policy and procedures concerning incident command, having regard to whether it is effective for the choice of IC to be tied closely to the number or type of appliances attending an incident and the effectiveness of a policy which may result in rapid and frequent changes of IC*'.

178 In response, the Brigade implemented changes to its incident command thresholds to reduce the number of handovers required, as part of series of measures to improve the delivery of effective incident command.

***Key observation 3.3 : Effective early information gathering enabled the 'on arrival' tactics and actions identified in PN 633 to be implemented effectively by the crews who formed the pre-determined attendance for the incident.***

179 Information was gathered effectively by the initial IC in the early stages of the incident and used to select and implement a safe system of work to deliver the 'on arrival' tactics and actions detailed in the Brigade's high rise firefighting policy. Experts have surmised that these actions resulted in the extinguishment of the fire in the kitchen of flat 16 within 21 minutes of arrival on scene, but not before the fire had breached the window and ignited materials contained within the combustible rain screen cladding system fitted to the exterior of the building.

180 It is recognised that crews had to overcome a number of issues in delivering the 'on arrival' actions including accessing the building and the failure of the lift to respond to the fire control switch.

***Key observation 3.4 : There was effective early recognition of resourcing requirements by incident commanders.***

181 There was a necessary and effective focus on identifying resource requirements as the fire breached the kitchen window of flat 16 and ignited materials in the cladding system, particularly by the initial IC who sent a number of 'assistance' messages up to 'make pumps 25'. This escalation of resources was reinforced by subsequent ICs who ordered further pumping and specialist appliances resulting in the attendance of:

- 40 pumping appliances
- 14 Fire Rescue Units
- 4 aerial appliances
- 7 Command Units
- 6 Operational Support Units
- 24 senior operational officers.

***Key observation 3.5 : Recording of decisions, rationale, objectives and tactical plans were in some regards ineffective.***

182 A number of witnesses discussed their objectives and tactical planning during their evidence to the Inquiry. One Brigade witness described in oral evidence their thinking around the evacuation of the building. The witness described his thoughts as prioritising those making FSG calls and those residents located in the immediate vicinity of the fire, followed by a systematic search beginning on the upper floors of the building.

183 However, there is little evidence that decisions and the rationale for them, objectives and tactical plans were effectively recorded during the incident. The recording of 'key decisions' such as the application of operational discretion is discussed in more detail below (Key observation 3.7 refers).

184 The recording of objectives and tactical plans are crucial to support effective communication with others within the command team to achieve a shared understanding and to enable the command team to control the incident through sectorisation and clear, visible lines of command. In addition, the recording of such information facilitates effective post incident review, whether by internal debrief processes or wider external scrutiny, such as that currently being undertaken by the Grenfell Tower Inquiry.



185 It is noted that the Grenfell Tower fire was beyond the experience of those who attended the incident. Such was the extremely dynamic nature of the incident, it is likely this impacted on the recording of decisions, objectives and the tactical plan that might ordinarily be expected at an incident. In addition, the reported inoperability of the Command Support System (CSS) during the incident may have been an additional factor in the absence of effective recording.

**Recommendation 7** - The Brigade should consider how it can most effectively raise awareness of and reinforce the requirements of PN 828 'Recording decisions at incidents'.

***Key observation 3.6 : Difficulty in confirming who was being rescued or self evacuating from the building and from where created difficulty in maintaining accurate records to inform the search and rescue operation.***

186 Many witnesses working at the Bridgehead described in evidence the challenge of accurately gathering information about persons self evacuating or being rescued from Grenfell Tower. A number of factors appear to have impacted on the ability to gather this information, including casualties suffering physical or psychological trauma and communication issues.

187 Lack of information about where a casualty had been rescued or self evacuated from impacts on maintaining a search and rescue plan that reflects the changing circumstances and priorities of the incident. Similarly it can impact on wider situational awareness and the ability to evaluate progress of search and rescue operations and subsequent reporting on progress to others.

188 At the Grenfell Tower fire, it is observed that these challenges, combined with the movement of residents within the building, created circumstances that made it extremely difficult to ascertain which flats identified in FSG calls were actually clear of occupants because either, the occupants had self evacuated, had moved to a different location or had been rescued from elsewhere in the building. These challenges could have potentially led to taskings to individual flats being duplicated, impacting on resource utilisation or crews not being tasked to a flat because inaccurate information suggested the occupants had been rescued or self evacuated.

### **Actions by the Brigade since the fire**

189 It is noted that the Brigade has been reviewing PN 790 'Fire survival guidance' and other associated policies and evaluating procedures with Brigade Control and operational staff to deliver effective service improvements in this area. Further details of this work are provided in paragraphs 275 – 277.

**Recommendation 8** – Whilst it is recognised that the volume of FSG calls experienced during the Grenfell Tower fire and the information associated with those calls was unprecedented, it is recommended the Brigade considers the issues carefully to ascertain if any measures can be implemented to address this matter.

**Key observation 3.7 : Operational Discretion was adopted for the incident but it was not formally recorded in accordance with Brigade policy.**

190 Due to the fast-moving and varied nature of fire service operations, it is not possible for the Brigade to provide explicit guidance that will satisfactorily cover all situations. On the rare occasion that operational guidance does not meet the needs of the incident, ICs can adapt or move away from an operational policy where this is necessary and justifiable in terms of risk versus benefit. The decision to move away from operational policy is known as 'operational discretion' and should be based on 'professional judgement' enabling the IC to make calculated decisions about the course of action appropriate in the circumstances.

191 The use of operational discretion must be recorded as soon as practicable as stated in PN 828 – 'Recording decisions at incidents'. The policy states that where a decision is made to carry out actions that amend or change a current operational procedure, this needs to be recorded in a Key Decision Log (KDL) and a risk assessment of the proposed activity needs to be undertaken and recorded. The risk assessment must show the additional hazards and the associated risks that have been identified and that appropriate control measures are being implemented before any action is taken. This can be recorded on either the CSS or, if not available, on a KDL pad which are provided on all CUs.

192 Two training packages covering 'Recording decisions at incidents' are available on the London Fire Brigade / Babcock Training 'Big Learning' portal. One is aimed at station based personnel and the other at senior officers.

193 The dynamic nature of some incidents may mean that it is not possible for a decision log to be started immediately. However, key decisions are to be recorded as soon as reasonably practicable using the KDL form, or on the logging facility within CSS.

194 As discussed under key observation 3.5 there was no decision log started for the incident until 02:47hrs although the incident was necessarily operating outside of the Brigade's policy framework, an example being crews deployed above a known fire situation without firefighting media.

195 Once the decision log is started it records a number of decisions that move outside of policy but there is no evidence, at the time of writing, that a risk assessment identifying the additional hazards and associated risks or the appropriate control measures is recorded.

196 See recommendation 7.

#### **Theme 4 – Operations**

##### ***Key observation 4.1: The Brigade had limited means to fight an external façade fire resulting from the non compliance of the installed external cladding system with the requirements of Regulation B4(1).***

197 The response to fires in high rise premises is predicated on internal firefighting and supported by building regulations which provide for firefighting facilities within such buildings, including protected shafts, firefighting lifts, dry rising mains and internal compartmentation.

198 In his expert report for the Inquiry, dated March 2018, Mr Colin Todd noted that building regulations state *'the external walls of a building shall adequately resist the spread of fire over the walls and from one building to another, having regard to its height, use and position of the building'*. Mr Todd goes on to observe *'that whilst the dynamics of fire, can potentially, result in the external spread of fire from one flat to the flat immediately above, fire spread significant beyond such an extent would demonstrate a failure to comply with Requirement B4(1) of Approved Document B'*.

199 In respect of external firefighting capability, the Brigade has 11 frontline aerial appliances, which consist of three different types of vehicle: All three vehicle types have varying functions / capabilities and achieve a range of heights from 22 to 32 metres. In optimum conditions the turntable ladder has the maximum height reach of 32 metres, which is equivalent to the 10th floor of a typical high rise premises and it is likely, in most circumstances, that a firefighting jet can be applied as high as the 14<sup>th</sup> floor.

200 These vehicles were originally chosen, taking in to account factors such as the technology available at the time of purchase, the ability to locate the vehicles within the Brigade's fire station estate, their operational capability and vehicular access in London's streets.

201 In advance of the arrival of an aerial appliance or if there is insufficient access to deploy an aerial appliance, handheld jets and / or ground monitors can be deployed to provide an external

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firefighting capability. However the reach of any such firefighting jet is limited by a number of factors, including but not limited to water flow, pressure, proximity to the fire.

202 Grenfell Tower did not have an aerial appliance included on the PDA for the premises at the time of the fire. The nearest aerial appliance to Grenfell Tower is located at Paddington fire station and it is noted this was the appliance (A213) mobilised in response to the first request for an aerial appliance.

203 Having examined the incident log and noted a travel time of 12 minutes from Paddington to Grenfell Tower and assumed a minimum of 15 minutes to get the appliance sited and working, it is likely that even if A213 had been mobilised at 00:55hrs as part of the PDA for the premises, the external fire would have been near if not past the reach of the appliance's water monitor.

204 It is notable that access issues meant that no aerial appliance was able to operate on the north or west elevations of Grenfell Tower. Operations on the south elevation were restricted by the Grenfell walkway and the grassed area on the east elevation was not identified as suitable for positioning a large aerial appliance albeit a aerial appliance was set up on this area after the crew risk assessed that the recent period of hot weather had resulted in the ground being firm enough to support the weight of the aerial appliance.

205 It is clear from documentary evidence that a water jet was directed intermittently at the east elevation of Grenfell Tower between 01:15 and 01:25hrs before the crew ceased this activity and returned to their appliance to rig in BA sets at around 01:28hrs. Attempts at external firefighting were also made from the kitchen window of flat 16 once the original fire had been extinguished. This was undertaken at significant risk by crews leaning out of the window space and directing the jet at the flames above. Ultimately this initial external firefighting was not successful and flames had reached the 23<sup>rd</sup> floor by 01:30hrs. Dr Lane concluded that it was not possible for any handheld jet to reach beyond the 7<sup>th</sup> floor.

206 Further external firefighting was carried out on the east elevation from around 01:43hrs by a ground monitor and by a turntable ladder, A213, until 02:07hrs when it was housed and re-located due to falling debris. It was re-pitched and recommenced firefighting operations until 02:18hrs when it was again housed and moved under the Grenfell walkway due to falling and burning debris.

207 Whilst external firefighting operations were improvised on all four elevations of Grenfell Tower and Dr Lane noted there is a strong correlation between the floors to which water was applied and the lack of external fire damage to these floors, it is recognised that the Brigade did not have

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the capability to apply water effectively to the exterior of the building above the 14<sup>th</sup> floor. It is also noted that due to access restrictions, an aerial was unable to operate on the north and west elevations and therefore water could only be applied up to the seventh floor on these elevations.

208 Dr Lane provided an opinion in her 5<sup>th</sup> November 2018 report that *'it is not acceptable to expect the fire and rescue service to mitigate the risk posed by combustibile external wall construction in high rise residential buildings, as there are so many reasons why that is not feasible'*.

### **Actions by the Brigade since the fire**

#### Aerial appliances

209 At the time of the fire, the Brigade was finalising the procurement of 15 state of the art articulating head 32m turntable ladders to replace its existing aerial fleet. Partially in response to the Grenfell Tower fire and the new risk presented by clad buildings, the Brigade modified its procurement plan to incorporate three 64 metre turntable ladders. These extended reach aerial appliances will be strategically located across London to complement the standard aerial fleet. Deliveries of new fleet of aerial appliances, built by Emergency One Limited, are scheduled to commence in January 2020 for the 32 metre variant and in July 2020 in respect of the 64 metre model.

#### Pre Determined Attendance (PDA)

210 As a result of the Grenfell Tower fire, and whilst awaiting the outcome of the MHCLG work into cladding on high rise buildings, the Brigade implemented an interim change to the PDA to all high rise buildings. This revision took effect from 22<sup>nd</sup> June 2017 with five fire engines, one aerial appliance and the standard officer complement for a five pump fire being mobilised to any high rise fire related incident.

211 In addition to the above, and as a result of the findings from the Government's series of fire safety tests of cladding and insulation combinations undertaken by the Building Research Establishment, the Brigade made a further interim revision to the high rise PDA starting from 10<sup>th</sup> August 2017. From this date when Brigade Control receives multiple calls (four calls or more) to a residential high rise premise the PDA now includes eight fire engines and one aerial appliance. Where the fire is reported to Brigade Control as involving the outside of a clad building the PDA is further increased to ten fire engines and one aerial appliance (if the aerial appliance hasn't

already been despatched). When this increase in resources is made the standard officer complement for an eight and ten pump fire is also mobilised.

***Key observation 4.2 : Extensive breaches of compartmentation resulted in simultaneous serious fires on multiple floors, impacting on the Brigade's operational response.***

212 The external fire experienced at Grenfell Tower was significant in terms of its scale and by the rapidity of the spread and precipitated fires internally on multiple floors.

213 The premises was provided with a number of active and passive fire safety measures which were intended to create a layered safety system intended to provide the means for an early internal firefighting intervention. This is achieved by providing the means to limit fire and smoke spread from a dwelling fire and create the high degree of compartmentation necessary to support the 'Stay Put' strategy in a high rise residential premises.

214 Once the fire was established within the rain screen cladding system the fire safety measures provided within Grenfell Tower were required to perform during an event not considered by Building Regulations – a multi storey fire.

215 Dr Lane in her report, dated 5<sup>th</sup> November 2018, concluded that '*The high degree of compartmentation had suffered its primary failure, caused by the fire spreading through the rain screen system*'.

