INDEPENDENT OPERATIONAL REVIEW

New Zealand International Convention Centre fire

afac

Prepared for Fire and Emergency New Zealand

ACKNOWLEDGEMENTS

The following conducted this Review on behalf of the Australasian Fire and Emergency Service Authorities Council (AFAC):

- Jeremy Fewtrell – Fire and Rescue New South Wales
- Paul Considine – Australasian Fire and Emergency Service Authorities Council
- Trevor Brown – Fire and Emergency New Zealand

The Review team wishes to gratefully acknowledge the administrative support provided by staff of Fire and Emergency New Zealand, in particular Mr Robert Wesney who accompanied the team on their fieldwork visits.

The Review team would like to thank those individuals who gave freely of their time and spoke openly with the Review members. The Review benefitted from the input of representatives of Fire and Emergency New Zealand, officials from local government and emergency managers, and representative bodies.

The Review spoke to over 30 individuals or groups as well as reading operational debriefs and other written materials relating to the management of the NZICC fire. We have not attempted to respond in this report to each point that was made to us, but we have had regard to the major themes that emerged.

The input of all participants in preparing this document was of great benefit to the Review. However, the content of this report and its conclusions remain the joint responsibility of the Review team.

AFAC, August 2020

Australasian Fire and Emergency Service Authorities Council Limited (ABN 52 060 049 327)

Level 1, 340 Albert Street
East Melbourne Victoria 3002
Telephone: 03 9419 2388
Facsimile: 03 9419 2389

Email: afac@afac.com.au
Internet: http://www.afac.com.au

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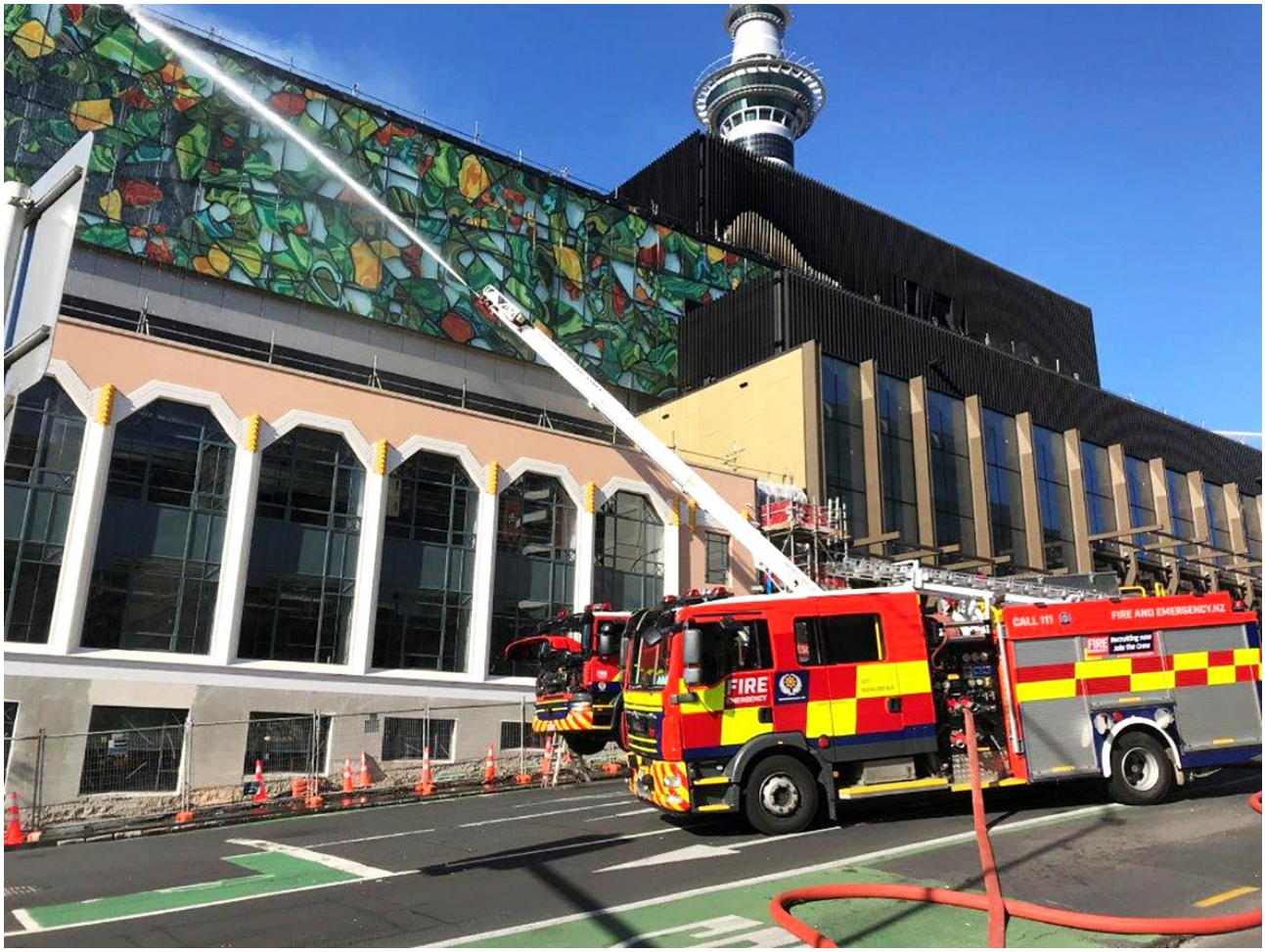

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1. INTRODUCTION

1.1 On Tuesday 22 October 2019, a large fire broke out in the Auckland central business district at the New Zealand International Convention Centre (NZICC), which was under construction. Fire and Emergency New Zealand firefighting crews arrived at the scene at approximately 1.10pm and the incident was not handed back to the site owners until 11 days later.

1.2 By historical standards in New Zealand the fire was complex and dangerous. At its peak, 130 firefighters, 30 appliances and 16 operational support vehicles attended it. The fire severely impacted the Auckland CBD and resulted in a full evacuation of the NZICC precinct, subsequently causing days of traffic chaos in Auckland as emergency operations required the closure of key city streets.

1.3 Fire and Emergency New Zealand conducted a statutory investigation at the site to determine the cause and origin of the fire. Representatives from 10 different organisations including police, insurers and other government agencies conducted a cooperative investigation for their own purposes.

1.4 While there are few direct comparators for a structure fire of this size and complexity in New Zealand, the ever-growing and evolving built environment means that urban fire services have to be prepared to face challenges that are unlike those of the past. At the same time, the expectations of firefighter safety and modern incident management mean that the less structured tactics of historic times are no longer acceptable.

1.5 We hope that the learnings from this incident, and the recommendations and observations made in this report, will support Fire and Emergency New Zealand in its journey of continuous improvement and evolution to meet the challenges of the contemporary world.

1.6 This Review recommends as follows:

Recommendation 1

Fire and Emergency New Zealand should review its strategies to understand and manage high-risk buildings, including buildings under construction. These strategies should take into account the practicality of physically inspecting and keeping up-to-date with individual buildings, and provide solutions to support operational firefighters effectively to manage fire in the complex built environment where they may not be personally familiar with individual buildings.

Recommendation 2

Fire and Emergency New Zealand should review its operational doctrine to provide guidance to incident controllers about identifying incidents that are likely to develop into long-duration events, and setting up appropriate command facilities in an EOC to manage all major incidents, of whatever hazard type, from an EOC.

Recommendation 3

Fire and Emergency New Zealand should reinforce with incident controllers that individuals should only be given sector command responsibility if they have the appropriate training and competency assessment; and provide sufficient skills maintenance opportunities to qualified staff to ensure that they are able to deploy their skills effectively at low frequency, high impact incidents.

Recommendation 4

Fire and Emergency New Zealand should reinforce current operational doctrine, training and exercises to ensure that crew accountability is placed front and centre of command considerations.

Recommendation 5

Fire and Emergency New Zealand should progress the review of its aerial appliance strategy to completion, to include the training of additional aerial appliance operators in the next 12 months.

Recommendation 6

Fire and Emergency New Zealand should provide clear direction to communications staff and commanders about the capability of Fire and Emergency New Zealand brigades in their area to respond to a range of hazards, and should also ensure that any specialist training required to equip brigades to respond to hazards in their area and neighbouring areas is provided to them.

Credit: John Waldow

Recommendation 7

Fire and Emergency New Zealand should review its doctrine relating to liaison with emergency management partners, to ensure that the importance of liaison, and having appropriate command facilities for liaison activities to be carried out, is embedded throughout Fire and Emergency New Zealand; and to formalise a liaison structure with emergency management partners for major incidents where Fire and Emergency New Zealand is the control agency.

Recommendation 8

Fire and Emergency New Zealand should engage with government to obtain confirmation about both responsibility and capability for atmospheric monitoring, and should use its influence to ensure that a national air quality monitoring capability exists and can be activated on an emergency basis for incidents such as the NZICC fire.

Recommendation 9

Fire and Emergency New Zealand should develop doctrine on supporting welfare functions and their organisation as a formal Rehabilitation Sector at an incident.

Recommendation 10

Fire and Emergency New Zealand should develop doctrine on the functions and responsibilities of the Recovery Officer and identify triggers for the appointment of this role in respect of an incident.

Recommendation 11

Fire and Emergency New Zealand should engage with iwi when managing any future major incident with community or environmental impacts.

2. ABOUT THE REVIEW

INTRODUCTION

2.1 This Review was requested by Fire and Emergency New Zealand. It has been conducted on a non-statutory basis, with no formal powers of compulsion of witnesses or documents.

2.2 Fire and Emergency New Zealand has expressed its desire to learn from its operational activities to support ongoing improvement. This review of Fire and Emergency New Zealand's operations during the 2019 fire and the New Zealand International Convention Centre (NZICC) at SkyCity provides an important opportunity for improvement. It identifies successes as well as areas for improvement of both firefighting operations and Fire and Emergency New Zealand's support activities.

2.3 The Chief Executive of Fire and Emergency New Zealand is the sponsor of this independent review and the Office of the Chief Executive provided day-to-day administrative support.

REVIEW TEAM

2.4 The independent Review team was appointed by the Australasian Fire and Emergency Service Authorities Council (AFAC) in consultation with Fire and Emergency New Zealand. Reviewers were appointed with expertise in urban firefighting operations, and the conduct of formal review activities. A decision was taken to include a senior officer of Fire and Emergency New Zealand in order to provide local knowledge and context to the Review; however, the conclusions of the Review are independent of Fire and Emergency New Zealand and represent the considered view of all members of the Review team.

2.5 The Office of the Chief Executive provided secretariat services for the Review, including technical writing, from within existing Fire and Emergency New Zealand resourcing.

METHODOLOGY

2.6 The Review team met with the Chief Executive in Wellington on Wednesday 12 February and carried out field work in Auckland between Thursday 13 February and Thursday 20 February inclusive. The team met with Fire and Emergency New Zealand personnel, staff from other agencies, government and representative bodies significantly impacted by the fire.

2.7 The team had the opportunity to visit the immediate environment of the NZICC and discuss the strategies used there. They considered relevant documentation and also had the opportunity to review video footage of the fire and firefighting operations, and listen to recorded radio traffic from the incident. An opportunity was given for officers and firefighters to provide a written submission on their experience during the fire. Over 20 submissions were received and the information added substantially to the evidence available to the Review team. The Review also contacted some stakeholders by telephone to obtain feedback on their experience of the management of the fires.

2.8 The Review has intentionally adopted the following principles:

- We have not tried to read and digest every document produced in relation to the management of the NZICC fire. We have been provided with a significant amount of documentation relating to the incident and we have reviewed key documents that have assisted our understanding of the circumstances of the fire.
- We have not acted as a fact-finding body to resolve disputes. Where we have identified issues of note about the management of the fire we have discussed these with the people involved and we have reached conclusions based on the available evidence and our professional judgment. We have not gone about this exercise in the same way as a court or legal inquiry would, and our conclusions should not be relied upon to prove that one party or another is right about a particular issue.

Language

2.9 We may use language in this report such as 'we were told', which sets the context for the conclusions that follow, but does not imply that we investigated and confirmed the truth of the statement. We believe that everyone we spoke with engaged with us in good faith, and the very fact that we were told certain things may indicate a need for discussion and reflection, even if it later turns out that what we were told is only a point of view or that there is more to the story. If we use phrases such as 'we found' or 'we conclude', these should be taken as conveying our opinion on the matter based on the best evidence available to us.

Recommendations

2.10 Arising out of our Review we have identified certain recommendations for Fire and Emergency New Zealand; we invite them to have regard to our recommendations while acknowledging that it is a matter for them to prioritise these as they see fit. In places in this report, we have made comments or suggestions that we have not wished to elevate to the status of recommendations, but which, again, we invite Fire and Emergency New Zealand to take account of in their future business planning.

INFORMATION SOURCES

2.11 The lead reviewers conducted interviews with key internal and external stakeholders from 12 February 2020 to 20 February 2020.

2.12 As outlined in the terms of reference the reviewers were provided with the following information sources:

- Commanders and watch debriefs
- Area 4 debrief
- ICAD report
- Recovery plan and report
- Fire Investigation Team briefing
- Video from the Command Unit
- UHF radio traffic recordings
- Individual firefighters' testimonies
- NZPFU staff survey
- Communications Centre dispatchers
- Media reports

Relationship to other review activities

2.13 While this Review focused on strategic and higher-level issues, it also took into account operational debriefs that focused on some of the more tactical firefighting issues.

2.14 This report is free-standing and based on the evidence that the Review team gathered during the fieldwork phase of the Review. It deliberately does not deal with the detailed operational issues that will have been addressed in internal after-action reviews, and our intent has been to maintain the discussion and conclusions of this report at a more strategic level.

SCOPE

2.15 The following were explicitly out of scope:

- The origin and cause of the fire
- The conduct or behaviour of any individuals involved for performance-related purposes
- The regulatory framework per se (i.e. any review of Fire and Emergency New Zealand's statutory functions or powers)
- The subsequent investigations into the fire, including the cause and origin investigation
- Legislative policy, and legal, issues, such any potential fault or liability in connection with the fire
- Building legal compliance issues
- The operations and/or performance of agencies other than Fire and Emergency New Zealand.

3. CHRONOLOGY AND RESPONSE

3.1 This section outlines the key decisions and actions for the incident. It does not detail all firefighting operations that occurred; rather it is intended to give a high-level picture of the incident as it developed. Discussion under the headings of the individual terms of reference will provide more detail about the key findings and recommendations of the Review team.

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3.2 At 13:09:37, the Northern Communications Centre (NorthCom) received a 111 call from a Fletcher Construction Ltd (Fletchers) employee to a fire on the roof of the New Zealand International Convention Centre (NZICC), Wellesley Street, Auckland.

3.3 Shortly before this call NorthCom had responded two pumps from the City fire station (CITY201 and CITY207) and one from the Grey Lynn fire station (GREY261) to a private fire alarm (PFA) activation to a building in College Hill, approximately one kilometre from the Convention Centre. These three fire appliances are recorded in the NorthCom PDA database as normally the first responding appliances to a first Alarm response to the NZICC. With these pumps already committed NorthCom dispatched three alternate pumps from Parnell, Ellerslie and Remuera stations to the Convention Centre call.

3.4 When CITY207 arrived at the College Hill location there was a large group of people, who had evacuated from the building, standing on the footpath in front of the building. They advised that their alarm activation was a false alarm but pointed out to the firefighters the smoke issuing from the NZICC that was prominent on the skyline. The Senior Station Officer (SSO) from CITY207 looked around and could see a considerable amount of smoke and flame coming from the vicinity of the NZICC, and immediately advised NorthCom that they were now responding to the Convention Centre to what looked like a large fire on the roof of the Convention Centre. The SSO also transmitted a third alarm (13:12 hours). As initiation and turnout were being processed, several other 111 calls were received also notifying of the fire.

3.5 The third alarm response was initiated by ComCen calling a total of seven pumping appliances, and five aerial appliances. Only one heavy aerial was immediately available due to servicing and maintenance issues with the others, and two of the five were Type 4 appliances with a 17-metre reach and pumping capacity. Three support specialist appliances, a Command Unit, a Breathing Apparatus tender and a canteen unit were also dispatched. The third alarm also activated notifications to the Auckland executive officers. Due to the prompt actions of CITY207 there were a number of fire appliances, an aerial appliance (PARN256 – relief ladder) and a Command Unit (CITY2018) on scene very early.

3.6 CITY207 was the first arriving appliance at the Convention Centre, and the SSO, along with the officer in charge of CITY201, commenced a size up of the building. CITY201 and CITY207's drivers were tasked to establish water to the riser system and set up the Entry Control Officer (ECO) board. The SSO was met near the upper entrance on Wellesley Street by a Fletchers project manager, and this was designated sector 1. The Fletchers manager advised that they were evacuating the site of all Fletchers and contractor personnel, approximately 400 workers.

3.7 Around the same time the officer of GREY261 advised that they could gain access to the roof of the Convention Centre from the adjoining hotel (also under construction) on Hobson Street and was able to run a further delivery from there, designated sector 4. These two deliveries were set up and crews began firefighting operations on the roof, but their efforts were hampered by lack of water pressure.

3.8 As these deliveries were in the process of being established, PARN256 set up in sector 4, being an accessible but downwind location with the potential for roof attack, but also to protect the large tower crane that was still located within the roof structure. An upwind position was not achievable due to the height of the building on the Nelson Street side which would have seen an aerial setup as fruitless.

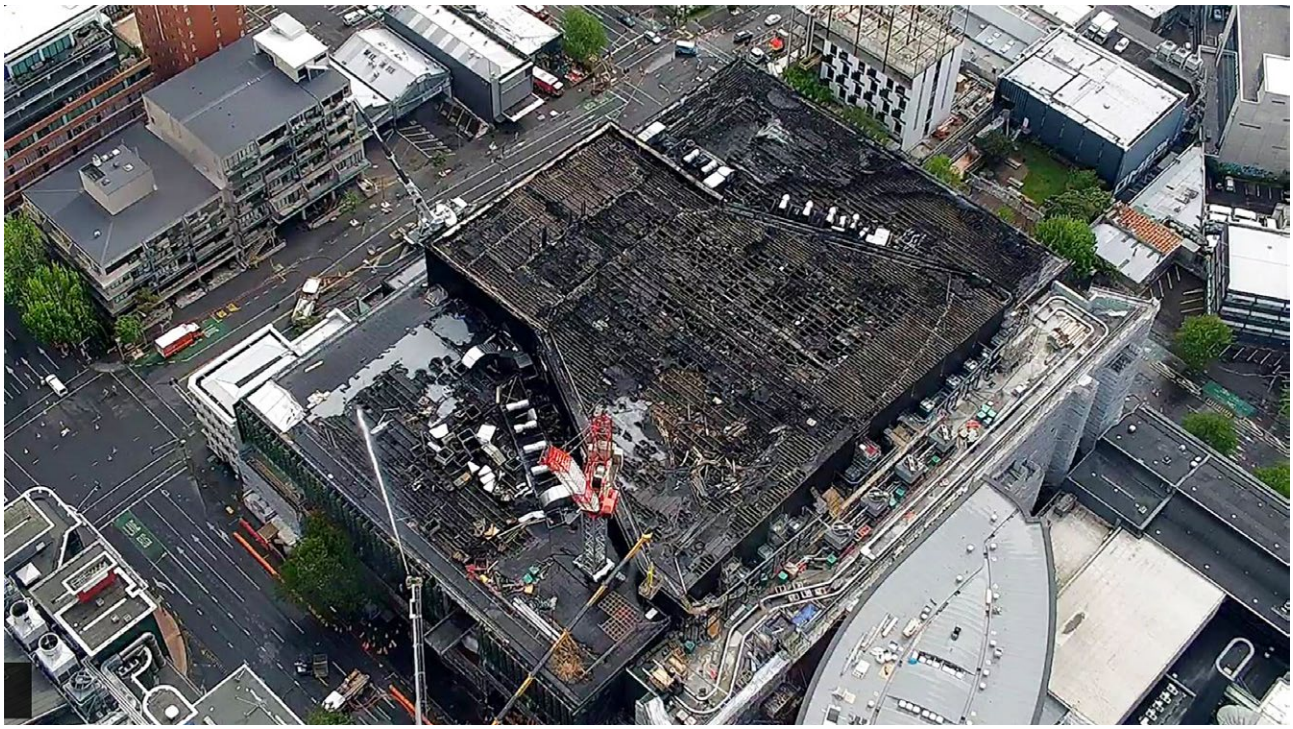
3.9 While doing his size up the SSO could see no sign of fire within the building. The size up took a considerable amount of time due to the distances he had to navigate. While he was still conducting his size up the first executive officer, an Assistant Area Commander (AAC) who had had responded immediately on the transmission of the third alarm, arrived on scene and advised the SSO he was there by radio. Two other AACs had also arrived about the same time, so after a quick discussion agreeing each role they would take, the first AAC then proceeded to conduct his own size up and clarified the sectorisation implemented.