216 Professor Jose Torero in his expert report, dated 23<sup>rd</sup> May 2018, states '*Firefighting protocols for response to high rise building fires are intimately linked to a single floor fire. Furthermore, for residential buildings, the firefighters should find, on arrival, a single unit fire*'.

217 In practical terms, the failure of the compartmentation resulted in the Brigade facing and being required to mitigate a number of significant and linked fire events, spread across multiple floors. As described by Professor Torero, the firefighting provisions do not anticipate fire spread affecting multiple floors and as such the water supply provided through the dry rising main is predicated on a single unit fire event and, and as such, is only required to provide two or three firefighting jets.

218 The impact of this was that the Brigade was unable to undertake simultaneous firefighting on multiple floors to extinguish or control the fires. The deteriorating conditions within the lobbies and stairwell resulting from these fires affected the ability of residents to self evacuate from the building and hindered the Brigade's attempts to effect rescues.

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219 In order to progress the search and rescue operations, it was necessary to deviate from Brigade's operational policy and commit firefighters above fire situations and into hazardous environments without firefighting media.

220 Compliance with the Brigade's operational policy would have resulted in a limited or no search and rescue operation above the fourth floor, so commanders took what must have been a difficult decision to continue operations by applying operational discretion.

### **Actions by the Brigade since the fire**

#### Provision of water

221 The Brigade is currently reviewing existing solutions and undertaking further research into the practical water pressures and flow rates that can be achieved at the maximum height of dry rising mains, particularly those premises built when dry rising mains were permissible up to 60 metres. This work is aimed at identifying if the Brigade's current hose equipment and pumping capabilities are able to provide optimum fire fighting jets at the maximum height of a dry rising main. This research will involve practical testing at a number of residential high rise premises with similar characteristics to Grenfell Tower.

#### High rise firefighting policy (PN 633)

222 PN 633 'High rise firefighting' and the associated training materials have been the subject of an extensive review by the Brigade's OPA department. The revised policy is currently out for consultation with the Brigade's Heads of Service. It is also being extensively consulted on with the two main Representative Bodies; the Fire Brigades Union (FBU) and Fire Officers Association (FOA).

#### National Operational Guidance

223 The Brigade is also supporting the development of NOG for high rise fire fighting following the Grenfell Tower fire. Two immediate issues were identified by the Grenfell Tower fire 'safety and learning' investigation;

- rapid fire spread taking place at the early stages of an incident and well before the expectation of when compartmentation of a building would normally be compromised, and
- how Fire Survival Guidance (FSG) calls are managed nationally when this type of call is passed to another fire and rescue Control.

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224 Both issues have been communicated to the Fire Central Programme Office, where the Brigade have worked closely with the NOL Secretariat. This has produced a series of recommendations.

### NOLUG

225 These recommendations have resulted in a number of national 'Action Notes' being published through the NOLUG forum. These include:

- An Action Note sent to 'Skills for Justice' (the sector skills council for the fire and rescue service) with a recommendation for the review of the National Occupational Standards (NOS), with a purpose of ensuring relevant knowledge and understanding of building construction, fixed installations, fire science and fire engineered solutions that complement NOG – 'Fires in buildings';
- An Action Note to all fire and rescue services in the UK highlighting the existing requirements under the NOG control measures: 'Produce a risk management plan' and 'Site Specific Risk Information (SSRI)', in reference to high-rise premises designed or constructed in a way that may result in rapid fire spread. The note states that the National Fire Chiefs Council (NFCC) support the approach of fire and rescue services determining their PDA for specific incident types on the basis of their own operational risk assessment (ORA). Each ORA will be cognisant of the need to achieve the appropriate speed and weight of attack;
- An Action Note to NOG recommending a number of hazard and control measures relating to rapid fire spread and appropriate provision for fire survival guidance has also been issued.

### NFCC Simultaneous evacuation guidance

226 The Brigade also provided significant support to produce the NFCC publication '*Guidance: To support a temporary change to simultaneous evacuation strategy in purpose-built blocks of flats*'<sup>9</sup> for owners and persons / organisations responsible for buildings fitted with Aluminium Composite Material cladding. This guidance was published in May 2018 and superseded an earlier version published in October 2017. The guidance has been appended to this report as Appendix F.

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<sup>9</sup> <https://www.nationalfirechiefs.org.uk/Simultaneous-evacuation-guidance>



**Key observation 4.3 : The building behaved in an unpredictable manner beyond the experience of the Brigade.**

227 The fire at Grenfell Tower originated in flat 16 on the fourth floor having started in an electrical appliance. The evidence of the Inquiry experts identified that the building owners, Royal Borough of Kensington and Chelsea (RBKC), had declared a 'stay put' strategy for the building which was confirmed in its most recent fire risk assessment.

228 The 'stay put' strategy documented in guidance has been a principle of building design since the 1960s and works on the assumption that residents are safe to stay in their flats unless directly affected by fire, heat or smoke whilst the fire service extinguishes the fire. That principle is founded on the building being constructed to provide a series of fire resistant compartments (the flats), one or more protected means of escape, and fire safety measures to support internal firefighting to ensure the fire in the compartment of origin can be extinguished before it spreads beyond that compartment.

Behaviour of the external fire

229 The fire in the compartment of origin was extinguished at 01:21hrs but had breached the kitchen window on the east elevation of Grenfell Tower. This, in itself, is not an usual event and the Brigade and its operational personnel have experience of this situation. More unusually, the fire emanating from the window ignited materials within the rain screen cladding system installed on the original external walls of the premises and proceeded to spread vertically.

230 The Inquiry expert, Mr Colin Todd states in his report, dated March 2018 '*whilst the dynamics of fire, can potentially, result in the external spread of fire from one flat to the flat immediately above, fire spread significant beyond such an extent would demonstrate a failure to comply with Requirement B4(1) of Approved Document B*'.

231 The resulting fire continued to spread vertically, reaching the top of the building by 01:30hrs. The fire then proceeded to spread laterally in both directions, assisted by the presence of an architectural crown, whilst causing burning droplets to create further fires within the cladding below, resulting in what appeared to be a diagonal fire front burning laterally in both directions on the east elevation.

232 At 01:42hrs, the fire had reached the north east corner of the building and proceeded to continue to spread laterally across the north elevation. At 02:25hrs, the second flame front had reached the south elevation and continued to spread. At 02:51hrs the first flame front had

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reached the west elevation and by 04:44hrs, all four elevations of the building were fully involved in the external fire.

### Training on high rise external fires

233 A number of Brigade witnesses stated they had no specific training on fires in cladding. Many witnesses explained that it was their expectation that exterior of a building could not burn in the way experienced at Grenfell Tower but did demonstrate an understanding of the 'coanda' effect referenced in GRA 3.2 and PN 633.

234 A number of witnesses provided evidence that their experience and expectations of external fires on high rise buildings involved fires in netting provided for safety purposes on scaffolding around buildings under construction or refurbishment, or involved fires on the balconies of such premises .

### Penetration of the fire internally

235 Internal penetration of the fire through open or failing windows subsequently caused internal fires on multiple floors which in turn spread further as a result of compartmentation issues.

236 Evidence from witnesses suggested that the extent of any internal fires was not clear to command officers until some time after 02:15hrs, although some witnesses acknowledged the likely presence of smoke within the building as indicated by the FSG calls.

### GRA 3.2 and PN 633

237 Following the Lakanal House fire and a number of other significant fires in high rise premises, GRA 3.2 was reviewed and 15 new hazards were incorporated and others were enhanced with additional information in the 2014 version. The new hazards included make explicit reference to the fact that fire and smoke can spread in an upward, downward and horizontal direction and in ways that can be less predictable than in other building types. A new hazard was identified with regard to the risk of fires occurring simultaneously on multiple floors and explicit reference is made to the fact that falling debris has the potential to cut hose lines and interrupt water supplies during firefighting.

238 The Brigade's PN 633 was reviewed following the publication of the revised GRA 3.2 and generally reflects the information contained within the GRA. Notably PN 633 makes reference to the fact that fire and smoke can travel in any direction and the downward travel, in particular, can

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have an adverse impact on fire service operations. It also notes the potential for fires on more than one floor.

239 A full explanation of the development of both documents, their relationship and any differences is set out in the Brigade report '*National guidance and London Fire Brigade operational policy for fighting fires in high rise buildings*' is appended to this report as Appendix E.

240 The Brigade has previously addressed unusual fire spread in two training interventions, specifically, the Lakanal House case study in 2014 and the High Street, Barkingside case study in 2012, completion of which were mandatory for all operational personnel. Additionally, unusual fire spread was addressed in two issues of Operational News, issues 20 and 28, dated November 2011 and December 2014 respectively.

241 The extent to which, and when, the Brigade's officers recognised the significance of and the potential consequences of the external fire and the unexpected fire and smoke spread within the building will be a key area of investigation in Phase 2 of the Inquiry.

242 An effective recognition of both matters was inextricably linked to any consideration of the requirement for a full simultaneous evacuation of the building.

### **Actions by the Brigade since the fire**

243 It is noted that the Brigade has commissioned a comprehensive review of its training provision following the major incidents that the Brigade responded to in 2017. It is being undertaken by an independent consultancy company, Ribband Star Limited, and is expected to take six months to complete.

244 The purpose of the review is to provide an objective baseline of organisational awareness of operational training including Control training and support key organisational priorities and provide an evidence base for continuous improvement.

245 The review will examine four key areas:

- Acquisition of Skills/Knowledge
  - An assessment of the effectiveness of all operational training provided by the Brigade's third party contractor, Babcock Training Limited.

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- An assessment of the effectiveness of Brigade Control training provided by the Brigade's Control training team.
- Maintenance of Skills
  - To review systems in place – and those proposed for Developing and Maintaining Operational Professionalism (DAMOP) – to ensure that maintenance of skills activities are undertaken at all operational levels including Control training and that assurance mechanisms are in place to evidence that the service is maintaining an operational readiness to an appropriate professional standard.
- Routine testing/quality assurance
  - To provide an assessment of quality assurance processes in place within the Brigade and Babcock Training Limited ensuring that assurance processes are fit for purpose.
- Future proofing
  - To analyse whether the current training provision (acquisition and maintenance) is risk based and is adaptive to future demands.

**Recommendation 9** - The Brigade should consider to what extent recognition that a building is behaving unpredictably in fire is addressed in policy and training.

***Key observation 4.4 : The building's single escape route was significantly compromised by the products of combustion from an early stage of the incident.***

### Protected lobbies and stairs

246 The means of escape to the final exit at Grenfell Tower was a single staircase provided with a protected lobby at every storey. A smoke control system, an active measure, was provided to protect each lobby and in doing so protect the single escape stair.

247 The evidence from witnesses and the Inquiry's experts indicate that the active and passive fire protection measures in the lobbies and stairwell failed to perform adequately on the night of the fire and became compromised by heat and smoke from some time between 01:21 and 01:40hrs.

248 The failure of the protected lobbies is attributed by Dr Lane to flat front doors failing to control the spread of fire and smoke from flats into the lobbies and vice versa. This is attributed to a lack

of performance, initially identified by a fire resistance test undertaken by BRE Global, on behalf of the MPS, on a sample door of the type fitted to the majority of flats within Grenfell Tower.

249 Evidence available to date indicates there is a close correlation between the progress of the vertical fire spread and the presence of smoke in lobbies. For example, smoke is reported in 13 of 20 lobbies between 01:19 and 01:38hrs, increasing to 15 out of 20 lobbies by 01:58hrs. By 02:38hrs, smoke is reported in 19 out of 20 lobbies with severe temperatures on floors six to 10.

250 British Standard 9991:2015 states *'Whilst a simultaneous evacuation is normally not necessary, there will be some occasions where operational conditions are such that the fire and rescue service decide to evacuate the building. In these situations, the occupants of the building will need to use the common stair, sometimes whilst firefighting is in progress. As such, the measures in this British Standard for the protection of common stair are designed to ensure that they are available for use over an extended period.'*

251 Dr Lane has further noted in her report in relation to the stair doors *'I observed no fire damage in the stairs consistent with the total failure of a stair door, allowing fire spread onto the stairs'* but does note *'the non-compliances I have identified would have contributed to the failure to prevent the spread of smoke to the stair'*.

#### Mechanical smoke control system

252 A replacement mechanical smoke control system was installed in Grenfell Tower during the 2012-2016 refurbishment, its purpose being to control the amount of smoke entering a lobby and therefore reducing the risk of smoke spread to the protected stair. The smoke control system was intended to operate on one floor only, as per the requirements of Approved Document B, and was not expected or designed to operate on multiple floors simultaneously.

253 A smoke detector was present outside flat 16, the fire compartment of origin, and this detector should have activated the smoke control system on the fourth floor. There are no reports of smoke in any other lobby at this time. Evidence from residents report thick black smoke entering the stairs from the lobby on the fourth floor, indicating the smoke control system was not operating as designed.

254 As detailed in paragraph 249, the failure of the mechanical smoke control system to operate as designed contributed to the extensive spread of smoke into a number of lobbies and the protected stair as the fire developed.

### Positive Pressure Ventilation

255 The Brigade has a limited Positive Pressure Ventilation (PPV) capability incorporated within its Special Operations capabilities but it is not, at present, a frontline capability. PPV can be utilised to undertake the planned and systematic removal of heat and smoke from the structure on fire, and their replacement with a supply of fresher air in order to facilitate other firefighting priorities and is used extensively by other UK fire and rescue services.