Early stages of firefighting operations – two low pressure deliveries and aerial monitor at work. Credit: Fire and Emergency New Zealand.

3.10 A fourth alarm was transmitted at 13:50 hours and Convention Centre Command was established at 13:56 hours from CITY2018 with the first arriving executive officer officially taking command as Incident Controller (IC) at the same time (13:56 hours). By this time crews were using multiple deliveries, and the aerial ladder (PARN256) was positioned in sector 4, mainly protecting the onsite crane. A strong westerly wind was hampering the crews on the roof being able to get close enough to safely apply water to the fire.

3.11 The first situation report (sitrep) was transmitted at 14:21 hours, using the HAULET format (Height of structure, Area of structure, Use of building, Location of fire, Exposures at risk, Tactics) to provide an initial picture of the incident. The Region 1 Regional Coordination Centre (RCC) was activated at 14:33 hours. One of their early key priorities would be to coordinate the shift change at 18:00 hours. A fifth alarm was transmitted at 14:46 hours and shortly after at 14:53 hours command changed from the first arriving Assistant Area Commander to an Area Commander (AC) who had been on the incident ground approximately one hour supporting the IC. The Incident Management Team (IMT) continued to operate out of CITY2018, with support being provided through the RCC at Region HQ.

3.12 Mid-afternoon a second AC located himself in the Mayor's office in the Auckland City Council building. The Mayor had an office on an upper floor and from there he would be able to get a good view of the fire from above. The AC in the Mayor's office was able to increase situational awareness for the IC. Throughout the afternoon the AC was able to give the IC progress reports on firefighting effectiveness, behaviour of the fire, and where problems might emerge through smoke drift. He was also able to support the IC's decision to vacate the roof as he was reporting that they were making no headway in extinguishing the fire with present tactics. The IC's intelligence was further aided by deploying drones from the Auckland USAR cache, from then on supporting all ICs throughout the incident.



Drone photo of roof with fire nearly fully extinguished. Credit: Fire and Emergency New Zealand.

3.13 At 14:58 the Hamilton Aerial appliance (HAMI415) arrived, having been responded by NorthCom to supplement the aerial appliance that was in the workshops undergoing maintenance. That aerial appliance was subsequently released from the workshop late in the afternoon to allow it to be used for aerial monitor operations. At 15:18 hours a sixth alarm was transmitted and at 16:00 hours another sitrep was transmitted advising that all firefighters had been removed from the roof for safety reasons. This sitrep was reiterated at 16:45 hours. The decision to evacuate the roof was made after consultation between the IC, Fletchers and BECA engineers who advised that the roof was not safe for firefighters to be on.

3.14 As this was to be an important decision in firefighting operations it required both a strategic and tactical change to operations. The strategy changed from offensive external operations to defensive external and internal attack. This was achieved by continuing fire suppression from aerial appliance monitors but adopting internal defensive tactics using multiple low-pressure deliveries (LPDs) on level 5 to stop any fire spreading internally from debris falling from the roof. Fundamentally the operational strategy and tactics did not change for the rest of the incident until the fire was fully extinguished and the building handed back to Fletchers.

3.15 The fire created significant volumes of black toxic smoke drifting across large parts of the CBD, causing a number of businesses to close and subsequently asking their staff to work from home if possible. The smoke was also entrained into some apartment air conditioning systems causing health concerns and requiring the evacuation of the SkyCity Hotel. The smoke was an issue for firefighters at the incident as well, making it difficult to have an ideal location for the IC and the IMT. It was also taxing on aerial operators at the head of the aerials who had to stand in this position for several hours wearing a BA set. This was compounded by varying wind conditions during the operation changing the direction and intensity of smoke travel.

3.16 Recognising that this fire was going to attract major media and political interest a decision was made at Fire and Emergency New Zealand National HQ in Wellington to send media management support to Auckland. The aim was to ensure that the messaging coming across the various media outlets was consistent, relevant, and giving the public as much information as possible. The first media support officer arrived in the RCC around 18:30 hours. He went to look at the site then met with the Fire Region Manager back at the RCC around 20:00 hours. From then on, he supported the Fire Region Manager and IC for all media briefings.

3.17 At 18:00 hours shift changes commenced, and the RCC was notified that the National Coordination Centre was fully activated to support the RCC if required. The NCC had been in a monitoring mode as it had been activated to support a USAR exercise being conducted on the North Shore. Command changed for the night shift at 19:50 hours, but shift changes for firefighters were more complex.

3.18 The night shift tactics were two active sectors: sector 1 which had the internal firefighting operations, and sector 4 which had aerial monitor operations.

Credit: Fire and Emergency New Zealand.

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3.19 The night shift IC was relieved at 02:01 hours in the early hours of the morning, and command changed again at 12:14 hours and began to move into a formalised roster of shift rotations for executive officers. It was established that commander shift rotations would change over at 10:00, 16:00, 22:00, and 04:00 hours. Additional executive officer support was provided by commanders brought in from other Regions. From the 12:14 hours change of command onward the six-hour shift rotation was instigated. It was still problematic relieving firefighters due to availability of specialist aerial operators and overtime shifts being worked. Shift changes for firefighters did not align to the executive roster and followed the normal shift patterns.

3.20 From the 23 October the strategy and tactics did not substantially change until the fire was extinguished. The plan was to sacrifice the Auditorium roof but prevent the fire spreading to any other part of the structure. Operations to achieve these tactics remained focussed in sector 1 and sector 4.

3.21 Four commanders had arrived from outside Auckland to support the IMT and were briefed at 09:00 hours at the RCC before proceeding to the Convention Centre site. Some firefighters, especially aerial operators, were not relieved from their posts for many hours. If they were relieved, they went to their home station, if possible, for a rest and recovery, then were sent back to the fireground.

3.22 The roads around the Convention Centre are all main arterial routes in the Auckland CBD and were closed for several days by police at the request of the IC. This created major transport issues in and around Auckland, impacting public and private transport (cars, buses, trucks and trains). The Auckland Transport Authority activated their Emergency Operations Centre (EOC) located in Albany on the North Shore. Their statutory role was to ensure both public and private transport could operate as smoothly as possible, as well as providing public updates on road closures and alternative routes. Effectively, they were trying to ensure the CBD could continue to function. The traffic congestion impacted the greater Auckland area due to the large amount of commuter traffic.

24 OCTOBER 2019

3.23 Early in the morning of Thursday 24 October the RCC was advised that the Prime Minister would be visiting the site and she would be hosted by the Fire Region Manager. This had become a major media event and preparations were put in place to ensure she was able to be well briefed on the fire and see the efforts for herself.

3.24 Following discussion between the Fire Region Manager and the National Community Readiness and Recovery Manager it was agreed that a recovery team should be established. The IC appointed one of his AACs to lead this team that was made up from a range of skills to ensure this was effective. The Recovery Manager had spent time at the incident as the Safety Officer, and as liaison officer in the RCC, so had a good understanding of the fire and conditions, as well as challenges, being encountered.

3.25 The team worked to understand the key relationships with businesses and organisations most impacted by the fire. The intelligence they gathered allowed the IMT to build these issues into their planning. This had a major impact on getting roads, businesses, apartments etc. back to normal as soon as was safely possible. This was assisted by the following Monday being a public holiday (Labour Day) giving the IMT an extra day to complete firefighting activity and allow key roads to be opened to assist vehicle movement through the city for Tuesday morning when the new working week commenced.

3.26 After nearly two days firefighting efforts were continuing and by now it was thought the majority of the fire in the roof had been supressed. But fire crews were having difficulty accessing hot spots to ensure the fire was fully extinguished. Help was provided to firefighters to achieve full extinguishment of the hot spots through the use of a crane with a 'person cage'. This had the reach required and allowed firefighters access to all areas of the roof without endangering themselves by having to stand on the roof. They were able to utilise hand lines from the crane cage, and also direct aerial monitors.

3.27 During the day efforts were made to reduce resources on the fireground, but hot spots were proving difficult to extinguish, especially around the perimeter of the roof. There was still a lot of smoke impacting firefighting efforts and causing concern in and around the Convention Centre. One of the issues emerging was the quantities of water from firefighting that had accumulated in the basement areas. Discussions were held with Fletchers about possible strategies to remove cars from the basement car park but it was decided this would be logistically too difficult. Fletchers decided they could bring in large portable pumps to attempt to drain the basement. In the end this was not able to be accomplished, partly due to the volume of water that was contaminated due to being mixed with oil and water from vehicles, and other contamination from the fire. There was no way to contain the water if it was pumped out, and Auckland Watercare did not want it going into the storm water system, nor was it appropriate to pump it into the harbour.