256 The IC requested PPV at 02:57hrs and it arrived on scene at around 04:00hrs. An attempt to use the PPV at around 05:00hrs to improve conditions in the ground floor lobby was unsuccessful and actually worsens the conditions, so its use was discontinued.

### Challenges presented by the conditions

257 The circumstances described above created challenging conditions for anyone seeking to evacuate from the building and for firefighters attempting to rescue those trapped within the building. In some instances firefighters were forced to make decisions, having reached a resident/s, as to the viability of moving a person through conditions that may have been considered untenable in terms of saving life and were often changing second by second.

258 In some cases, firefighters opted to leave residents in situ or move them to safer areas to avoid the risks presented by the untenable conditions. On one occasion around 02:00hrs, a crew utilised spare firefighter BA sets, obtained from the bridgehead, to rescue a mother and daughter from ninth floor. This improvised method of rescue was not replicated during the remainder of the incident but remains a commendable example of the ingenuity of firefighters.

259 Those conditions described above may have impacted on the feasibility and potential success of any full evacuation from the building, owing the very real but unquantified danger that those evacuating may have been overcome by the conditions encountered in the lobbies and stairwell, assuming that residents could have been contacted to advise on evacuation. It is noted that there was no central alarm system fitted to Grenfell Tower, nor was there any regulatory requirement for such a system.

### **Actions by the Brigade since the fire**

260 Recognising the challenges that Brigade officers faced in respect to the catastrophic failure of the Grenfell Tower building, in particular that associated with the protected single staircase which became compromised by heat, smoke and fire at a very early stage of the incident, the Brigade

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has undertaken research and procured fire escape hoods (also commonly referred to as smoke hoods).

### Fire escape hoods

261 Fire escape hoods are designed to be used easily by members of the public where they need rescuing through smoke filled environments, such as those experienced at Grenfell Tower. They provide members of the public with up to 15 minutes of protection from four of the main fire gases and can be worn by conscious and unconscious persons. If more than 15 minutes of protection is required then another hood can be given to each wearer. Firefighters will be able to offer a hood to those being rescued and they can also be used to protect those who are not able to escape easily, such as the elderly or those with limited mobility.

262 The fire escape hoods have been issued to all frontline appliances across the Brigade and are carried on the Brigade's standard and extended duration BA sets. This provides a total of 649 hoods on frontline appliances and gives firefighters and officers a new tactical option should a similar building failure occur in the future.

263 Since their introduction and at the time of writing, the fire escape hoods have been used on 8 occasions to protect 16 members of the public from hazardous conditions created by the products of combustion.

### PPV and PN 833 – Tactical ventilation

264 The Brigade has extensively reviewed PN 883, Tactical Ventilation as of the 4 April 2018, reiterating that the PPV equipment and capability is currently under evaluation. They have also added Appendix 1 to PN 883, which explains the functionality and capabilities of PPV.

265 In addition, the OPA department has recently initiated a PPV project group. The aim of this group is to deliver level 1, defensive ventilation, which is carried out away from the fire, or after the fire is extinguished, to remove heat and smoke, particularly to improve access and escape routes in areas of the building not directly affected by fire. The aspiration in phase one of the project is to place 10 PPV into operational service at 10 strategic locations to provide the Brigade with a defensive ventilation operational capability. The Brigade has allocated £350k to evaluate and deliver this part of the project.

266 The Brigade still retains two sets of PPV reserved specifically for its Special Operations capabilities and this equipment is now available on two specialist vehicles; one for responding to terrorist incidents and the other on a vehicle carrying an ultra high pressure lance used to

suppress fire conditions, particularly in situations when it not possible to enter a compartment on fire.

Future firefighting technology

267 The Brigade is also evaluating the introduction of other new firefighting technologies for frontline appliances including the ultra high pressure lance and misting systems. Both have identifiable benefits for firefighter and public safety in many operational scenarios.

***Key observation 4.5 : Number of FSG calls and the resulting volume of information significantly exceeded the expectations of Brigade policy and training.***

268 Following the Lakanal House fire in 2009, the Brigade reviewed its procedures for managing fire survival guidance calls and introduced PN 790. In addition, it introduced Forward Information Boards to record key information at a range of different incident types and PN 820 to support their use. At the Lakanal House fire, crews recorded FSG information on walls at the Bridgehead and it was identified that this risk critical information could be lost if the Bridgehead was forced to relocate due to deteriorating conditions.

269 The first of 152 calls from persons located within Grenfell Tower was received by Brigade Control at 01:21hrs and the volume increased exponentially to an extent that British Telecom began transferring calls to other fire and rescue service Control rooms, namely North West Fire Control, Essex FRS, Merseyside FRS, Surrey FRS, and Kent FRS. There is also evidence that calls were received by other agencies during the course of the night including the MPS and London Ambulance Service (LAS). The last call received from someone inside Grenfell Tower was received at 04:33hrs.

270 The evidence adduced in Phase 1 of the Inquiry suggests that there were a number of communication channels for FSG information established from Brigade Control to the incident ground during the first two hours of the incident.

271 On the incident ground as the volume of FSG calls intensified, the process of transferring information to the Bridgehead became more complex as additional officers and communication systems were introduced incrementally into the system. Evidence from witnesses indicated that various elements were working independently without knowledge of the other.

272 Around 02:00hrs, an FSG coordinator was appointed to manage the information and allocated CU7 for this purpose. All FSG information held on CU8 was transferred to CU7. Once CU7 was



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set up and established, a message was sent to Brigade Control at 02:22hrs advising that all FSG information should be passed to CU7.

273 In the fire sector, crews, as they had at the Lakanal House fire, resorted to recording FSG information on walls in all three locations where the Bridgehead was set up. It is not clear if the use of multiple Forward Information Boards (FIB) was considered to manage the volume of information. Information was photographed on a mobile phone when the Bridgehead was relocated to ensure it was captured and re-recorded in the new Bridgehead location.

274 It is clear that the Brigade's policies and training did not anticipate the volume of the FSG information and the rapidity with which it was received. Evidence from witnesses suggest that incidents or exercises involving more than three or four FSG calls are extremely rare.

### **Actions by the Brigade since the fire**

275 The Brigade's OPA department is currently reviewing PN 790 and the extant processes used to manage FSG calls to identify improvement. To date, five exercises have been conducted with Brigade Control to identify any resourcing difficulties and the interface between Brigade Control, CU, and the Bridgehead. The exercise used was based on a high rise incident with FSG phone calls into Brigade Control from members of the public (role played by firefighters).

276 Any identified improvements arising from an evaluation of these exercises will necessitate further testing and consultation with Representative Bodies before they can be incorporated into policy and training solutions identified and implemented. This is likely to take some months and no clear outcomes are expected before the end of the summer 2019.

277 The Brigade's CU replacement programme may also offer a longer term technical solution which delivers further improvements.

### ***Key observation 4.6 : Operational personnel were required by circumstances to provide fire survival guidance to residents, a task not anticipated by policy or training.***

278 During the course of the Grenfell Tower fire, firefighters were required to provide fire survival guidance to members of the public in a number of ways.

279 There are a number of instances where BA crews, having reached the location they were tasked to, had to make calculated decisions on the tenability of conditions within the building that were often changing by the second, to determine whether it was feasible to evacuate the persons trapped. Crews would have had minimal situational awareness of conditions away from their

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immediate location and radio communications issues meant they could not seek information on conditions from others. Similarly, issues with radio communications resulted in crews being unable to seek advice or support from others on the most effective course of action.

280 When crews determined the risk arising from an attempted evacuation was too great, they were then required to provide instructions and advice to keep residents safe until a subsequent rescue attempt could be made.

281 Outside Grenfell Tower, there were a number of occasions where firefighters and officers were required to talk to trapped residents directly on the phone or indirectly through family or friends. On some occasions, residents were encouraged to ring 999 to ensure their information was recorded accurately and transferred effectively.

282 On other occasions, firefighters felt a moral duty to help and engaged to provide advice and support directly to residents on the phone. In one instance, a firefighter stayed on the phone for a considerable length of time until the call dropped out when the resident is likely to have become overcome by smoke.

283 The issues described above are not anticipated by policy and firefighters and officers have received no specific training in relation to this situation, other than the more general knowledge and understanding of fire survival guidance and the 'stay put' strategy.

### **Actions by the Brigade since the fire**

284 The Brigade's OPA department are considering this issue within its wider review work around PN 790 and the systems and processes related to FSG calls, as detailed in paragraphs 275 – 277.

### ***Key observation 4.7 : Operational crews had problems physically identifying floor numbers in the stairwell.***

285 Many Brigade witnesses involved in the search and rescue operation noted that it was difficult to establish what floor they were on due to the lack of suitably visible markings in the stairwell indicating the floor number. This may have created delays to the search and rescue operations as crews had to periodically enter lobbies to identify on which floor they were located by checking numbers of flat front doors.

286 In addition to potential delays in getting to the floor or flat that they had been tasked to, this issue resulted in crews having to enter lobbies unnecessarily, in order to identify which floor they were on. Often, these lobbies were significantly involved in fire and / or heavily smoke logged

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and many of those crews did not have firefighting media available to them, owing to water supply issues arising from the capacity of the DRM. This placed them at greater risk than was entirely necessary.

### **Actions by the Brigade since the fire**

287 The Brigade has suggested the requirement for adequate markings within buildings to indicate floor levels should be more effectively addressed in building regulations as part of its comprehensive response to the government's consultation on the technical review of Approved Document B (ADB).

### ***Key observation 4.8 : Some elements of the BA operations during the Grenfell Tower fire were not fully aligned to the Brigade's operational procedures set out in PN 466.***

288 The Brigade's BA operations are governed by a procedural framework set out in PN 466 '*Respiratory protective equipment (RPE) – BA operational procedures*'. This PN is supported by nine additional PNs addressing technical specifications, BA operations for specific incident types, ancillary equipment, personal protective equipment and radio communications equipment.

289 The purpose of BA and associated control procedures is to reduce the risk of respiratory discomfort or injury to personnel and provide safe systems of work when BA is used. It is important that personnel who may be required to wear BA or undertake entry control duties understand and properly implement these procedures at all times.

290 At any incident, the IC is responsible for ensuring that RPE is worn whenever there is a risk of personnel suffering respiratory discomfort or injury. Where any doubt exists as to the presence of a respiratory risk, the IC will give instructions for RPE to be used. BA is the default level of respiratory protection for fires and other incidents presenting an acute respiratory hazard.

291 PN 466 has been produced with regard to the following RPE legislation and approved codes of practice as well as other health and safety legislation:

- National Operational Guidance Programme – Foundation for Breathing Apparatus.
- National Operational Guidance – Breathing Apparatus Training Specification.
- Control of Substances Hazardous to Health Regulations: 2002.
- Ionising Radiations Regulations: 1999.
- Control of Lead at Work Regulations: 2002.
- Control of Asbestos Regulations: 2012.

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- Dangerous Substances and Explosive Atmospheres Regulations: 2002.
- Confined Spaces Regulations: 1997.
- Reporting of Injuries, Diseases and Dangerous Occurrences Regulations: 2013.

292 BA operations are identified as a core skill for firefighters and as such wearers are subject to regular maintenance of competence checks undertaken on station, known as 'Best Practice Assessments'.

293 In addition, firefighters have to complete BA refresher training provided by Babcock Training annually at one of its Centres of Excellence.

294 The Babcock Training / London Fire Brigade learning portal also provides seven online training packages covering all elements of BA equipment and operations.

295 It is not intended to cover each occurrence in full within this preliminary report as investigations are ongoing but a summary of each issue is provided below, together with information, where appropriate, for the Brigade to reflect on when determining its response to this operational learning.

296 The Health and Safety Executive (HSE) has acknowledged in its publication '**Striking the Balance**' that the application of health and safety law is challenging for fire and rescue services in relation to some operational activities. It notes the following points which are considered relevant and should be reflected on by the Brigade:

- they have to send firefighters into dangerous situations in order to save lives when anyone else would be seeking to get away from the danger;
- there is often an unrealistic public expectation that firefighters will put themselves at risk even when such risks outweigh any potential benefits to be gained;
- many incidents firefighters face can develop at speed, some can develop in unexpected ways – and firefighters may, from time to time, be confronted with situations outside their experience;
- they have to prepare individual employees to be able to make decisions in dangerous, fast-moving, emotionally charged and pressurised situations, even when there may sometimes be incomplete or inaccurate information about the incident;

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- they have to respond to dangerous situations which are not of their own making - this is different to most other sectors where it is the employer's own business that creates the hazards; and
- they may not be able to control or mitigate some aspects of the working environment.

297 No BA emergency teams were formally established as detailed in PN 466 but the Brigade should consider this in the context of the large number of BA wearers who were rigged and ready for deployment in Grenfell Tower throughout the incident.

298 PN 466 states that wearers must withdraw from the hazard if both radio communications and telemetry are lost between the Entry Control Point (ECP) and the BA team. Whilst there is evidence that there were sustained radio communications issues and sporadic telemetry signal issues, it is not clear at the time of writing if and when this occurred simultaneously and investigations are ongoing. From the available evidence it is known that no personnel were withdrawn from the hazard area by commanders as a result of radio and telemetry issues and no BA team elected to withdraw for this reason.

299 A relatively small number of personnel were recommitted to the incident when there were additional firefighters on scene who had not previously worn and were available for deployment. It is not clear at the time of writing if those previously recommitted into the hazard area had the sufficient rest and recovery periods detailed in PN 466. The policy states that rest and recovery periods will only be shortened in exceptional circumstances i.e. to save a saveable life when no fresh wearers are available.

300 Whilst it is apparent that fresh wearers were available, the dynamic nature of the incident, the need to save life, and the individual responsibilities of personnel should be taken into account by the Brigade when considering their response to this operational learning.

301 It has been identified that the maximum number of wearers for one Entry Control Board (ECB) was exceeded during the early stages of the incident, meaning appropriate entry control procedures and the recording of briefs, locations and actions, alongside the use of telemetry were not always achieved.

302 Following the revision to the maximum number of wearers permitted under Stage 1 entry control procedures to six wearers, this will increase the likelihood of exceeding the facilities of one ECB and resources that will be required to establish Stage 2 entry control procedures earlier in an incident where higher number of BA wearers are required.

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- 303 A number of firefighters booked into the ECP in accordance with PN 466 but did not don their facemasks and 'go under air' until they reached a point in the hazard area that respiratory protection became an absolute necessity. PN 466 makes clear that all personnel passing through the ECP must be 'under air'.
- 304 Despite BA Main Control being established, the majority of the BA teams that exited the building did not return to BA Main Control for further instruction. The Brigade's policy requires the role of BA Main Control Officer, now a BA Sector Commander under the revised policy, to be undertaken by a minimum role of a SM. The training requirements for the role of a BA Sector Commander are not identified in any training framework for the role of a SM or above.
- 305 A number of firefighters exited the hazard zone past their 'time of whistle' and therefore without the required safety margin of air remaining in their cylinders. There is one instance of a firefighter leaving the hazard zone without his BA facemask and helmet, having abandoned both after completely exhausting his air supply during his attempts to rescue a casualty from the building.
- 306 There is no evidence that emergency exchange of air procedures were adopted to support firefighters who were low on air whilst still in the hazard area.
- 307 Evidence has identified that there were occasions where briefs and debriefs lacked detail, which led to areas of the building being searched on more than one occasion. Information such as, areas that had been searched and numbers of people rescued from specific flats were not accurately relayed. This was also compounded by residents and occupants of the building moving to different flats and floors or attempting to self-evacuate following fire survival guidance.
- 308 A clear degradation factor that contributed to a lack of detail for some briefings was the amount of information that was being communicated under high pressure conditions, which led to some key information not being recorded appropriately, leading to tasks that were allocated to subsequent BA teams being less effective. Accurate recording of briefs and debriefing would have assisted subsequent allocation of tasks and identification of hazards. The Brigade had previously published an article and associated training in its Operational News publication in January 2012 covering the briefing and debriefing of BA teams.
- 309 A dedicated BA Comms Operative was not established until 04:00hrs although sufficient resources were available. It is suggested that the Brigade reflect that there were radio communications issues, most likely as a result of demand exceeding capacity, and therefore the

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ability for BA teams to communicate with the ECP was limited in any event. This is addressed in more detail in Theme 6 – Communications.

310 ECB tripods were not used until approx. 06:00hrs. It is known that placing the ECB in the provided tripod stand increases telemetry signal propagation.

311 A number of BA log books had been completed incorrectly on station and are illegible, impacting on the post incident review. This issue is described more fully under key observation 7.3.

312 Evidence has identified that the deployment of working radio repeater and telemetry repeaters was unsuccessful. The ultimate reason cannot be confirmed as to why they did not perform as expected but it is evident that personnel's knowledge and understanding of their deployment is inconsistent. Currently only extended duration BA wearers are trained in the deployment of radio repeaters, which is delivered on refresher training courses only.

**Recommendation 10** - It is suggested the Brigade considers the extent to which policy, training and human factors played a role in the control measure degradation identified in the preceding paragraphs.

### **Actions by the Brigade since the fire**

#### Data retrieval and analysis

313 Immediately following the fire, the Brigade downloaded the data from over 1200 BA sets and 100 telemetry boards to ensure it had captured all data that might be relevant to the incident. A number of telemetry boards suffered extensive heat and water damage and were returned to the manufacturer who were able to retrieve the required data.

314 The only data believed to have been lost is that where the electronic memory of a board was overwritten due to insufficient capacity. This learning was communicated to the manufacturer who has now increased the memory capacity of its telemetry boards to prevent a reoccurrence.

315 The data retrieved from both the BA sets and telemetry boards is complex and not easily understood without the correct knowledge. The Deputy Head of the PEG has been seconded to GTIRT since June 2017 to ensure all data is collated and analysed effectively to support the internal investigation and assist external investigations by the Inquiry and the MPS.

National Operational Guidance

316 The Brigade has engaged extensively with NOL Secretariat to reinforce its own understanding of the observations identified above and to support the identification of degradation factors which may cause control measures not to perform as expected. A report by the Secretariat outlining findings and making recommendations for revisions to the Foundation for BA guidance has been finalised and will be presented to NOLUG for consideration.

Respiratory health monitoring

317 The Brigade is currently working with University College Hospital to scope an independent long term respiratory health study for staff who attended the incident to support those staff and build a greater understanding of the long term impact of firefighting operations on respiratory health.

**Theme 5 – Brigade Control**

***Key observation 5.1 : The facilities at the Brigade's fallback Control, located in Stratford, did not fully replicate those at the primary Control in Merton.***

318 The Brigade's primary Control is located at Merton and it operates a secondary or fallback Control, located at Stratford fire station to provide resilience to its control and mobilising function.

319 The Stratford facility is generally used during planned maintenance to the systems at the primary location but can be stood up at short notice if the primary site is not able to operate for any reason. The Brigade has established and well practiced procedures to fall back to the secondary Control when required.

320 On the 14<sup>th</sup> June 2017, Brigade Control was operating at Stratford due to planned maintenance at the Merton site. The secondary Control at Stratford is smaller than the primary site and images illustrating the difference are contained within the report appended as Appendix B.

321 In general, the facilities at Stratford replicate those at Merton with the same integrated mobilising and communications systems provided at both locations. On the night of the Grenfell Tower fire the main differences were that the Stratford site did not have the facility to access the Brigade's Dynamic Cover Tool (DCT) or access the National Police Air Service (NPAS) downlink imagery via the 'heli tele' system.

322 The DCT is a computer software application designed to assist Brigade Control to manage the movement of appliances between locations during large incidents or periods of peak demand, in



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order to maintain operational cover across the geographical area the Brigade is responsible for. The non-availability of the DCT on the night of the fire required an Assistant Operations Manager (AOM) to manually manage the movement of appliances to maintain pan London fire cover. This was a complex task, given the number of appliance movements required as the incident at Grenfell Tower escalated, and it is testament to the knowledge and experience of the AOM responsible that operational cover was maintained effectively.

323 The Brigade is unique in having a fixed 'heli tele' downlink and this is a legacy of its relationship with the MPS Air Support Unit before it transitioned to NPAS. The fixed downlink is provided to increase situational awareness and is available at the primary Control, Brigade Headquarters, and on the CUs.

324 Whilst the facility was not provided at Stratford, it is noted from evidence, during Phase 1 of the Inquiry, that on the night of the fire, the downlink had been withdrawn from external agencies by NPAS and so CROs would have been unable to view in any event.

### **Actions by the Brigade since the fire**

#### DCT and Heli-Tele

325 The DCT software application has now been installed at the Stratford site and is fully functioning to assist staff to manage operational cover requirements when Brigade Control is operating from the secondary facility. The heli – tele downlink is also now available at the Stratford site.

326 As referenced in paragraph 164, the Brigade is also undertaking an operational trial of drone technology to increase situational awareness during and reduce its reliance on support from external partners such as NPAS.

### **Key observation 5.2 : FSG call information was not gathered and communicated in accordance with PN 539, Appendix 3.**

327 PN 539 states '*The Brigade defines a Fire Survival Guidance (FSG) call as being a call to Brigade Control where the caller believes that they are unable to leave their premises due to the effects of fire, and where the Control Room Operator (CRO) remains on the line providing appropriate advice until either the caller is able to leave by their own means, is rescued by the Brigade, or the line is cleared*'.

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328 There is specific guidance for CROs to follow when taking calls to fire situations in domestic accommodation, where callers have indicated they are unable to leave their premises. This guidance follows national guidance and employs the principles of Escape, Assist, Protect and Rescue.

329 The following text is the relevant extract from Appendix 3 of PN 539:

*Brigade Control advise callers to 'Get out and Stay out', however if a call is received from a High rise building where Fire, Heat and Smoke are not affecting the caller, LFB would advise that:*

*You are usually safest to remain in your premises unless affected by fire, heat or smoke. If the situation changes, you should leave your premises and dial 999, if you need further assistance.'*

*Should the caller be unable to escape, a RIF<sup>10</sup> containing prompts are in place on the computer-aided mobilising system to assist the CRO in:*

- *Providing guidance to assist the caller to safety.*
- *Provide timely and relevant information to the attending resources.*
- *Provide reassurance to the caller that help and assistance is forthcoming.*

*The CRO will ascertain through initial questioning, the type of premises the caller is in and use the link on the Reference Information File to take them to the appropriate area of information to use, to assist the caller.*

*CROs will always use the four principles of Escape, Assess, Protect and Rescue to provide guidance to these callers. Firstly by assisting the caller to help identify a safe, alternative ESCAPE route for them to leave their premises. If this is not possible, then CROs are directed to ASSESS the situation by asking the caller direct questions: Example questions are:*

- *Do you know where the fire is?*
- *What room are you in?*
- *Is anyone with you?*

*CROs will begin to PROTECT the caller by providing current fire safety advice to attempt to keep the caller safe. They are directed to reassure the caller and REASSESS the callers situation:*

*Example questions are:*

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<sup>10</sup> Reference Information File

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- *Has that stopped the smoke coming in?*
- *Let me know if the smoke gets thicker?*
- *What's happening now?*

*CROs will remain on the telephone with the caller and assist with RESCUE.*

*Other CROs and supervisory staff will assist the CRO carrying out the Fire Survival Guidance call by ensuring all relevant information regarding the caller's situation is passed via both the airwave radio and via telephone when a CU is in attendance. Relevant information to be passed to the incident ground includes:*

- *Number of persons involved*
- *Names if known (by telephone only, not by radio)*
- *Condition of their location i.e. heavy smoke, thick smoke*
- *Location of caller within premises*
- *Callers proximity to fire*
- *Latest FSG advice given by Control*
- *Time of FSG call*

330 From the evidence adduced in Phase 1 of the Inquiry, it is apparent that during a number of FSG calls arising from the Grenfell Tower fire there were no proactive attempts to identify a safe alternative escape route with the caller. During questioning on this matter by Counsel to the Inquiry, one witness explained they would expect persons living in residential high rise blocks with a single stair would be familiar with their escape route. Another witness described the volume of calls as being a factor and the need to prevent a queue of calls from building.

331 Counsel to the Inquiry also asked Brigade Control witnesses about efforts to assist callers with assessing the situation. Those witnesses explained that their own situational awareness is limited as they are remote from the incident and the callers themselves are generally best placed to assess the conditions affecting them.

332 Witnesses also provided oral evidence that expressed the difficulties and risks associated with directing those trapped to follow particular instructions like opening doors to check escape routes, which may only serve to further deteriorate conditions in the location where persons are sheltering.

333 It is noted that many residents expressed a reluctance to leave their properties even when instructed to do so, because of the conditions outside of their flats. Control witnesses said that in

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those circumstances you have to believe the caller, who is best placed to observe the conditions they are experiencing and assess the conditions they face if they attempt to leave their place of relative safety.

334 This is reinforced by the evidence of one resident ultimately rescued by the Brigade but who had earlier resisted all attempts by CROs to persuade him to evacuate the building. When questioned by the Inquiry on why he had ignored the instructions from the Brigade, the witness stated *"Well ... I would have assessed again if I was in the condition to go out. But obviously she would've taken a big responsibility to do so on her behalf, because she wouldn't know how bad the conditions outside were. I knew, she didn't. She wouldn't know"*.

335 He went on to state *"Now let's say I would be convinced by this person to go out, and if something had happened to me, how would that person feel if I had not made it out, basically? So that's why I said, you know, I don't want to think of someone thinking, "Oh, because I gave him that advice, look what happened to him". How would that person then live for the rest of their life?"*

336 This graphically illustrates the dilemma which CROs face in circumstances such as those experienced at Grenfell Tower that even if they seek to explore with a caller the conditions immediately outside their flats, they cannot know what the conditions may be beyond the immediate vicinity when considering whether to advise residents to leave their flats. There always remains a risk that they will be directing them into dangerous and potentially lethal conditions. There were numerous examples in the evidence of rapidly changing conditions within the building, by which smoke, toxicity and visibility changed minute by minute and often, second by second.

337 There, of course, may come a time when the situation has deteriorated to such an extent that escape remains the only viable option, whatever the risks involved. In those circumstances, it is necessary for CROs to make every effort to encourage or even coerce callers into attempting to escape. Evidence adduced in Phase 1 established that one CRO, during a particular FSG call, very forcefully sought to persuade the caller to leave their flat, even graphically describing the potential consequences if they did not.

338 It is noted from evidence that PN 539 directs CROs to stay on the line with callers until they are rescued by the Brigade. Such was the volume of calls related to Grenfell Tower, CROs felt unable to stay on the line in most instances due to the need to reduce the number of calls queuing in the system, many of whom would have also been from residents trapped in the Tower.