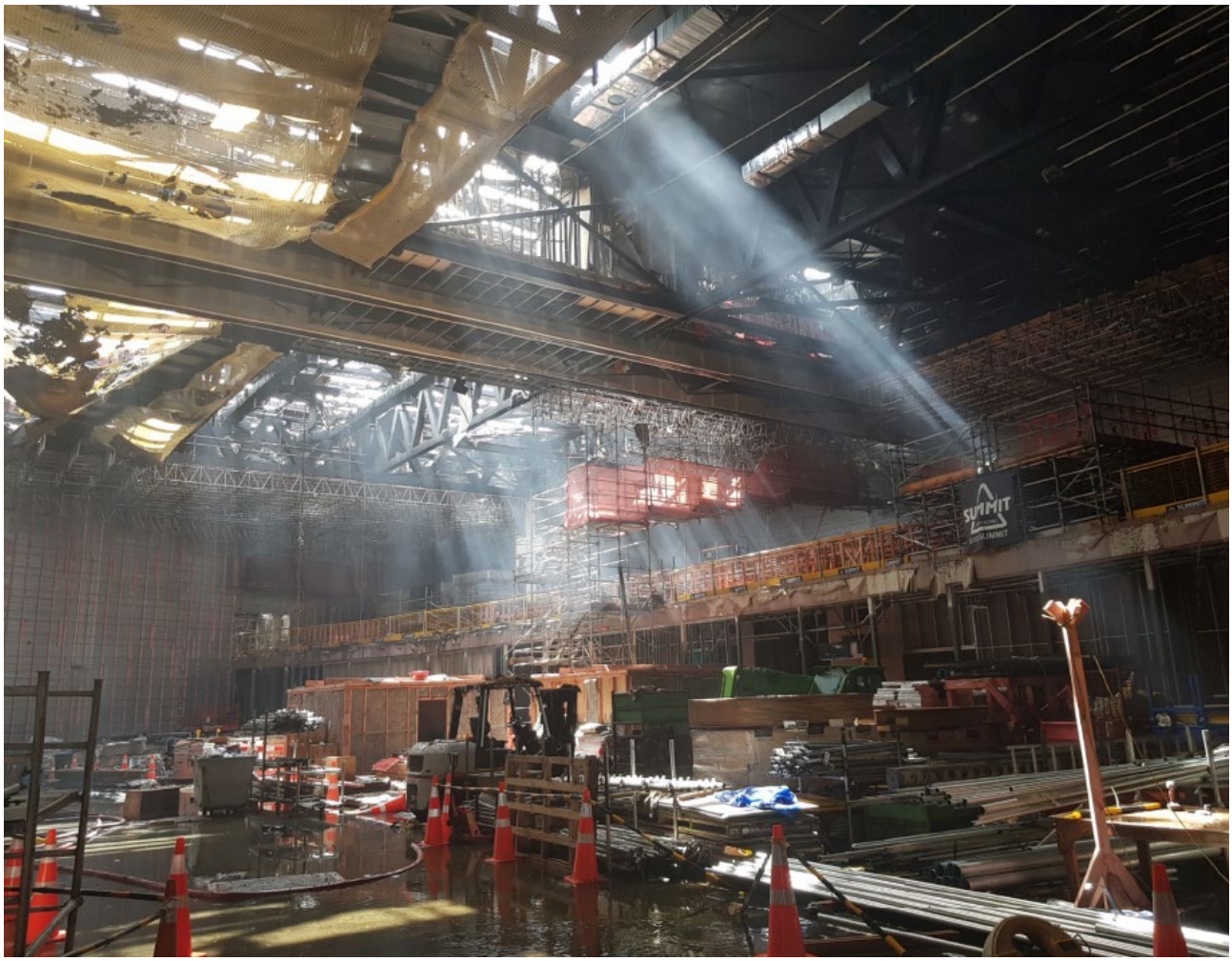
3.28 Around 14:30 hours there was a significant flare up of the fire and aerial monitors were utilised to extinguish it. Through drone footage the IC observed firefighters on the roof and ordered them off immediately. At this time there were still significant resources at the incident including 12 pumps, three Type 4 aerials and two Type 5 aerials, along with three cranes brought in by Fletchers.

25 OCTOBER 2019

3.29 By Friday 25 October the Recovery Team was well established with a solid work plan and having established solid stakeholder networks. They established a strong link with the IMT which proved valuable in quickly ensuring key issues were identified to the IC. For example, on the 25 October the BECA engineering team advised that they no longer had confidence in the stability of the glass facades on Hobson and Nelson streets. This information was quickly relayed to the IC who ensured the streets were cordoned and the hazard noted on the incident hazard board for future ICs.

3.30 The recovery and investigation teams moved to space provide by Fletchers and began establishing key relationships that would continue throughout the incident. They also engaged with the Public Information Management (PIM team) to ensure the messaging that was going across the various media platforms was correct.

3.31 By this time firefighting effort was focussed on extinguishing hot spots using the cranes to give firefighters safe access to the roof.



Auditorium with fire damage to roof. Credit: Fire and Emergency New Zealand.

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3.32 Efforts to extinguish hot spots continued for the next few days, with changing wind direction creating new flare ups just as firefighters thought they had that area extinguished. Tactics continued the use of aerial monitors and low pressure deliveries, as well as the cranes brought to the site to assist firefighting operations. A crew rotation was developed so fire crews spent around three hours at the site before being relieved back to normal duties. From this time IC responsibility was handled by SSOs.

3.33 The recovery plan had a key objective to ensure that all the arterial routes impacted by the fire could be opened for normal movement around the city from the end of Labour Day which fell on 29 October. This was a significant pressure point for the Auckland Transport Authority who wished to open roads for normal business operations on Tuesday 30 October. This target was achieved with all roads being able to be opened albeit with some lane restrictions to allow fire crews to operate safely. There was also a message promulgated through the media avenues to ensure the Auckland public knew that most of the retail facilities in the CBD would be operating over the Labour weekend to ensure pressure was eased on businesses significantly impacted by closures and restrictions due to the fire.

3.34 The recovery team met on 31 October to work through a comprehensive handover plan to give the site back to Fletchers. This included a full briefing with Fletchers management that listed all significant hazards Fire and Emergency New Zealand had identified on the site. The handover was done on Friday 1 November with the Auckland Mayor being briefed first so he was aware of what was planned. A stop message was transmitted from the incident ground on Friday 1 November at 16:56 hours.

Figure 1: Architectural schematic of Convention Centre. Credit: Fletcher Construction.

BUILDING/SITE DESCRIPTION

3.35 The New Zealand International Convention Centre is a major infrastructure project adjacent to the SkyCity Casino. It is intended to provide a national world class convention centre facility to host national and international conferences. It was due to be completed in time for the international APEC conference that is being hosted by New Zealand in 2021.

3.36 It is centrally located in the Auckland CBD occupying an entire city block with four major arterial roads (Wellesley, Nelson, Victoria and Hobson streets) that border it. The building comprises a 32,000 square metre Convention Centre with an adjoining 300-room hotel being built concurrently. The building is a unique construction design with a large auditorium which the roof on fire covered.

3.37 The structure is seven levels above ground and has four basement levels for car parking. The auditorium is on level 5 with the main roof on fire designated by Fletchers as level 7. The auditorium has a height from the solid concrete floor to the roof of approximately 12 metres. The size and spans involved required very large internal steel trusses and a roof designed to ensure high quality acoustics inside the auditorium. It was the construction design and materials used to build the roof that contributed to the major challenges for firefighting operations.

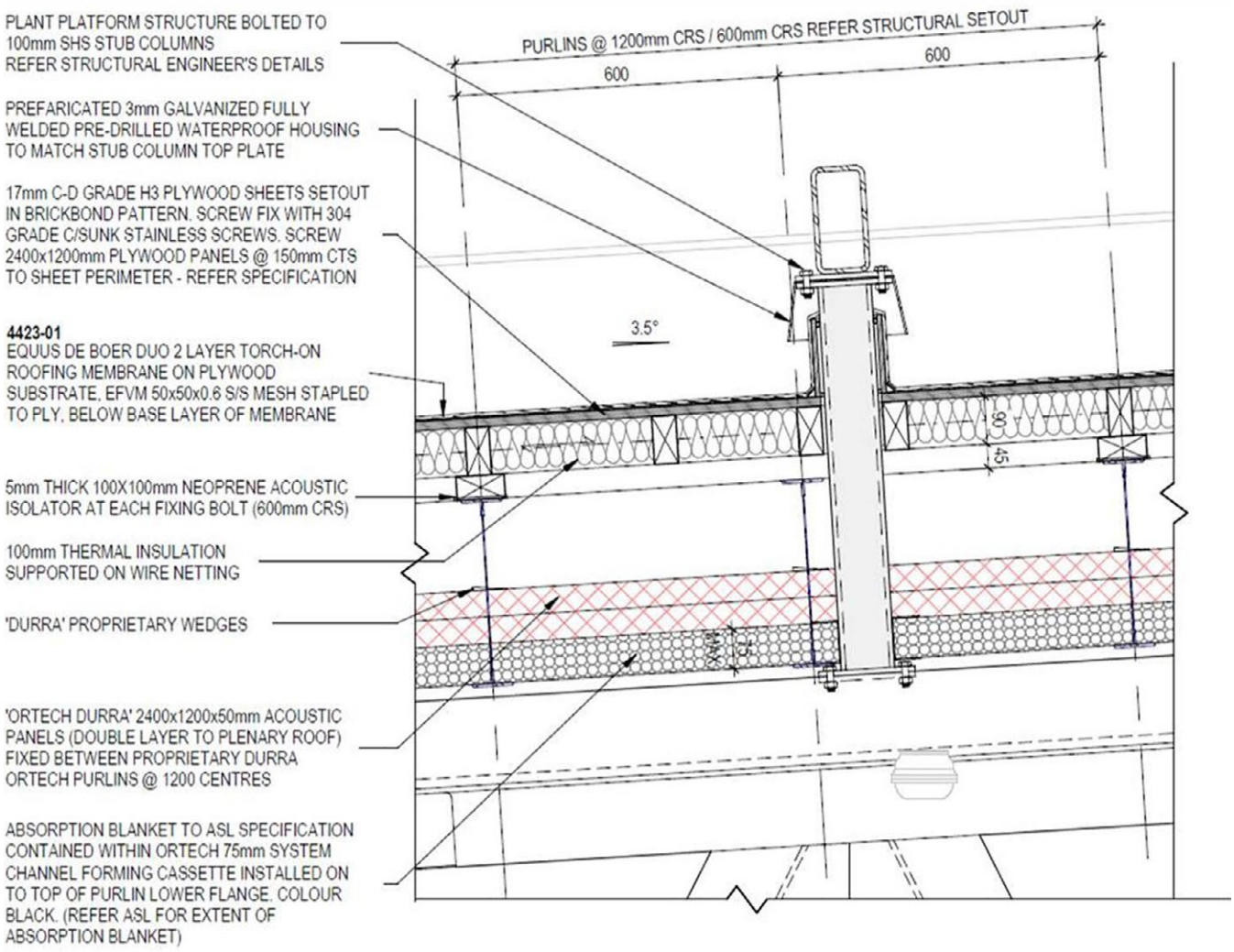


Figure 2: Side elevation of building materials and construction method of roof. Credit: Fletcher Construction.