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- 339 There are exceptions when CROs stayed on the call until the call dropped out which included one call which lasted just under an hour and these calls proved to be particularly harrowing for the CROs concerned. This is discussed in more detail under key observation 5.8.
- 340 Evidence from witnesses during Phase 1 demonstrated that the way CROs handled FSG calls and provided advice to callers was predicated on the assumption that they would be rescued. The Lakanal House fire in 2009 tragically demonstrated this is not always the case and prompted the need for CROs to engage more fully in active listening to build a more complete picture of the circumstances facing the caller.
- 341 A number of calls were received by Brigade Control in the early stages of the incident where the callers, located on the upper floors of Grenfell Tower state there is smoke in their flats and / or fire at the window. However the significance of this information is not recognised by the CROs and with limited situational awareness, they did not reconcile the information to their understanding of the incident.
- 342 One Brigade witness gave oral evidence to the Inquiry describing how they were unable to comprehend that a caller from an upper floor was describing smoke, and even fire, in their vicinity, when the fire was on the fourth floor.
- 343 The RIF details the information that should be recorded and communicated to the incident ground. One notable omission from nearly all FSG information received by the incident ground is the time the FSG call was received. This information is significant, particularly in circumstances where the IC or responsible officer may need to prioritise the individual calls.
- 344 There were also limited examples where other important information, such as the caller's name, the conditions i.e. heavy or thick smoke, the location of the caller within the premises, their proximity to the fire and the latest FSG advice given by Control to the caller, was communicated to the incident.
- 345 The Lakanal House Incident Assurance Review commissioned by GTIRT to support its investigation noted in its report, dated 7<sup>th</sup> August 2018, that training records show that fire survival guidance refresher training has not been completed by all Control staff on an annual basis in accordance with national guidance (Fire Service Circular 10/1993 '*Training of Fire Control Staff*' and Brigade expectations as set out in its pre-Inquest actions (identified as Action 12 of the Pre-Inquest actions within the report) following the Lakanal House fire.

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346 As part of the refresher training referred to above, the Brigade identified an action (Action 8 of Pre-Inquest Actions) following the Lakanal House fire to include an input from Fire Safety Officers in Control FSG training to comply with the requirements of Fire Service Circular 10/93. The Lakanal House Incident Assurance Review report notes that *'Whilst Fire Safety Officers were involved in developing the building structure / fire safety issues content for the fire survival guidance training and they have delivered the content on initial training, they have not consistently delivered that content in refresher training'*.

347 It is appropriate to acknowledge the extraordinary challenge that handling FSG calls presents in normal circumstances, let alone in the extreme situation presented by the Grenfell Tower fire, in that they are required to provide appropriate advice to persons, who are often in danger and acute distress. This has to be undertaken from a remote position and with limited situational awareness. The circumstances of the Grenfell Tower fire increased those challenges exponentially.

348 It should also be noted that PN 539 anticipates that a CRO handling a FSG call will be supported and assisted by supervisors and other CROs. The circumstances of the Grenfell Tower fire meant that such support was not available due to the volume of calls being received.

### **Actions by the Brigade since the fire**

349 All Brigade Control staff have undertaken FSG refresher training during 2018 and further training will be undertaken this year once the revisions to PN 790 are published. At the time of writing, five of the six Brigade Control Watches have taken part in the exercises that are informing the revision of PN 790 and the associated procedures with the sixth Watch due to participate in the final exercise shortly.

350 A competency framework for all levels of Brigade Control staff identifying core skills and frequency of training to support maintenance of competence is currently being developed.

351 A new IT solution was implemented towards the end of 2018 to support the planning, delivery and recording of Brigade Control training. The new solution ensures that training activities are automatically recorded within Individual Training Records.

352 A facilitated discussion with Control staff around the challenges presented by the Grenfell Tower fire has been led by Control senior managers, supported by the Operational Support Team (OST) to ensure that all staff are aware of the ad hoc actions taken on the night where these were considered effective. Where actions taken on the night were identified as not being effective,

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staff are discussing the situation which precipitated the original action and seeking to agree possible improvements. It is recognised this training is an interim measure prior to the implementation of revised policies, technological and training solutions that will be associated with the updated PN 790.

### ***Key observation 5.3 : There was no established or tested method to maintain an overview of the FSG call information being received by Brigade.***

- 353 Brigade Control received a total of 408 '999' calls from 0054hrs up to 0800hrs related to Grenfell Tower, and also handled 212 similarly related admin calls in this period. This volume is completely unprecedented in the collective memory of the Brigade and does not include calls related to other incidents ongoing in London during this period. On duty staff were also dealing with the large volume of appliance mobilisations and notification protocols associated with the fire, whilst attempting to manage the incoming calls and the transfer of risk critical information to the incident.
- 354 The first of 152 calls from persons located within Grenfell Tower was received by Brigade Control at 01:21hrs and the volume increased exponentially to an extent that British Telecom began transferring calls to other fire and rescue service Control rooms, namely North West Fire Control, Essex FRS, Surrey FRS, and Kent FRS. There is also evidence that calls were received by other agencies during the course of the night such as the MPS and LAS.
- 355 Such was the intensity of the calls being received by Brigade Control, a queue quickly built up within the system, impacting on the ability to maintain an adequate degree of situational awareness in regard to the rapidly developing situation at Grenfell Tower. This situation was alleviated to an extent by the arrival of the Brigade Control Duty Senior Manager who arrived at Stratford at approx. 02:15hrs.
- 356 A white board system was then implemented to display FSG call information to provide shared situational awareness in the room and enable CROs to correlate information, should any further calls come in from the same flats or floors. The white board system was not a recognised or tested procedure but an ad hoc measure established to ensure information was immediately available and could be utilised by CROs handling calls and providing advice to callers. The information was also available to the Brigade Coordination Centre (BCC) which had been set up at Stratford in response to the major incident.

### **Actions by the Brigade since the fire**

357 A large wall screen has been fitted at the primary Control facility at Merton to increase shared situational awareness amongst Control staff. The screen is able to display the DCT, the heli-tele downlink feed, and information sourced from the Vision mobilising system including incidents in progress. In addition, the screen is able to display television broadcasts. As yet there are no plans to provide a similar system at the fall back location in Stratford although it is noted that all such information is available at individual CRO work stations.

**Recommendation 11** - It is suggested the Brigade considers how shared situational awareness within the Control room might be achieved in similar circumstances and whether a more sophisticated system than the whiteboards used on the 14<sup>th</sup> June should be developed and implemented as an established Control protocol.

**Key observation 5.4 : The 'Vision' mobilising system does not support the identification of telephone numbers to enable call backs, and the Brigade does not have a clear policy position on re-contacting callers.**

358 PN 539 and the associated RIF requires that CROs maintain contact with callers being provided with fire survival guidance until they are rescued or are able to self evacuate. As detailed earlier in this report, the volume of calls and the rapidity with which they were received resulted in CROs not keeping calls open with those located in the building, in order to reduce the queue that had built up in the system.

359 The Brigade does not have a policy regarding re-contacting callers as the requirement to re-contact was not envisaged. Callers on 14<sup>th</sup> June were provided with guidance and advised to call '999' again if the situation changed or deteriorated and the CRO ended the call in order to answer the next call. CROs had no means to know, before answering, if calls queuing in the system were from residents at risk in the building or from those reporting the fire from outside and not in danger.

360 Evidence demonstrates that callers did re-contact Brigade Control on many occasions during the course of the night and some residents made a number of '999' calls as conditions deteriorated and their situation got worse. It is unlikely that residents making repeat calls would have spoken with the same CRO.



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- 361 For those residents who called '999' after the decision to advise all persons to leave the building whatever the dangers they faced, CROs were able to provide instructions to evacuate the building using wet towels to protect themselves.
- 362 For residents who did not or could not call after this time, this presented a serious situation, in that the Brigade had no means to advise them to leave their flat unless an individual made a further emergency call.
- 363 When questioned by Counsel to the Inquiry on this subject, one Brigade witness explained that such a situation was beyond the experience of the Brigade and described how it would have been very difficult to recontact callers as Brigade Control was inundated with emergency calls at that time, with many calls held in a queue. The witness went on to describe how it would have been very time consuming to search through call records to find the correct telephone number to recontact the caller.
- 364 When asked how previous FSG callers would know that the advice had changed, the witness reiterated that it was very difficult situation and such were the circumstances on the night that there was a reliance on those trapped calling '999' again, in which case they would be provided with the appropriate advice.
- 365 In addition to the resourcing issues associated with attempting to recontact callers, it is noted that the Vision mobilising system does not have a facility that makes the identification of previous callers and their phone numbers easy or timely. This is, perhaps, not unsurprising as it was not anticipated that such a situation would occur and such a facility would be required. As a result, this was not included in the technical specification for the current mobilising system.

### **Actions by the Brigade since the fire**

- 366 The Brigade's OPA department have been asked to consider this issue in the review of PN 790 and FSG procedures. However, it is noted that any changes to the current mobilising system in this respect are probably not achievable and would have to be included in the specification for any future replacement mobilising system.

**Key observation 5.5 : There are no national standards for passing and receiving FSG call information between Fire and Rescue Service Control rooms handling calls related to the same incident.**

367 The Brigade, like all emergency services have established mutual aid arrangements in place with other Control rooms to answer and handle '999' calls including FSG calls should its own capacity be exceeded as a result of a major incident or spate conditions such as widespread flooding.

368 On the 14<sup>th</sup> June 2017, five fire and rescue service Controls, North West, Essex, Surrey, Merseyside and Kent provided mutual aid support to the Brigade by handling overflow calls, many of which were Grenfell Tower FSG calls. All fire and rescue services use the Escape, Assess, Protect and Rescue protocol for handling FSG calls so callers directed to these supporting Controls received fire survival guidance based on the same principles used by Brigade Control.

369 However, it is noted that the sharing of information in a timely and effective manner between the supporting Controls and Brigade Control was problematic. The sharing of FSG information being received by the supporting Controls was affected by the volume of calls being received in Brigade Control resulting in limited capacity to answer calls from the supporting Controls. Similarly Brigade Control found it challenging, in resource terms, to pass information to the supporting Controls to ensure shared situational awareness.

370 It is observed that there are no national standards for passing and receiving information between Control rooms handling FSG calls arising from the same incident to support the existing mutual aid arrangements.

371 It is further noted that much of the specific guidance available to fire and rescue services is historic. Fire Service Circular 10/1993 'Training of Fire Control Staff' is a relevant example of this. NOG provides information on control and mobilising functions across its suite of guidance, however there is no specific 'one stop' guidance provided for fire and rescue services addressing the delivery of the relevant statutory duties required under the Fire and Rescue Service Act 2004.

### **Actions by the Brigade since the fire**

372 Brigade Control senior managers are engaging with the NFCC Mobilising Officers Group (MOG) to discuss how to improve the communication of information between Controls involved in taking overflow calls under the established mutual aid arrangements.

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373 The group is carefully considering the Grenfell Tower fire and the challenges presented by a number of Controls simultaneously handling calls relating to the same incident. The group considers the establishment of a dedicated national Airwave talk group for Fire Controls could enable the affected Control to simultaneously broadcast information to all Controls handling overflow calls and ensure supporting Controls can communicate information to the affected Control.

374 This proposal, if confirmed by the NFCC MOG, will need to be presented to the NFCC Operations Committee for approval.

375 The NOL Secretariat has also been contacted regarding this issue and is examining the issue to identify improvements which could be made to national guidance.

***Key observation 5.6 : There is no automated system to link NICE voice records to Vision call records, impacting on any post incident review.***

376 The Brigade's call management system is made of four key components, one of which is the NICE<sup>11</sup> voice recording system. The recording system for all incoming '999' calls and the administration lines is stand alone and does not create a unique reference that aligns to the Vision mobilising system call records or the BOSS desk top incident viewer<sup>12</sup>.

377 When a 999 call is connected to the call handling system by the BT operator, the system immediately starts to record and includes the period whilst the call is waiting to be answered by Brigade Control. Once answered, the recording continues until the CRO ends the call, the caller hangs up or the call drops out because of a loss of signal or a malfunction.

378 The system captures all voice interaction on the line which includes the BT operator passing the call to the CRO. If the caller drops off the line or the call is cut off before being answered the recording will continue, this allows for the capture of any conversation with the BT Operator.

379 This system is not linked to other components in the system and as a result, when collating call data for review the voice records have to be manually cross referenced against the incident records on the BOSS desk top viewer application.

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<sup>11</sup> NICE is the name of the company that make the software package installed on a stand alone computer.

<sup>12</sup> BOSS is a software application used to present incident information to Brigade personnel without the need to access the Vision mobilising system.

380 It was identified that times presented in the BOSS desktop viewer do not align with the call times associated with the audio recording because the BOSS application includes the ring time before the call is answered. The BOSS application also uses the 'created time' as the call time which is subject to variation depending on the call handling time and the selection of the 'create record' action.

381 During the exercise to gather information for the Actions by Brigade Control report, appended as Appendix B, voice recordings were found to be referenced against the wrong incident record i.e. the phone number did not correspond to the NICE record, effectively meaning that call information was held against the record of another call. There were also examples of voice call records not allocated to a incident record at all resulting in new records being created several months after the event.

382 Whilst these issues did not impact on the night, the reconciliation of call data presented a significant challenge for GTIRT who worked collaboratively with the Inquiry and MPS to ensure an accurate record of all calls related to the Grenfell Tower fire was adduced into evidence.

### **Actions by the Brigade since the fire**

383 It is acknowledged that overcoming these issues requires a significant change to the Brigade's communications and mobilising systems and it not feasible until the future replacement of those systems.

384 These issues will also be captured as learning in a future guidance document to be produced as an appendix to PN 920 'Major incidents investigation' to ensure future investigations are sighted on the issues identified during the Grenfell Tower safety and learning investigation. A new working group will convene in April 2019 to scope out work required to produce effective guidance to support future investigations.

### ***Key observation 5.7 : The 'Vision' mobilising system 'call collection form' can be overwritten if a new call is taken before it is added to the incident log.***

385 During the collation of call data it became apparent that audio records of 999 calls had been captured on the NICE recording system that were not recorded against an incident record.

386 When a CRO answers a '999' call on the Integrated Control and Communications System (ICCS), a 'call collection form' automatically opens on the Vision mobilising system. Some details of the call are automatically populated and the CRO is required to gather and enter other data

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manually by asking the caller questions. When the CRO has reached the point that they are satisfied they have gathered all relevant information, an incident record is created and, where appropriate, the required resources are mobilised.

387 When large numbers of calls are received to the same incident the mobilising system provides the facility to 'duplicate' calls when a CRO determines the incident being reported is the same as an incident already being attended by the Brigade. In this event, a copy of the incident record is created and becomes a duplicate. The duplicate has a separate incident number but is linked to the original record created for the incident. This process assists the Brigade in managing call volumes and avoids unnecessary mobilisation of resources.

388 During the Brigade's investigation a review of the NICE recording system was undertaken to ensure all audio records had been captured. It was identified that several '999' call records were captured which were not assigned to an incident record. It was also observed that in some cases two phone numbers were captured in the same incident record. On further investigation it was apparent that it is possible to answer a '999' call through the ICCS system with the previous call collection form still open, resulting in the new call number becoming embedded in the previous incident record.

389 Following any incident the collation of call data forms an important part of the evidence required to provide assurance to the organisation. The issue identified as key observation 5.6 results in investigators having to listen to the audio file for each call and manually cross reference these to incident logs to ensure all evidence is captured and is accurate.

390 While the issues identified above did not impact on the night of the fire, it did result in considerable delay in identifying all incident records to support the post incident investigation and review activities related to the Grenfell Tower fire.

### **Actions by the Brigade since the fire**

391 This issue has been communicated to Brigade Control senior managers and has been addressed during the facilitated discussions (paragraph 352 refers) to ensure Control staff are fully aware of the issue and take active measures to prevent a re-occurrence during future incidents involving large numbers of incoming calls.

***Key observation 5.8 : There is potential for Brigade Control personnel to experience secondary trauma following a traumatic incident.***

392 Following the Grenfell Tower fire there were a significant number of counselling referrals from Brigade Control staff and high levels of sickness absence were recorded, mostly related to stress, anxiety and depression (SAD).

393 Sickness arising from participating in the Grenfell Tower fire response and the public inquiry continues to contribute to sickness absence. The increasing number of episodes of sickness absence due to SAD, combined with the fact that episodes of SAD absence usually last longer than other causes of sickness absence, continues to drive up headline absence rates. The Brigade's target for sickness absence for Brigade Control staff is 4.7% of working days lost, but has remained consistently above this figure since the Grenfell Tower fire and peaked at 9.06%.

394 On the night of the fire the Counselling and Welfare Services (CWS) duty counsellor was contacted by Brigade Control at approximately 03:00hrs on the day of the fire. A request was made to provide a counsellor to go to Brigade Control at Stratford to support CROs and managers. The Head of CWS was notified of this request and decided to go to Stratford as she was the nearest counsellor and arrived at Brigade Control approximately two hours after the initial call.

395 In Brigade Control, the Head of CWS met with managers and all the No. 2 Watch CROs involved in dealing with the calls from residents and other people close to the Grenfell Tower. At the end of their shift the CROs were provided with psychological first aid and support prior to them leaving to go home.

396 It is noted that one month after the fire, 19% of Brigade Control staff involved in the incident had been referred to CWS, this compares with 20% of firefighters involved in rescue operations.

**Actions by the Brigade since the fire**

397 The Head of GTIRT recently commissioned an independent study of the Brigade's counselling and trauma service provision during and following the Grenfell Tower fire by Dr Noreen Tehrani, Past Chair of the Crisis, Disaster and Trauma Section of the British Psychological Society and a member of the Crisis, Disaster and Trauma Standing Committee for the European Federation of Psychological Associations.

398 Dr Tehrani made the following recommendations in her report in March 2019:

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- Firefighters and others in high risk roles such as Brigade Control staff should be submitted to regular psychological surveillance, to manage the risk of psychological health in the same way that physical health is managed.
- Following a major incident, the use of 'screen and treat' for all involved personnel would help to identify those likely to develop trauma related conditions.

399 Dr Tehrani also suggested the following changes be considered by the Brigade:

- Introduction of trained peer trauma support volunteers
- Increased mandatory/routine psychological screening of those involved
- Additional psychosocial support for Brigade Control personnel
- Increased support for senior officers

400 The report will be considered by the Brigade in April 2019 to determine its response to Dr Tehrani's recommendations.

### Theme 6 – Communications

#### ***Key observation 6.1: The volume of hand held radio traffic exceeded the capacity of both the breathing apparatus and command channel.***

401 A number of witnesses stated in oral evidence that they had difficulty in communicating on the fire ground using their hand held radios and in the building using BARIE<sup>13</sup> sets. Other witnesses said that the hand held radios were not working. The Brigade employs two main forms of communication equipment. A digital national radio system, 'Airwave' for wide area communications (Brigade Control to appliances) and a system of personal issue analogue 'fireground' radios for local use at incidents.

402 The Brigade's hand held radios (Entel HX-480/1) are issued to all operational staff and are programmed with 10 separate channels. These are detailed below:

- Channels 1 and 2 - General Incident and Command channels
- Channel 3 - Used under direction of the IC / sector commander for firefighter communications during specific tasks
- Channel 4 - To be used only under direction of the duty radio officer

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<sup>13</sup> Breathing Apparatus Radio Interface Equipment

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- Channel 5 - For communications (including BA) where a leaky feeder or base station equipment is installed
- Channel 6 - BA
- Channel 7 - To be used only under the direction of the duty radio officer
- Channel 8 - For communications in specific buildings where leaky feeder or appropriate base station equipment is installed
- Channel 10 - For use by the CU staff

403 An intrinsically safe variant, the Entel HT981 is used within the BARIE system (PN 592 refers). Intrinsic safety is achieved by capping output at one watt.

404 It should be noted that channels 2, 5 and 8 are duplex<sup>14</sup> and will only work in conjunction with a repeater set available when a CU is in attendance or a base station is fitted in the premises, e.g. London Underground stations.

405 Channel 1 is reserved for all initial incident command communications. It remains the primary command channel until the circumstances of the incident dictate or the IC decides that additional command and control radio capacity is required.

406 Once a CU is in attendance the CU communications operator will advise the IC that channel 2 is available to be introduced as the command channel if required.

407 Channel 6 is the default channel for BA communications unless the premises involved has a base station and leaky feeder installed, such as London Underground stations. In this case Channel 5 will be used for BA Communications. During the Grenfell Tower fire only Channel 1 was utilised for command communications and Channel 6 was primarily used for BA communications.

408 In the aftermath of the fire the Brigade undertook a number of controlled radio signal propagation tests in and around Grenfell Tower testing both the hand held radios, BARIE system, and telemetry equipment. Tests on all floors and throughout the inner stair case on Channels 6 and 2 utilised a standard HX480 radio at the BA control board locations and BARIE variant at remote locations within the building.

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<sup>14</sup> Duplex channel radio systems describe the use of two frequency channels, usually in the same band spectrum, which allows simultaneous communication between two stations.



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409 It is noted that when these tests were undertaken the fabric of the building was substantially altered from the night of the fire. The results of the tests are detailed below:

**TEST 1. - Channel 1 within inner cordon.** Channel 1 transmissions and reception were clear during all tests. Within all areas of the inner cordon and the atrium of Grenfell Tower radio messages were clearly audible without signal loss.

**TEST 2. Channel 1 at original CU location.** Channel 1 transmission and reception clear during all test calls. Within all areas of the inner cordon and the atrium of Grenfell Tower it was possible to transmit to and receive messages from a radio placed at the original CU location.

With the Channel 2 repeater deployed at the original CU location Tests 1 and 2 were repeated.

Channel 2 transmissions and reception were clear during all tests. From the original CU location to all areas of the inner cordon and atrium test messages were clearly audible without signal loss.

**TEST 3. Channel 1 at Bridge Head locations to and from all floors.** Channel 1 transmissions on all floors from all bridgehead locations (floors 0,2,3 and 7) clearly audible without signal loss with the following exceptions:

- Floor 7 (bridgehead at floor 0) - Slight background noise within lift lobby, but message still audible and understood.
- Floor 10 (Bridgehead at floor 0) - missed number during test count, repeated clearly received.
- Floor 23 (bridgehead at floor 0) - slight clipping of received signal, message audible when repeated.
- Roof level (bridgehead at floor 0) - transmission from West side of roof area broken and inaudible when receiving at floor 0 (atrium).

Channel 6 BA radio test. Bridge Head BA entry control locations to and from BA wearers on all floors.

- Channel 6 BA transmissions on all floors from all bridge head locations (floors 0,2,4,7) clearly audible without signal loss with the following exceptions.
- Floor 13 (bridgehead at floor 0) - 1-2 second loss on transmission from BA wearer within lobby area.
- Floor 16 (bridgehead at floor 0) - slight signal loss within flat 1 regained clear transmission from lobby.
- Roof level - Not tested by BA wearers.

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Channel 2 (repeater at original CU location) to and from all floors.

- Channel 2 transmission and reception was intermittent when leaving the atrium and proceeding within the central stairwell of the building up until reaching floor 3. From floor 3 communication was possible from within flats but broken within the central stair core of the building.
- From floor 7 communication on channel 2 improved but was still breaking at times.
- On floor 17 difficulties were experienced with interference. It was found that when transmitting on Channel 6 a whine was experienced on equipment monitoring channel 2 rendering reception of the test message inaudible.

410 Recognising the potential for signals to be reflected from surrounding buildings back into Grenfell Tower a further test was carried out within the central core of the building on upper floors to assist in ruling out the scenario. A radio operator on channel 1 was placed at floor 11 (above the level of any surrounding buildings) and test calls were then made to a radio operator ascending the building floors 12 to roof. Test messages were clearly received on all floors from 12 to roof level.

411 The Grenfell Tower fire was one of the largest and most complex incident communication challenges the Brigade has ever experienced. At the height of the response phase of the fire there was in excess of over 300 hand held radios available and potentially in use at the incident.

412 Given this fact and taking into consideration the radio propagation test results the most likely cause of the radio communication issues is the sheer volume of radio traffic being generated. This situation would have also been exacerbated by the unprecedented volume of BA crews deployed to undertake search, rescue and firefighting operations during this incident.

### **Actions by the Brigade since the fire**

413 The Brigade is reviewing its handheld radio capability and is in the process of tendering for a replacement radio handset. The Brigade officers involved in the radio replacement project have been made aware of the issues experienced at the Grenfell Tower fire and will, if the technology exists, select a replacement hand held radio that may mitigate some of these capacity challenges. It is anticipated that the replacement of the BARIE and the standard handheld radios will be completed in the 2019/20 financial period.

414 In addition to replacing the hand held radios the Brigade's OPA department are reviewing the current guidance that is available to staff in respect to radio protocol. It is acknowledged that at

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large scale and complex incidents where a significant number of hand held radios could be potentially used that operational staff may need to exercise more radio discipline in terms of generating radio traffic so as not too overrun the capacity of the available radio channels.

***Key observation 6.2: There is evidence of a lack of knowledge and understanding of the potential tactics and associated equipment that may have mitigated radio communication issues.***

415 Evidence from Brigade staff points to a lack of knowledge and understanding of the equipment available to potentially mitigate the radio communication issues experienced during the incident. As can be seen in the findings detailed above, the requirement to deploy the Brigade's radio repeater and leaky feeder capability probably wasn't required at this incident as the radio communication issues experienced at the Grenfell Tower fire were primarily caused by the sheer volume of radio traffic being generated.

### **Actions by the Brigade since the fire**

416 To address the knowledge and understanding issue, two mandatory communications training packages, one of which specifically covers the capability and deployment of the Brigade's radio repeater and leaky feeder equipment have been made available to all operational staff as part of the Operational News publication (Ops News 36, February 2019).

***Key observation 6.3: Senior officers were unable to book in attendance at the incident due to the high volume of radio traffic on the Airwave main scheme radio.***

417 In reviewing the available data from the 'Vision' mobilising log it has been identified that a number of officers (and appliances) did not book in attendance with Brigade Control when they arrived at the incident as required by PN 238<sup>15</sup> and PN 162<sup>16</sup>. Booking in attendance with Brigade Control is required to confirm that the asset has arrived safely at the incident they were mobilised to.

418 Booking in attendance provides a date and time stamp, which is used to measure attendance times for pumping appliances, which is one of the Brigade's key performance indicators. This date and time stamp data can also be used for post incident review and investigation and greatly assists in producing a detailed timeline of incident, if required.

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<sup>15</sup> Incident command procedures

<sup>16</sup> Officer responsibilities at incidents

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419 In producing the STEP timeline of activities the GTIRT has overcome this issue by cross referencing other data sources and the available Global Positioning System (GPS) information, mobile phone footage and CCTV imagery. This has enabled GTIRT to place officers and other resources at the incident with a reasonable degree of accuracy.

### **Actions by the Brigade since the fire**

420 In an attempt to overcome this issue the Brigade has reviewed the capability of the 'Airwave' hand held radios to establish if the equipment will allow an officer to book in attendance with Brigade Control without recourse to sending an oral message, i.e. will the equipment and the mobilising system allow for a data message to be sent and acknowledged.