Fuel factors

3.38 The fuels burning in the fire were all products used in the construction of the roof. The skeleton of the roof had thousands of metres of high-grade timber to support the top layer of the roof. The roof was termed a 'non-walk on roof' that was engineered to carry a load not exceeding 75 kilograms per square metre.

3.39 The weather seal was a two-layer rubber membrane on plywood substrate. The plywood had a 50mm by 50mm stainless steel mesh stapled to it that the membrane lay on. Under this lay 100mm of thermal insulation supported on wire netting. This lay on hundreds of large joists packed with a compressed straw-like product to add further insulation properties. Below this again were acoustic panels on top of an absorption blanket.

3.40 The complex roof construction made it impossible for the Fire and Emergency New Zealand tools available to effectively cut through the roof to try to create a fire break. While it may have been possible to breach the roof using the tools and technical expertise available to Fletchers staff, not only was that deemed impractical for safety reasons, but it is doubtful that it would have been possible to apply extinguishing media directly onto the fire given the complexity of the roof construction.

4. DISCUSSION AND RECOMMENDATIONS

4.1 In this section of our report, we discuss each of the terms of reference that the Review worked to and make recommendations where we consider it appropriate.

4.2 In a number of cases, we have made observations on issues that we have not considered significant enough to warrant a recommendation. We encourage Fire and Emergency New Zealand to take these observations into account as far as they can, along with other actions they may take in response to this report or more generally in the course of standard doctrine review cycles.

4.3 Where we have discussed possible improvements to future operations, these are not necessarily intended as criticisms of the way the fire was managed. Few reviews of fire and emergency incidents, working with the benefit of hindsight, would not identify lessons for the future, and this is one of the main reasons to carry out reviews of this nature. Our comments and recommendations should therefore be read in the spirit that they are intended, which is to support continuous improvement of the delivery of fire and emergency services in New Zealand and elsewhere.

TOR 1: PRE-EVENT PLANNING

4.4
- Pre-event planning with respect to site visits, including:
  - fire engineering review documentation
  - operational assessment/planning
  - engagement with stakeholders involved in the design and construction of the complex with regard to active and passive firefighting equipment.
- Whether that activity was adequate.

Discussion

Site visits and familiarisation

4.5 Carrying out pre-incident planning and undertaking familiarisation visits to notable fire risks in their area has for a long time been understood as a key function for fire services, particularly those that operate in the built environment. Inadequate pre-incident planning and familiarisation has been cited in a number of overseas inquiries and reviews[1] as being a contributory factor to bad outcomes in significant structure fires. Fire crews who have good access to plans of buildings, understand where fire services such as hydrants and boost points are located, and have visited premises to familiarise themselves with their layout, will have an advantage when attending a fire at the premises.

4.6 Set against that is the ever-increasing number of significant risks in the built environment, as cities grow and develop. Auckland is like most other modern cities in the amount of development that has taken place in recent years; of high-rise buildings, underground construction, and new and complex buildings such as the NZICC. This poses an inevitable challenge to the concept that operational crews should try to visit and become familiar with all significant risks in their area.

4.7 The NZICC was understood by Fire and Emergency New Zealand officers in Auckland to represent a new and significant risk. Operational crews had already visited the lower (car park) levels of the NZICC when the building's fire protection systems were commissioned at those levels. However, because the building was under construction, was constantly changing, and was effectively a construction site, it was not realistic to expect that Fire and Emergency New Zealand crews could develop a working familiarity with the building as a whole. The complexity of the building and its construction has already been explained in part 3 of this report. Owing to the ongoing construction works, the Review was advised by Fletchers that anything learned during a familiarisation visit would have been out of date within three months.

Operational planning

4.8 Fire and Emergency New Zealand has policies and standards around operational planning, requiring Area Managers/Principal Rural Fire Officers to collaborate to develop and register a local procedure to manage the workflow, timing and logistics of operational planning, over a five-year review cycle. The supporting doctrine sets out criteria for process, risk assessment, and creation of site reports and tactical plans.

1 *Report on the fire at Atherstone on Stour 2 November 2007*, Warwickshire County Council, 2014
Letter to London Fire Commissioner pursuant to rule 43 of the Coroner's Rules, Her Honour Frances Kirkham CBE, 28 March 2013

4.9 In relation to the NZICC building, we have noted above that there do not appear to us to have been any steps that should have been taken by Fire and Emergency New Zealand that were not, in fact, taken. We do not consider that operational planning requirements can be realistically applied to buildings that are under construction and constantly changing, and Fletchers made the point to the Review that if plans had been prepared they would soon have been out of date.

4.10 It was not within the scope of this Review to audit general compliance with Fire and Emergency New Zealand operational planning doctrine. In speaking to local commanders, a number of them noted the practical challenges with applying this doctrine, given the number of construction projects in the city and the rapidity of changes to buildings under construction or renovation.

4.11 While there is no direct link to the circumstances of the NZICC fire, we consider that it would be beneficial for Fire and Emergency New Zealand to carry out some work to assess whether current operational planning doctrine is capable of being complied with in rapidly changing urban environments. Depending on the outcome of that consideration, consideration could be given to providing further guidance on how operational planning policies should be applied in that environment, and how the risks posed by a rapidly-changing built environment from an operational planning perspective could be mitigated.

Fire engineering

4.12 Fire engineering refers to the technical aspects of a building's design and construction that impact on its resistance to fire, and how people can be kept safe and the fire suppressed if a fire does break out. It involves consideration of both passive design of the building and its construction to minimise the risk from fire, and active systems installed in the building to manage fire.

4.13 All jurisdictions including New Zealand have building codes that cover a broad range of engineering, design and construction issues with the aim of making new buildings safe and fit for purpose. In New Zealand as in many other places, fire services are directly engaged in building code issues as they have a role to assess plans for new buildings to check that they will be in compliance with relevant codes and will overall be safe. This is typically managed in fire engineering departments staffed by expert qualified engineers, and is not a function carried out by operational firefighters.

4.14 We note that the Fire and Emergency New Zealand fire engineers have developed The Fire and Emergency New Zealand Designers' Guide to Firefighting Operations, to provide help to ensure building designs comply with the New Zealand Building Code. This is a sound initiative aimed at promoting risk reduction and increasing building safety across New Zealand. The Guide is currently still in draft form and we encourage Fire and Emergency New Zealand to complete work on this as soon as possible.

4.15 The Fire Engineering Brief (FEB) process is a non-mandatory exercise that allows the fire engineer working with a building design to consult early with the key stakeholders in order to gain in-principle agreement over key design considerations. Although it is not a legal requirement, it is strongly encouraged and generally considered good practice. It is part of the design process outlined in the International Fire Engineering Guidelines which are endorsed by New Zealand. The basic idea is that the overall methodology and specific parameters are discussed and agreed in advance so the designer can carry out modelling and assessments as required with a degree of certainty that the basis of said modelling and assessment is sound and will not be challenged at consent stage.

4.16 Usually, FEB discussions also cover operational considerations including attendance point, alarm panel and sprinkler/hydrant inlet locations, hose run distance, provisions for internal access and so on. For these topics, although the Fire Engineering Unit is usually the primary point of contact and coordinates the response, they would work closely with Area operational staff to provide their input and considerations.

4.17 For the NZICC building, there was extensive FEB consultation starting in 2014 and lasting until around 2017. The focus on this consultation, however, was very much on the final design, i.e. those provisions that were going to be included in the completed building. This covered both the fire engineering aspects of the design including assessment of compliance with the Building Code for occupant egress, fire separation from other buildings, and operational requirements including location of firefighting facilities and internal access into the building. Items such as the location of the primary attendance point and fire alarm panel were agreed. It was also agreed that the building would be provided with a hydrant system with numerous outlets in protected paths (stairs).

4.18 The FEB discussions did not include the construction stages. NZS 4510 (hydrant standard) requires the hydrant system to be gradually commissioned during construction.

4.19 We would observe that, on the information available to us, all necessary consents had been obtained for the NZICC project including the requisite fire engineering consideration by Fire and Emergency New Zealand. There were no identified gaps in the fire engineering considerations for this building, and no suggestion that engagement had been lacking with the design and construction phases of the project.

Firefighter access to operational risk information

4.20 Operational firefighters are expected to have sufficient knowledge of building construction and codes to enable them to understand how a building will behave in the event of a fire, and how they can use both passive and active fire systems in the building to assist them to manage any fire that occurs. For example, firefighters are expected to be able to read building plans that demonstrate the fire protection systems in place, and interpret them to support their activities.

4.21 It was clear to us, however, that risk management both for the NZICC and for other major construction projects in Auckland poses a major challenge for Fire and Emergency New Zealand. There are issues both with simply keeping up with the size and pace of development in terms of understanding from an operational point of view, what new risks are arising and how they can best be managed; and also from a practical point of view, of having available materials such as drawings and plans to allow for most effective response.

4.22 We were told about a project currently underway in Fire and Emergency New Zealand (the 'Mobility' project) to provide mobile tablets on fire appliances, which will allow firefighters to quickly access relevant plans and information for premises they attend. Solutions such as this are key to modern fire services being able to keep pace with the amount of development and the number of high-risk premises they now have to manage, and we hope that the Mobility project will soon reach its potential in providing that support.