421 This review confirmed that while the 'Airwave' hand held radios have this functionality the Brigade's mobilising system is not currently set up to process text data received from the 'Airwave' handset. Capita, the company that supplied and maintains the Brigade's mobilising system, is currently scoping the work and associated costs involved in adding this capability to the Brigade's mobilising system.

### ***Key observation 6.4: There was a lack of information provided to Brigade Control on progress with search and rescue operations.***

422 As previously covered in this report (Theme 5 refers) the sheer scale and unprecedented number of calls, both emergency and FSG, overwhelmed the capacity of the CROs who, understandably, were trying to answer as many of the '999' calls as possible.

423 At the incident the same problem occurred as the command structure, the Fire Sector and FSG CU in particular, became overwhelmed with the volume of information that they had to process and disseminate. This led to a lack of situational awareness in Brigade Control who were advising residents and providing fire survival guidance to callers over a protracted period.

424 PN 790 states that once a FSG Coordinator is appointed at the incident this officer should make contact with a supervisor in Brigade Control. This contact is to keep Brigade Control apprised of developments and progress relating to the search and rescue of those residents involved in FSG calls.

425 The evidence shows that the sheer volume of information coming into the FSG CU left them little, if any, opportunity to contact a supervisor in Brigade Control. It is also clear that all the supervisory managers in Brigade Control were fully engaged in call handling and mobilising

activities for an extended period of time so no-one would have been available to communicate with the FSG Coordinator, even had this officer attempted to make contact with Brigade Control.

**Actions by the Brigade since the fire**

426 As a result of these findings the Brigade has initiated a comprehensive review of its FSG policy and procedures which has included undertaking a range of exercises to establish at what point, in terms of the number of FSG calls, does Brigade Control and the FSG CU functions, as detailed in current policy become overwhelmed. The findings from these exercises will be incorporated into updated FSG procedures.

***Key observation 6.5: Dissemination of FSG call information between the CU and the Bridgehead was delivered via multiple communication channels as the volume and sources of information increased.***

427 There is evidence that multiple information exchange processes were established at the incident for the dissemination of FSG call information between the FSG CU and the Bridgehead. Some information was passed by hand held radio communications while at other times 'runners' were used. These communication channels were implemented incrementally as the volume of FSG calls and information increased.

428 It is also evident that as the incident developed, and the various FSG call communications channels were implemented, there was minimal shared situational awareness of the process for disseminating and exchanging this information.

429 There is also evidence that the officers deployed on the FSG CU did not consistently use the 'Control Information' forms, which are available on all front line fire engines. These forms are carbonated so that the casualty information can be shared at the incident with one copy being retained by the CU staff for post incident analysis. There is evidence that other forms of paper records were used to pass some FSG call information and at times this was passed via a number of officers before it reached the Bridgehead.

**Actions by the Brigade since the fire**

430 Improvements to this area form part of the review work currently being undertaken to update the Brigade's FSG policy, which will be published later this year.

***Key observations 6.6: There was limited practical means to communicate with all the residents in the building to provide advice and/or instruct an evacuation.***

- 431 During Phase 1 of the Inquiry there has been a considerable focus on why the Brigade did not initiate a full evacuation of the Grenfell Tower during the early stages of the incident when it was first recognised that the fire was spreading rapidly beyond the flat of origin. While this is an understandable line of enquiry the Brigade has repeatedly, both in oral evidence and in its 'Opening' and 'Closing' statements, explained that the full evacuation of a residential high rise premises, with the building design of Grenfell Tower, is a complex challenge.
- 432 As stated earlier in this report, Grenfell Tower was not fitted with a building wide communications system that could have been utilised by the Brigade to alert residents to evacuate the building.
- 433 Without any integral communications systems, the Brigade is left with very limited options to initiate an effective and efficient full evacuation of this type of premises during a major fire. In a single staircase residential high rise building, such as Grenfell Tower, this problem is further exacerbated as a full evacuation would greatly impact on the fire and rescue service undertaking its firefighting, search and rescue operations. This could place residents at additional risk especially when the fire is spreading rapidly and the Brigade is hampered in its firefighting operation.
- 434 The Brigade does have some limited capability, such as loudhailers, that can be used to communicate with residents from a distance. However, while there is evidence that loudhailers were employed to a limited extent by Brigade at the Grenfell Tower fire it is unlikely to be an effective way of communicating with residents located on the upper floors of a residential high rise building.
- 435 As such, the only way that the Brigade can fully evacuate a building is to commit large numbers of firefighters in BA into the building to knock and potentially force entry to every flat. This is both very arduous, due to the poor conditions in the staircase and lobbies, and inefficient in terms of being able to evacuate the whole block quickly. Such a decision would require the IC to operate outside of agreed operational policy as it would require firefighters to go above the known fire floors without any firefighting media, placing firefighters in significant danger.

### **Actions by the Brigade since the fire**

436 The Brigade recognises the importance of evacuation procedures and the means to implement such procedures is to the bereaved, survivors and residents but it also believes it is not something the Brigade can resolve on its own. Grenfell Tower was not originally designed to support a full evacuation of residents and as such the building did not contain the means with which to alert residents or coordinate a full evacuation.

437 The Brigade will continue to work with all stakeholders to identify and deliver improvements to the regulatory regime to prevent a re-occurrence of the Grenfell Tower fire and increase the safety of the public and firefighters.

438 The Brigade's OPA department also continues to review PN 633 and work with other fire and rescue services to identify solutions to mitigate the issues described above, until changes to the regulatory regime, such as those recommended by the Hackitt Review, are implemented. However the challenge of identifying workable and safe procedures to overcome the fundamental design principles of buildings described above is significant and practically difficult.

439 For those buildings identified as being fitted with ACM cladding similar to that installed at Grenfell Tower and until the cladding is removed, the NFCC simultaneous evacuation guidance should be applied by the responsible person and requires, either, the installation of a central alarm system or the provision of a waking watch to alert residents to a fire and initiate an evacuation.

### ***Key observation 6.7: There was no declaration of a 'Firefighter Emergency' to Brigade Control in accordance with Policy Note 496.***

440 From reviewing the Brigade's witness statements it has been identified that there were three Firefighter Emergency (FFE) events during the incident that were not formally declared in a message to Brigade Control, as required by PN 496<sup>17</sup>. In policy the term FFE applies whenever operational staff, or persons working under the control of the Brigade, are unaccounted for and/or in need of rescue.

441 If it is established or there is strong evidence to suggest that one or more firefighters or personnel working under the control of the Brigade are unaccounted for and/or in need of rescue the IC will immediately send the following priority message:

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<sup>17</sup> Tactical withdrawal, emergency evacuation and firefighter emergency

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*"From (Name of IC) at (address of incident), Firefighter Emergency, Tactical Mode Oscar".*

442 The FFE message will prompt Brigade Control to mobilise the following resources:

- Six Pumping appliances
- Two Fire Rescue Units
- Fire Investigation Unit
- Command Unit
- An ambulance
- Press Liaison Officer
- Senior Fire Safety Officer
- Three Station Manager
- Group Manager
- Deputy Assistant Commissioner
- Senior Accident Investigator (SAI).

443 PN 496 directs that this attendance will be mobilised in full, regardless of the resources in attendance or en route. If the size of the incident is subsequently increased, the mobilising system will not include the resources ordered for 'FFE' when calculating the additional attendance required.

444 Through further investigation of this issue it has been confirmed that while the FFE messages were not sent to Brigade Control, the Brigade did respond appropriately to these safety events by diverting resources to deal with the situation as a priority.

445 It has also been established that a conscious decision was made not to initiate the FFE message as they were aware that Brigade Control were already dealing with an unprecedented number of 999 and FSG calls and the further mobilisations required by the policy would create additional pressure and work for Brigade Control.

446 Evidence provided by witnesses also suggest the situation was assessed and it was determined the Brigade had sufficient resources in attendance at the time the events occurred to respond effectively to each FFE and the automatic mobilisation of the FFE PDA would further deplete the Brigade available operational resources.

**Recommendation 12** - The Brigade should consider whether any improvement measures are necessary in relation to policy and training, noting the context provided in the preceding paragraphs.



***Key Observation 6.8: From 02:06hrs FSG call information was passed from Brigade Control to the incident by a mobile phone to a mobile phone link resulting in a lack of evidence to support the post incident review and investigation.***

447 Evidence provided during Phase 1 of the Inquiry illustrates the transfer of FSG call information from Brigade Control to the incident did not follow the guidance contained in policy. PN 790 states that if there are a large number of FSG calls in progress and Brigade Control has sufficient resources then main scheme channel 1<sup>18</sup> can be used to avoid impacting on the main scheme radio channel in use.

448 Brigade Control also has a 'CU critical' phone line which has a higher priority than calls to the Officer of the Watch (OOV), which is the role normally undertaken by the on duty OM in Brigade Control. This number is programmed into CU phones and is used for passing life critical information securely. Both of these systems for passing FSG information are recorded.

449 During the Grenfell Tower fire mobile phones were used to pass FSG information from Brigade Control to the incident. The evidence suggests that this was done as a result of the high volume of FSG calls being taken and to keep the main scheme radio channel clear to send and receive 'Assistance' and 'Informative' messages relating to the Grenfell Tower fire and other incidents and enable CROs to focus on answering emergency calls.

450 The main issue arising from this situation is that the Brigade has no voice recordings relating to the FSG call information sent by this method. This has made tracking the FSG call information as part of the safety and learning investigation more difficult.

**Actions by the Brigade since the fire**

451 This issue is currently being considered as part of the review of the Brigade's FSG policy and procedures being undertaken by the Brigade's OPA department, who have been working closely with GTIRT to fully understand the challenges and issues that arose during the Grenfell Tower fire in respect to the handling and management of FSG calls. The lessons learnt from the incident will be captured and reflected in the revised FSG policy guidance and the associated training solution(s) that will be developed.

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<sup>18</sup> M2FH FLON-OPS-01

## Theme 7 – Operational Equipment

### **Key Observations 7.1: The Command Support System was unreliable during the incident.**

452 On the night of the Grenfell Tower fire it was stated in evidence by several CU operatives that the CSS did not work.

453 A Brigade witness when asked about the CSS on CU8 stated in oral evidence that on arrival at the incident around 02:20hrs that the CSS failed to start up, despite repeated attempts. The decision log maintained on CU8 after 02:47hrs notes at 04:03hrs that '*Command Support System has gone down*'.

454 However, another Brigade witness when questioned about whether there were any problems with the CSS on CU8 that night responded by stating that he could not remember any issues with the system but further noted that he had little involvement with the CSS during the night. This is supported by another witness who noted in his voluntary police statement that the CSS was working when he arrived on CU8 just before 04:00hrs and even took a photo of the command structure illustrated on the system.

455 Historically the problems with CSS at incidents are well documented and these issues were referred to a number of times in oral and written evidence. In these circumstances, officers and CU staff use alternative equipment provided on the CUs to manually record the same information that would ordinarily be populated on the CSS. This alternative equipment includes blank whiteboards and the 'headline board'<sup>19</sup> provided to record the incident command structure.

456 The CSS can provide a useful overview of the incident structure and as identified earlier in the report be used to record key decisions.

457 It is noted that whilst there are acknowledged issues with the reliability of the CSS, the Brigade has tried and tested methods to adapt and overcome these issues at operational incidents.

### **Actions by the Brigade since the fire**

458 The Brigade is currently in the process of delivering the CU replacement vehicle project, which aims to incorporate the latest technology to support its command, control and communications functions to support operational incidents.

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<sup>19</sup> Board incorporating a template which can be annotated with information to illustrate the command structure being employed at the incident.

459 The commencement of this project pre-dates the Grenfell Tower fire and demonstrates that the Brigade had already recognised the need to continually improve the functions delivered by CSS and actively review the new equipment and software technologies now available.

460 In January 2019, and ahead of the delivery of the CU replacement project, scheduled for 2020, the Brigade has rolled out two Windows 10, 4G enabled laptops to all seven CUs. This is to build resilience in the systems and to ensure that even if the main computer on the CUs aren't working effectively or if a CU is unable to attend an incident the Brigade is still able to utilise the CSS remotely. As part of the rollout of this new equipment the CSS software has been updated from Version 1.0 to Version 1.7, which provides a more stable platform and is compatible with the latest versions of the Windows 10 operating system.

461 The new software was tested for three months in the last quarter of the calendar year on various CUs and training was provided for CU operatives. The CUs are currently being further upgraded with new IT hardware which will allow the CSS to be used as originally intended on the Units, i.e., on a large, dedicated display terminal. Once the upgrade is complete the laptops will remain on the CUs to provide further resilience.

***Key Observation 7.2: There was no mobilising protocol for the Brigade's limited Positive Pressure Ventilation capability.***

462 The Brigade only had a limited PPV capability at the time of the Grenfell Tower fire. It was not well known throughout the Brigade that this capability was under evaluation and available, as its primary purpose is to assist the Brigade's response to a Marauding Terrorist Firearms Attack (MTFA) where fire may have been used as part of the deliberate attack.

463 Evidence shows that at 02:57hrs the Brigade's IC requests, via the Duty DAC, the attendance of Positive Pressure Ventilation (PPV). This request is made via a mobile phone call to Brigade Control.

464 The Brigade has an established method of mobilising the majority of equipment/resources to incidents, which is covered in PN 412<sup>20</sup>. However, as the PPV equipment currently only forms part of a specialist response capability to a specific incident type it is not in general use. This is why these vehicles and associated PPV equipment do not appear on the Pre Determined Attendances (PDAs) on the 'Vision' mobilising system.