Predetermined attendance

4.23 Predetermined attendance (PDA) is the way in which resources are allocated by fire control in response to a fire call, in a consistent fashion and with resources allocated to risk. Auckland is divided into zones and each zone has a default response/PDA. That is overlaid by special response zones (SRZ) for areas/sites of higher risk that need a greater weight of response. There are currently 240 SRZs across the three Auckland areas, with more created when required in light of operational planning activities (e.g. when a site assessment identifies changed circumstances or risks).

4.24 The NZICC was not in an SRZ, but had a PDA of three pumps with the Auckland City aerial to be used as part of that if one of the standard pumps was not available. The PDA then provided for aerial appliances to be dispatched as part of the second, third and fourth alarms. In the event, owing to the appliances on the PDA for the NZICC having been responded to another call, six appliances ended up responding to the fire within a short space of time. Our understanding is that the NZICC was not in an SRZ because it was still under construction. Having in mind the potential complexity and risk of fighting fires in buildings under construction, we suggest that Fire and Emergency New Zealand should review what the trigger points are for the consideration of SRZs relating to buildings under construction so that predetermined attendances can be assigned based on the risk posed by particular sites.

Conclusion

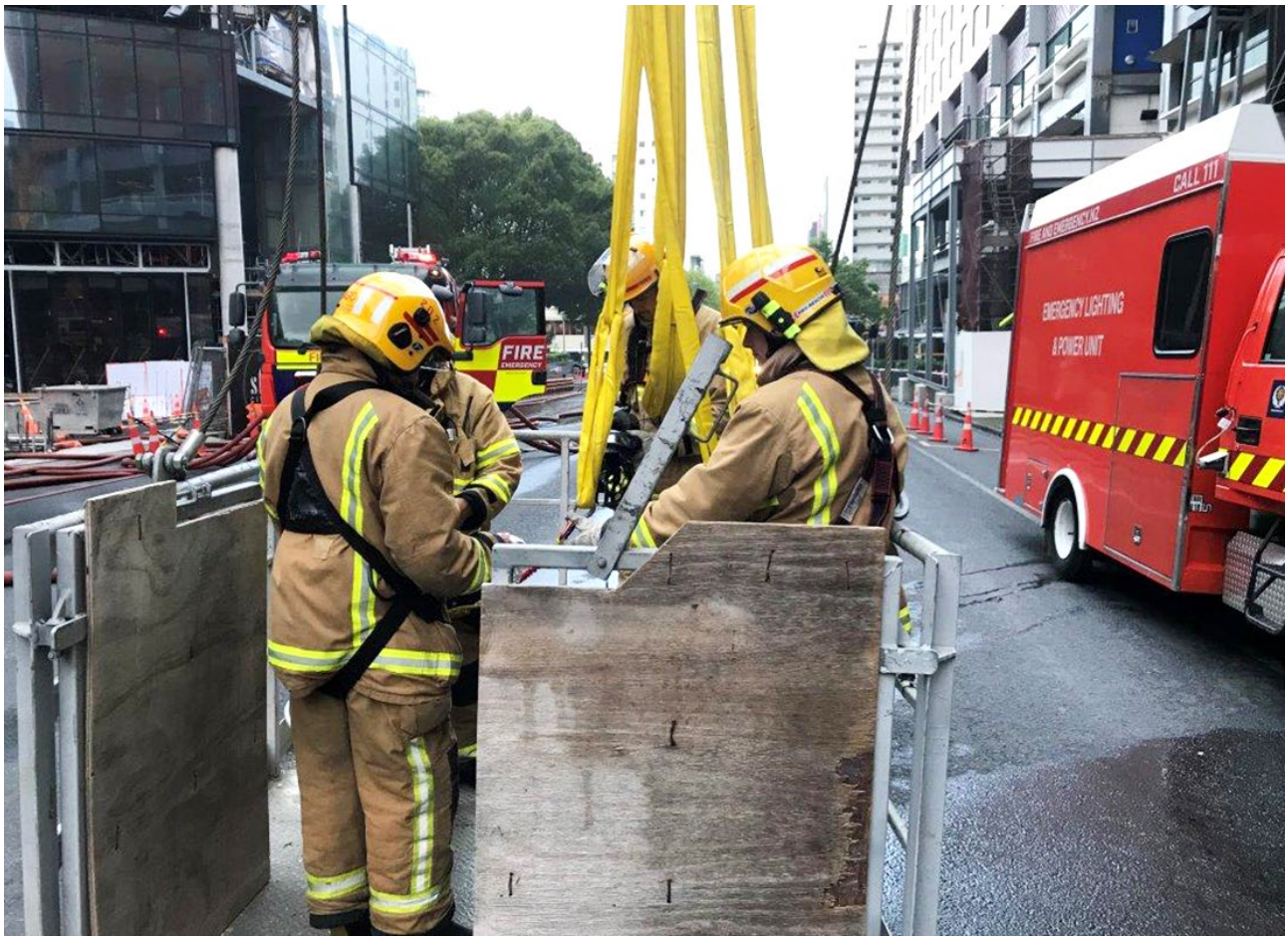
4.25 The Review considers that pre-incident planning and risk management, as they relate specifically to the NZICC fire, were appropriate in the context of current regulatory requirements and Fire and Emergency New Zealand policies. This takes into account our finding that site familiarisation visits had been paid to the NZICC while under construction, and that it would not have been reasonable to expect a pre-incident plan to be prepared for what was a rapidly changing construction site.

4.26 The context of the NZICC fire, and those conclusions we have reached, does in our view raise a significant issue around pre-event planning which applies not just to Fire and Emergency New Zealand but to all fire and rescue services that operate in the high-density urban environment. Expectations that operational crews will have the time or capacity to personally familiarise themselves with all high-risk buildings in their area, including buildings under construction, and create pre-incident plans to guide emergency response to buildings under construction, renovation or demolition, are contestable given the pace and complexity of contemporary urban development.

4.27 This means that other solutions, such as better access to plans created by others (the Mobility project being a good example) need to be implemented. Also important is a focus on general education of firefighters and officers in building construction issues – if they cannot be personally familiar with every building in their area, they should at least be familiar with the general issues that they will need to confront in managing fire in these environments, including buildings under construction. In our view, it would be timely for Fire and Emergency New Zealand to review its strategies and approaches in this area.

Recommendation 1

Fire and Emergency New Zealand should review its strategies to understand and manage high-risk buildings, including buildings under construction. These strategies should take into account the practicality of physically inspecting and keeping up-to-date with individual buildings, and provide solutions to support operational firefighters effectively to manage fire in the complex built environment where they may not be personally familiar with individual buildings.



Credit: John Waldow.

TOR 2: POLICIES AND PROCEDURES

Review of Fire and Emergency New Zealand's policies and procedures relevant to the incident to determine whether they were adhered to, and to identify any gaps in those policies and procedures.

Discussion

4.28 The Review team did not interpret this term of reference as calling for an audit of all Fire and Emergency New Zealand operational policies and procedures in order to try to find gaps or instances of non-compliance. Instead, we approached this part of the Review as posing two questions:

- Were there any notable instances where Fire and Emergency New Zealand policies and procedures were not complied with during operations at the NZICC fire?
- Did a consideration of operations at the NZICC fire, coupled with a discussion with relevant personnel as to why things were done, or not done, in a particular way, indicate that there was no policy or procedure that covered a particular situation where one might have been helpful?

4.29 Those questions are relevant to each of the other eight terms of reference which this Review considers. We could potentially determine in relation to any of the terms of reference that there was a failure to follow policy, or that development of a new policy might be beneficial in managing future incidents. In order to avoid duplication of discussion, we have considered those factors throughout the report and we comment on them where they arise in relation to any of the other terms of reference.

4.30 We have proceeded on the basis that it is highly likely that we would have been told, in our discussions with people involved in the NZICC incident, of any significant breaches of policy and procedure that they were aware of and indeed a number of issues of that nature were brought to our attention. Our overall impression, having spoken with a number of firefighters, station officers and executive officers who were involved in operations, was that compliance with policies and procedures was good. Our narrative focuses on the issues that were raised with us, and we conclude that the fact that we did not hear evidence of non-compliance in other areas is a good indication that the relevant organisational policies and procedures were being applied appropriately.

4.31 In order to address the intent of this term of reference we have collected below some comments about compliance with existing policies and procedures, or development of new ones. The reader will need to refer to the more detailed discussion under the other terms of reference for this Review to understand the rationale for each of these comments.

- We consider that there may be gaps in procedures, or alternatively in training on and application of procedures, in relation to water management in complex urban environments.
- We heard some evidence that officers placed in charge of sectors were either not trained, or not comfortable in the application of their training, in the responsibilities of sector commanders and to that extent, procedures may not have been followed on occasion.
- We identified examples of situations where crew accountability (knowledge of where crews were and what they were doing) was lacking. This indicates a failure to follow procedures in relation to accountability and a possible need for reinforcement in training.
- We think that the finalisation and implementation of a replacement aerial appliance strategy is overdue and this amounts to a gap in up-to-date policy.
- We heard evidence that some volunteer crews were not called upon to participate in operations at the NZICC fire because they lacked BA telemetry sets, which we are advised by Fire and Emergency New Zealand was a failure to follow procedure; in other words, that should not have disqualified those crews from attending.
- We think that there is a gap in operational doctrine focused on the early identification of incidents that are likely to develop into complex or lengthy operations, and relevant procedures should be developed.
- We consider that there is a gap in operational procedures to require that all major incidents, regardless of whether they are in the urban or rural environment, should be managed by a developed IMT operating from an appropriate incident command facility, and these procedures should be developed.
- We consider that there is a gap in policies around responsibility for atmospheric monitoring related to significant fires; and while this may not be a Fire and Emergency New Zealand responsibility, there should be clear policies and procedures about who is responsible and how that capability is to be deployed at fires.
- There is a gap in procedures preventing staff who work in the RCC having access to HR systems to support their organisation of reliefs, as this is currently limited to operational commanders.
- There is a need to develop policy to clarify the relationship between IMT, RCC and NCC.
- There is a gap in procedures to establish trigger points for the deployment of PIM and media staff, and provide them with all the tools they require e.g. corporate clothing, ID, training in fireground safety.
- Policies and procedures around shift lengths/rotations for firefighters and command/IMT staff appear to lead to differences in working patterns at incidents that are not objectively justified. While this is a comment on the content of the policies rather than a finding that they do not exist, we consider that this is a 'gap' within the broad meaning of this term of reference.
- We heard consistent evidence that firefighter fatigue was not managed well in the early shifts of the incident. This demonstrates either a failure to follow policy on fatigue management, or a gap in clear policies and procedures for managers to follow – or more probably a blend of the two.
- We consider that policies and procedures should be developed to formalise the response of supporting welfare functions and their utilisation as a formal Rehabilitation Sector at an incident. We encountered some evidence of existing policies and procedures on provision of facilities for firefighters not being followed, and we think that the development of new procedures clearly setting out responsibilities in this area would mitigate the risk of the same thing happening again.
- The appointment of a Recovery Manager was a first for an urban fire incident in NZ and formal policies and procedures should be developed to provide for the triggers for appointment of that role, and the responsibilities of the person appointed.
- We consider that the lack of a pro forma site handover form that can be used for any incident to formally hand back a property to an owner, occupant or the police amounts to a gap in procedures and a form should be developed.
- Iwi must be engaged by Fire and Emergency New Zealand incident controllers in the management of any future major incident with community or environmental impacts; the fact that this did not happen in the case of the NZICC fire may reflect a failure to apply existing policies and procedures but in any event those procedures should be highlighted for incident managers.