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<sup>20</sup> Mobilising policy

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465 This resulted in the PPV equipment, when requested, needed to be mobilised manually. This was done by a SM who was located at the BCC, who instructed a WM, also at the BCC, to collect the specialist vehicle carrying the two sets of PPV from the Brigade's headquarters. The PPV capability arrived on scene just after 04:00hrs and is seen at 05:03:20hrs being brought into the Grenfell Tower ground floor lobby.

### **Actions by the Brigade since the fire**

466 The Brigade has introduced a new mobilising protocol for the existing Special Operations PPV equipment, which is now identified as an 'attribute' on the 'Vision' mobilising system. In March 2018 a new RIF was produced to support PPV mobilisations. These system changes enable PPV to be mobilised either by the Duty National Interagency Liaison Officer (NILO) or in response to a request from an incident. When PPV is requested from a routine fire incident the mobilisation must be sanctioned by the Duty NILO and the Duty AC.

**Recommendation 13** - It is suggested that the Brigade considers whether it needs to make operational staff more aware of the currently available PPV capability and its uses.

**Key Observation 7.3: A number of Breathing Apparatus sets were used more than once by different wearers and there was no means to record the test or subsequent wearer.**

467 Traditionally when firefighters report for duty they are required to do a test of their BA sets. This is normally done at the beginning of the shift. Once the test is complete, whether the BA set has passed or failed the firefighter will, as soon as practicably possible, fill out the corresponding BA log book.

468 These BA log books are kept at the home station, enabling supervisory officers to check and confirm all BA sets have been allocated and tested. To support the Brigade's investigation and the identification of BA teams, all log books were scanned to record their contents. This exercise identified that some log books were not completed correctly and a small number had not completed at all.

469 The log books remain on the station all the time the BA set is allocated to that station. The only time the BA log book should be removed is when the equipment is sent to PEG for periodic testing or when the equipment is defective. The log books are not carried on appliances with their respective BA sets.

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- 470 At the Grenfell Tower fire between 01:04hrs and 08:11hrs there were 217 BA sets used by firefighters. Between 08:11hrs and 20:00hrs, a further 169 BA sets were worn.
- 471 The Brigade still have 58 BA sets that are known to have been used during the fire after 08:00hrs which have not been attributed to an individual firefighter, i.e. the Brigade has been able to confirm that the set was used during the fire, but is unable to identify by whom.
- 472 When firefighters exited Grenfell Tower some returned to their fire engine and performed a fire ground 'A' Test. This is a basic test of the set to ensure it is safe to be used again. As the incident escalated a specific area was established to service the sets and enable BA wearers to rest and recover. There was no facility at this area to record the testing of sets as all BA log books were at their respective fire stations.
- 473 The RPE Logistics Officers (RPELO) carry temporary log sheets that can be utilised on scene. The duty RPELO arrived on scene at 04:45hrs and the temporary log sheets were utilised from 10:30hrs. Reserve Extended Duration BA sets were mobilised to the incident from PEG with the accompanying log books but these were not used to record acceptance or fireground 'A' tests.
- 474 Whilst there was no impact on the availability or usability of BA sets on the night of the Grenfell Tower fire. The poor records in BA log books made it difficult to identify wearers, the sets those wearers used and how those wearers were organised into teams when they entered the hazard area.

### **Actions by the Brigade since the fire**

- 475 The issues described above have been communicated to the RPE policy team and PEG for consideration.

### ***Key Observations 7.4: Time stamp on the Thermal Image Cameras were not aligned to Greenwich Mean Time.***

- 476 As part of the Brigade's investigation and evidence gathering in the recovery phase of the incident, the Brigade's Fire Investigation (FI) officers undertook the task of identifying all of the Thermal Image Cameras (TICs) used during the fire. The FI officers reviewed the footage captured by the TICs as part of their own investigation as to the likely cause of the fire and downloaded approximately 60 hours of footage from 22 cameras. This footage was uploaded onto the Brigade's Grenfell Tower image library.

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477 The footage was reviewed by GTIRT to identify which TIC belonged to which station, who recorded the images and at what time, to corroborate the actions of firefighters, fire spread, smoke movement and identification of residents inside Grenfell Tower.

478 It was observed that there were a number of inconsistencies with time stamps on the images reviewed. Further investigation revealed that the TIC's do not have an auto update feature which automatically updates the time on the equipment to align with Greenwich Mean Time (GMT) and British Summer Time (BST) as this requirement was not included in the procurement specification.

479 The TICs do not provide a time indication whilst the equipment is being operated so any inaccuracies are not apparent to the equipment user. As there is no automatic update facility on this equipment the time has to be changed manually, which is normally only done once a year by an external contractor during the equipment's scheduled service. As a consequence it is highly probable the time stored within the Brigade's TICs will often be inaccurate.

480 All the TICs were subsequently examined by the Brigade and a retrospective calculation was used to establish the time difference against the GMT. From this, GTIRT were able to establish an approximate time for the majority of the TIC footage reviewed, which has been used to inform its timeline and associated reports.

### **Actions by the Brigade since the fire**

481 The issue described above was communicated to the TIC manufacturer and supplier in July 2017 by the Brigade's Technical and Commercial department to enable a solution to overcome the time stamp issue to be identified. The development of an approved solution is still being progressed.

## Chapter 4 - Summary of key observations

### Theme 1 - Observed failures of the building and its fire safety measures

Key observation 1.1 : The external cladding system installed on Grenfell Tower was not compliant with Regulation B4(1), contributing to the observed failure of the fire safety measures provided within the premises.

### Theme 2 – Operational pre-planning

Key observation 2.1 : Any knowledge concerning the risks associated with cladding systems may not been recognised and communicated effectively across the Brigade.

Key observation 2.2 : The Operational Risk Database entry for Grenfell Tower was not populated in accordance with PN 800.

Key observation 2.3 : There is a lack of consistency in the standard of premises risk information held on the Operational Risk Database.

Key observation 2.4: The Brigade has not undertaken Premises Risk Assessments for all residential high rise premises to determine the level of risk associated with these premises.

Key observation 2.5 : There may be an inconsistent level of knowledge and understanding amongst operational staff in relation to 7(2)d visits.

Key observation 2.6 : There is no established means for crews providing an emergency response to premises outside of their own station areas to be aware of any fire safety deficiencies that may have been identified.

### Theme 3 – Command and Control

Key Observation 3.1 : The scale and rapidity of the incident, combined with human factors, impacted on the ability to maintain situational awareness.

Key observation 3.2 : The rapid escalation of the incident impacted to a limited extent on command handovers.

Key observation 3.3 : Effective early information gathering enabled the 'on arrival' tactics and actions identified in PN 633 to be implemented effectively by the crews who formed the pre-determined attendance for the incident.

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Key observation 3.4 : There was effective early recognition of resourcing requirements by ICs.

Key observation 3.5 : Recording of decisions, rationale, objectives and tactical plans was in some regards ineffective.

Key observation 3.6 : Difficulty in confirming who was being rescued or self evacuating from the building and from where created difficulty in maintaining accurate records to inform the search and rescue operation.

Key observation 3.7 : Operational Discretion was adopted for the incident but it was not formally recorded in accordance with Brigade policy.

### **Theme 4 – Operations**

Key observation 4.1: The Brigade had limited means to fight an external façade fire resulting from the non compliance of the installed external cladding system with the requirements of Regulation B4(1).

Key observation 4.2 : Extensive breaches of compartmentation resulted in simultaneous serious fires on multiple floors.

Key observation 4.3 : The building behaved in an unpredictable manner beyond the experience of the Brigade.

Key observation 4.4 : The building's single escape route was significantly compromised by the products of combustion from an early stage of the incident.

Key observation 4.5 : Number of FSG calls and the resulting volume of information significantly exceeded the expectations of Brigade policy and training.

Key observation 4.6 : Operational personnel were required by circumstances to provide fire survival guidance to residents, a task not anticipated by policy or training.

Key observation 4.7 : Operational crews had problems physically identifying floor numbers in the stairwell.

Key observation 4.8 : Some elements of the BA operations during the Grenfell Tower fire were not fully aligned to the Brigade's operational procedures set out in PN 466.



## **Theme 5 – Brigade Control**

Key observation 5.1 : The facilities at the Brigade's fallback Control, located in Stratford, did not fully replicate those at the primary Control in Merton.

Key observation 5.2 : FSG call information was not gathered and communicated in accordance with PN 539, Appendix 3.

Key observation 5.3 : There was no established or tested method to maintain an overview of the FSG call information being received by Brigade.

Key observation 5.4 : The 'Vision' mobilising system does not support the identification of telephone numbers to enable call backs, and the Brigade does not have a clear policy position on re-contacting callers.

Key observation 5.5 : There are no national standards for passing and receiving FSG call information between Fire and Rescue Service Control rooms handling calls related to the same incident.

Key observation 5.6 : There is no automated system to link NICE voice records to Vision call records, impacting on any post incident review.

Key observation 5.7 : The 'Vision' mobilising system 'call collection form' can be overwritten if a new call is taken before it is added to the incident log.

Key observation 5.8 : There is potential for Brigade Control personnel to experience secondary trauma following a traumatic incident.

## **Theme 6 - Communications**

Key observation 6.1 : The volume of radio traffic exceeded the capacity of both the BA and command channels.

Key observation 6.2 : There is evidence of a lack of knowledge and understanding of the potential tactics and associated equipment that may have mitigated radio communication issues.

Key observation 6.3: Senior officers were unable to book in attendance at the incident due to the high volume of radio traffic on the Airwave main scheme radio.

Key observation 6.4 : There was a lack of information provided to Brigade Control on progress with search and rescue operations.

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Key observation 6.5 : Dissemination of FSG information between the CU and the Bridgehead was delivered via multiple channels as the volume and sources of information increased.

Key observation 6.6 : There was limited practical means to communicate with all residents in the building to provide advice and / or support.

Key observation 6.7 : There was no declaration of a Firefighter Emergency to Brigade Control in accordance with Policy Note 496.

Key observation 6.8 : From 0300hrs, FSG information was passed from Brigade Control to the incident by a mobile to mobile communication link, resulting in a lack of evidence to support a post incident review.

### **Theme 7 - Equipment**

Key observation 7.1 : The Command Support System was unreliable during the incident.

Key observation 7.2 : There was no mobilising protocol for the Brigade's limited Positive Pressure Ventilation capability.

Key observation 7.3 : A number of BA sets were used more than once by different wearers and there was no means to record the test or the subsequent wearer.

Key observation 7.4 : Time stamp on Thermal Image Cameras is not aligned to Greenwich Mean Time.

## Chapter 5 – Summary of recommendations

**Recommendation 1** - The Brigade should continue to work with all stakeholders to identify and deliver improvements to the regulatory regime to prevent a re-occurrence of the Grenfell Tower fire and increase the safety of the public and firefighters.

**Recommendation 2** - The Brigade should continue to campaign vigorously for the provision of sprinklers in residential high rise and other types of buildings in order to improve public safety.

**Recommendation 3** – The Brigade should consider reviewing its policies and training packages relevant to 7(2)d visits to ensure consistent guidance is provided to operational personnel.

**Recommendation 4** – The Brigade should consider how to ensure information relating to identified fire safety deficiencies in a premises is available to all operational crews.

**Recommendation 5** - It is recommended that the Brigade determines whether to retain the DMM or move to the DCP. It is acknowledged the Brigade needs to consider the challenges and benefits of implementing such a wider ranging and fundamental change to its incident command framework, at a time of significant organisational change and other improvement programmes.

**Recommendation 6** - The Brigade should consider the extent to which human factors affecting command and control are addressed in policy and training.

**Recommendation 7** - The Brigade should consider how it can most effectively raise awareness of and reinforce the requirements of PN 828 'Recording decision at incidents'.

**Recommendation 8** – Whilst it is recognised that the volume of FSG calls experienced during the Grenfell Tower fire and the information associated with those calls was unprecedented, it is recommended the Brigade considers the issues carefully to ascertain if any measures can be implemented to address this matter.

**Recommendation 9** - The Brigade should consider to what extent recognition that a building is behaving unpredictably in fire is addressed in policy and training.

**Recommendation 10** - It is suggested the Brigade considers the extent to which policy, training and human factors played a role in the control measure degradation identified.

**Recommendation 11** - It is suggested the Brigade considers how shared situational awareness within the Control room might be achieved in similar circumstances and whether a more

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sophisticated system than the whiteboards used on the 14<sup>th</sup> June should be developed and implemented as an established Control protocol.

**Recommendation 12** - The Brigade should consider whether any improvement measures are necessary in relation to FFE policy and / or training.

**Recommendation 13** - It is suggested that the Brigade considers whether it needs to make operational staff more aware of the current available PPV capability and its uses.

## **Chapter 6 - Appendices**

### **Appendix A – Operational Response Report Volume One**

Brigade reference: GTIRT19-00152

Inquiry reference: LFB 00032988

### **Appendix B – Actions by Brigade Control**

Brigade reference: GTIRT18-03448

Inquiry reference: LFB 00004790

### **Appendix C – Organisational Overview**

Brigade reference: GTIRT18-02288

Inquiry reference: LFB 00001905

### **Appendix D – Lakanal House Incident Assurance Review, August 2018**

Brigade reference: GTIRT18\_03758

Inquiry reference: Not applicable

### **Appendix E - National guidance and London Fire Brigade operational policy for fighting fires in high rise buildings**

Brigade reference: GTIRT19-00737

Inquiry reference: Not applicable

### **Appendix F – NFCC 'Guidance to support a temporary change to a simultaneous evacuation strategy in purpose-built block of flats'**

Brigade reference: GTIRT18-02260

Inquiry reference: LFB 00024392 or HOM 00045969