TOR 3: FIREFIGHTING OPERATIONS AND PERFORMANCE ON THE GROUND

4.32 Firefighting operations and performance on the ground, including:

- the initial and extended responses
- the attraction, deployment and support of surge capacity
- the effectiveness of handovers
- the use and effectiveness of aerial appliances and equipment
- Fire and Emergency New Zealand's capability and capacity to respond to other incidents.

Discussion

4.33 An initial, and important, point to consider is whether Fire and Emergency New Zealand could have managed fire suppression operations differently to avoid the loss that occurred.

Roof construction

4.34 We consider that the roof's unique construction, as discussed in section 3 of this report, imposed limits on strategies and tactics, meaning that ultimately there were no realistic options available to Fire and Emergency New Zealand to suppress this fire so as to reduce the loss significantly below what was incurred.

4.35 The decision to withdraw crews from the roof was taken on expert engineering advice and incident controllers had no choice but to follow it. The engineers who designed and oversaw the roof's construction advised the IMT that there was a risk that the roof was compromised and could not be guaranteed to take a firefighter's weight. This advice was significant as it meant that firefighters could not safely attack the fire directly. The IMT accepted this advice, recognised what it meant for the firefighting operation, and ordered all personnel off the roof.

4.36 At this stage, the firefighters on the roof were fully committed to extinguishing the fire. They had recognised that the roof structure was preventing the water from accessing the fire and had started cutting a trench through the main section of the roof to attempt to establish a cut-off point and stop the fire from spreading further. Based on the information provided to the Review team by firefighters who had been working on the roof, they had a belief that they were close to gaining the advantage over the fire and if they had been able to continue their operations, they felt that they may have been able to stop its spread and then extinguish the fire.

4.37 The crews on the roof were unaware of the roof's load limits, and that the fire could seriously compromise its integrity. It appeared strong enough to them and there was no sign of compromise. Fletcher Construction Ltd advised the Review team that it was a 'non-walk on roof', and that their contractors BECA had carefully GPS located all construction items placed on the roof so that they rested on strong points. The engineers advising on the structural integrity of the roof were also concerned about water getting into the straw insulation layer and being absorbed, increasing loads and putting the roof structure at more risk.

4.38 The conclusion of the Review is that once the engineering advice to vacate the roof was given, it had to be accepted. Once crews were withdrawn from the roof then in our view the roof was inevitably lost; the fact is, however, that the Review saw no evidence to show that the roof would have been saved even if crews had remained. The potential danger to crews working on the roof when an uncontrolled fire was burning within the roof structure itself is obvious, and the risks involved in keeping crews on the roof in an uncertain hope of being able to control the fire would have been unacceptable. We would have been critical of any commander who failed to follow safety-related engineering advice of this nature.

Incident scale

4.39 The initial response was appropriate and was able to be rapidly escalated. It was a fortunate circumstance that a number of senior officers were available in the city as the incident occurred during business hours, and were able to respond rapidly to the scene.

4.40 From the outset, the NZICC fire was a large and significant incident. Numerous 111 calls reported large volumes of black smoke, the responding crews requested a third alarm en route and the incident was promptly escalated up to a sixth alarm once executive officers arrived on scene. All attending personnel recognised the incident's scale and significance from a very early stage, and resourced the incident appropriately.

Incident duration

4.41 We gained the impression that almost all personnel attending the scene, including commanders, initially thought that the fire would last 24 hours at the most. Their assessment was based on their experience and a best estimate of what would happen. However, the incident's actual duration clearly illustrates that an urban fire can become a multi-day emergency affecting large sections of the public, especially when it occurs in a complex built environment such as Auckland's CBD. We feel that this provides useful lessons for managing similar incidents in the future.

4.42 The initial underestimation of the incident's potential length affected how Fire and Emergency New Zealand managed the incident in its early stages. The IMT Planning function had a time horizon of hours rather than days. This meant it focused entirely on extinguishing the fire instead of planning for a multi-day event from early on, and taking into account the impact that would have on the surrounding area.

4.43 Based on the information presented to the Review team, attending personnel continued to underestimate the fire's likely duration for multiple shifts. Firefighters and officers starting their shifts believed that they would be able to extinguish the fire and start to conclude the incident on their shift. Perceptions only changed a few days into the incident, and personnel began to think of it as a long-duration event.

4.44 This meant that the IMT continued to operate out of the Command Unit throughout the incident. This was appropriate for the first 12 hours or so, and the Command Unit provided good service and support. However, the IMT would have been able to better operate and coordinate the incident from a larger purpose-built emergency operations centre (EOC) that accommodated extra staff and resources. The Command Unit could still have been used as a forward command point (FCP) at the scene, but without having to accommodate all the functional teams of a full IMT. A larger EOC would have been a better option for liaising with the many agencies and stakeholders without disrupting the work of the IMT, and instead of meeting outside on the street. An EOC could also have accommodated liaison officers from other agencies throughout the incident. This would have strengthened relationships, improved information flows between agencies and improved understanding of the incident.

4.45 There does not appear to be any doctrine for managing large incidents to guide executive officers on:

- recognising that an incident is likely to be a long-duration incident
- moving the IMT's operations from the Command Unit on the scene to a remote designated EOC.

4.46 Long incidents are rare in urban firefighting; executive officers would not, based on their experience to date, have expected an incident to last so long, and the lack of doctrine may be a reflection of the unusual nature of incidents of this scale in the urban environment. We suggest that Fire and Emergency New Zealand should review its operational doctrine to provide guidance on identifying and managing long incidents, and establishing IMTs operating out of designated EOCs for all major incidents regardless of hazard type.

Recommendation 2

Fire and Emergency New Zealand should review its operational doctrine to provide guidance to incident controllers about identifying incidents that are likely to develop into long-duration events, and setting up appropriate command facilities in an EOC to manage all major incidents, of whatever hazard type, from an EOC.

Getting water to the roof

4.47 The building's complexity made it difficult to get water to the roof. There was no hydrant supply on the upper floors of the building, because construction had not yet reached the point where these hydrants were commissioned. This hampered initial firefighting efforts. The highest-level hydrant riser was reportedly on level two, which was below street level. This meant that the first arriving crews had to run over 20 lengths of 70mm hose up the stairway to the roof. This took a very long time, and the friction loss from so many hose lengths reduced water pressure in the hose lines and made firefighting difficult – crews on the roof and other upper levels were complaining about the poor water pressure. When more firefighting streams were needed on the roof, further hose lines were run out, each requiring similar lengths of hose.

4.48 The extensive hose lay for the first arriving crew is understandable, given their limited understanding of the building and the fire conditions. However, subsequent crews and senior commanders could have more thoroughly considered this fundamental practical firefighting aspect.

4.49 Other options may have been:

- Run lengths of 90mm hose down the external wall of the building, significantly reducing the number of lengths of hose used to get water to the roof. This was eventually done, which led to a better water supply being established.
- Use an aerial appliance as an external waterway, either its plumbed waterway or by running hose down the ladder bank.

4.50 This highlights the importance of aerial appliances when fighting fires at heights other than their role as an elevated platform or ladder access; we discuss the aerial fleet in more detail later in this report.

4.51 The Review is reluctant to second-guess decisions that were made by officers at the time based on the information known to them and the resources they had to work with, and we have paused to reflect on this issue only because the known hydraulic disadvantages in using long hoselays – which were demonstrated by the inadequate water flow that ensued – led us to wonder what options analysis and alternative strategies were considered in reaching this decision. A number of people we spoke to who had had the opportunity to think about this in hindsight recognised that other solutions would have been better.

4.52 We wish to clarify that none of our comments about water management is intended to suggest that these issues contributed to the ultimate outcome of the fire, which was dictated by the roof construction and the imperative to withdraw crews from the roof on engineering advice.

4.53 We suggest that Fire and Emergency New Zealand should review their training and exercising protocols – particularly for stations that regularly operate in a complex urban environment – to ensure that they incorporate principles of water supply and address unusual and complex problems to reach effective solutions.

Command training

4.54 Attending personnel developed an appropriate command structure and tactics to manage the situation. We encountered some evidence, however, that officers were being placed in command positions, such as sector commander, when either they had not had specific training in how to carry out that role, or they had not had the opportunity to develop and maintain those skills.

4.55 Fire and Emergency New Zealand provides command training and assessment to personnel for promotion to Station Officer (Operational) and Senior Station Officer, at levels 1 and 2. This training is accompanied by assessment and ensures that officers are competent to carry out tactical command at those levels. There are three notional levels of command competence above that, but these are not reflected in further training courses and formal assessment.

4.56 Particularly for command at an incident the size of the NZICC fire, advanced practical command skills are required, which include not only the skillsets required for a more strategic command focus, but also skillsets for commanding a sector or an operations function at a large incident. The knowledge required at this level also includes knowledge of incident control systems and the operation of incident management teams out of fixed facilities.

4.57 We have been advised that command training for senior station officers includes comprehensive instruction and competency assessment on fireground incident management, and so officers at SSO level and above should be able competently to manage the responsibilities of sector command at a major incident. The Review identified specific evidence that on occasions there were issues with sector command on the NZICC fireground: specifically shortcomings in fatigue and welfare management, which is a sector command responsibility, and on one occasion at least, shortcomings in personnel management and accountability.

4.58 In our view it would be useful for Fire and Emergency New Zealand, firstly, to reinforce with incident controllers that individuals should only be given sector command responsibility if they have the appropriate training and competency assessment; and secondly, to check that sufficient skills maintenance opportunities are provided to qualified staff, using simulation solutions where necessary, to ensure that they are able to deploy their skills effectively at low frequency, high impact incidents.

Recommendation 3

Fire and Emergency New Zealand should reinforce with incident controllers that individuals should only be given sector command responsibility if they have the appropriate training and competency assessment; and provide sufficient skills maintenance opportunities to qualified staff to ensure that they are able to deploy their skills effectively at low frequency, high impact incidents.

Accountability

4.59 Accountability, in other words knowledge of where everyone was on the fireground and what they were tasked with doing, was a significant challenge at this incident. Accountability is not necessarily in the hands of a single person, and may be achieved through chains of command, reporting lines, and physical and mechanical solutions such as breathing apparatus telemetry and tally boards. Accountability is nonetheless critical to firefighter safety, as if there is no good organisational awareness of where all firefighters are at a given time, it is impossible to be assured as to their safety, or to take appropriate actions if conditions at a particular location deteriorate.

4.60 Frequent comment was made to us by people we spoke with about the lack of a proper accountability system for crews. Some firefighters attempted to do this through breathing apparatus (BA) entry procedures, but these were not appropriate for this incident because the building's entry points were so far from any areas with atmospheres requiring the use of BA. This meant that BA entry control officers were deployed forward to where personnel might actually need to start up BA, leaving accountability on entry to the building unchecked.

4.61 One officer we spoke to became so concerned about accountability issues on his arrival, that he ordered all personnel out of the sector where he was in command for accountability checks to be made, before recommencing operations. While this was a correct action to take in the presence of significant concerns about accountability, it is an indication that procedures in place were not operating effectively. Knowing the whereabouts of all firefighters on the fireground has been called the holy grail of firefighter safety[2]. Until technological solutions are developed, we can only encourage repeated planning and exercises to ensure accountability at major incidents.

4.62 In Fire and Emergency New Zealand it is a recognised practice to assign officers from trucks to roles such as sector commander, separating them from their crews. This practice occurs in other services as well and is not inappropriate, but it makes accountability more difficult. Fire and Emergency New Zealand trains officers to maintain command and control of crews and accountability in such circumstances by assigning them to another officer or the command point, but it is important to ensure that this follows through to maintaining accountability in practice. Effective sector command training and skills maintenance, as discussed above, may help to improve accountability issues, as accountability of crews is a key function of command including at the sector level. Training should always emphasise that accountability is a joint responsibility, and firefighters are also responsible for remaining in communication with the chain of command.

Recommendation 4

Fire and Emergency New Zealand should reinforce current operational doctrine, training and exercises to ensure that crew accountability is placed front and centre of command considerations.

Surge capacity

4.63 By surge capacity, we are referring not to the ability to assign additional fire appliances to an incident from the immediate area, but to deal with heightened requirements for personnel caused by a long-duration incident with a need to rotate crews to allow for fatigue management in sustained operations. For many urban fire services, the initial recourse for surge capacity will be to recall off-duty firefighters to duty. Recall systems vary and this may be voluntary or compulsory. It is not, however, possible to undertake recall of firefighters who have been working their standard shifts and would therefore be in breach of fatigue management policies if recalled to duty. The point was put to us that surge capacity is seen as easier to come by in rural fires. However, we are not sure that the evidence bears that out – see for example the resourcing issues at the 2019 Pigeon Valley fire[3].

4.64 A significant challenge in the Auckland Region is that Fire and Emergency New Zealand relies on firefighters working overtime shifts to be able to meet its standard crewing requirements. This means that part of the workforce will be working overtime at any given moment and will so be unavailable for recall. If Auckland did not rely on overtime shifts for business as usual, recall and overtime would have provided a more robust surge capacity.

4.65 Fire and Emergency New Zealand could have looked for more specialist operators, e.g. for aerial appliances, from other parts of the country. Urban firefighters could also have been brought from elsewhere in the country, to ease the crewing problems being encountered in Auckland. We have not undertaken a detailed analysis of what might have been available, but of course to have taken firefighters out of other Regions would have reduced those Regions' capacity to manage their own business. Perhaps more significantly, the lack of recognition for the first shifts of this incident that it would last for several days meant that there would not have been any serious consideration of moving crews around New Zealand, which would have taken time to achieve when in the view of incident controllers the fire was likely to be resolved soon in any event.

2 *Wildfire Today* (www.wildfiretoday.com), Gabbert, 2013

3 *AFAC Independent Operational Review of the Tasman fires*, 2019

Credit: John Waldow.

4.66 Some volunteer brigades in the Greater Auckland area told us that they had not been called on to provide relief, partly because relief brigades need training to use telemetry BA sets. In an incident like this Fire and Emergency New Zealand needs to use all its resources, including volunteers. All brigades in the area with the skills and training should support the incident, and if there are identified gaps in brigade skills profiles that would disqualify them from providing surge capacity to a foreseeable event in their area, then these gaps should be filled with the provision of additional training as discussed below.

Aerial appliances

4.67 The availability and use of aerial appliances at this incident has been the source of much debate. The general consensus among people we spoke to is that without aerial appliances considerably larger than those that have been used in New Zealand up until now, the fire would have progressed in the same way.

4.68 At the time of the incident, there was only one aerial appliance in Auckland tall enough to reach the top of the building. This was the turntable ladder (TTL). This 30-metre ladder could only just reach the top of the building, but was not high enough to extend above the building.

4.69 The Communications Centre Supervisor from NorthCom sent an aerial appliance from Hamilton to support aerial operations. This was a Type 6 equivalent appliance, as it has a four-person cab, pump, and water tank, with a 22-metre reach. Given the significant travel time for this appliance, the decision to promptly respond this key resource was astute and showed commendable initiative.

4.70 It is important to note that while height is an obvious factor, the aerial appliance's horizontal reach is also key to its effectiveness. As the aerial appliances on scene at the NZICC were at their height limits, they could not reach over and work across the roof. Additional Type 4 aerial appliances from Auckland that were responded to the incident were not high enough to reach above the top of the building.

4.71 On the day of the NZICC fire, the Type 5 aerial appliance normally located at Parnell Fire Station was undergoing mechanical repairs or maintenance. Consequently, the only major aerial appliance available in Auckland was the TTL. The Type 6 aerial appliance normally located at Auckland City Central Fire Station was out of service due to chassis issues. This meant that the TTL, which is normally the reserve aerial appliance, was in continuous service and there was no other reserve appliance to backfill an aerial requiring mechanical repairs or maintenance or to provide surge capacity for significant incidents. When the size of the NZICC incident became apparent, mechanics expedited the return of the Type 5 into service so that it was available later in the afternoon of the first day of the fire.

4.72 The information gathered by the Review team indicates that due to the construction of the roof providing cavities for the fire to spread within the roof, and the rapid spread of the fire, a greater height and reach capability in the aerial fleet may not have significantly altered the outcome of the fire. The effectiveness of firefighting water was challenged as the fire was under the waterproof external layer of the roof which meant that in the early stages of the fire water was being deflected away from the fire by the roof functioning as per its design. An aerial appliance with great reach and height may have been able to better project water into the roof cavity and been more effective; however, the speed of the fire's development indicates that it is likely that the fire would have been significantly progressed into the roof cavities very quickly and would have been difficult to reach even for a larger aerial appliance.

4.73 The conclusion of the Review is that the outcome of the NZICC fire cannot be blamed on the nature of the Fire and Emergency New Zealand aerial fleet. However, the current fleet is based on a strategy developed in 2003. A review of that strategy is underway but has not yet been finalised, and we consider that it would be timely for Fire and Emergency New Zealand to complete and implement that updated strategy given the changes to the built environment in the country over the past 17 years.

4.74 When updating its aerial strategy, we would expect that Fire and Emergency New Zealand will consider technological advances that have made higher-reach appliances available without disproportionate increases in vehicle mass or size, making them more useful to fire services working in the urban environment where space to manoeuvre large vehicles can be at a premium. There is probably no justification for having the very largest appliances available globally in New Zealand. However, since New Zealand is on its own in terms of this capacity, Fire and Emergency New Zealand should consider the many options available and should not consider itself limited by the size of aerial appliances previously used.

4.75 It was apparent that there is a shortage of operators for aerial appliances in the Auckland area and possibly nationally. While the concurrent USAR exercise exacerbated this problem, the fact is that Auckland effectively ran out of aerial operators and individual operators had to work unacceptably long periods of time without relief. It is not for the Review to specify a number of operators that need to be trained, but we think that Fire and Emergency New Zealand should train more aerial operators and put them on the run in the next 12 months.

Recommendation 5

Fire and Emergency New Zealand should progress the review of its aerial appliance strategy to completion, to include the training of additional aerial appliance operators in the next 12 months.

Ability to manage a concurrent incident

4.76 When planning response capacity, any fire service will wish to consider not only what a reasonable worst-case scenario is for large incidents in its area, but what capacity it should retain to cope with a second large incident simultaneously. For example, the Scottish Fire and Rescue Service, in preparing for the 2014 Commonwealth Games, modelled its ability to respond to two 20 pump fires as well as carry out its obligations to keep the Games safe.[4] We accordingly considered Fire and Emergency New Zealand's capability to have responded to a second major incident during the NZICC fire.

4.77 There was a concurrent second alarm incident in the Auckland CBD that Fire and Emergency New Zealand attended while the NZICC fire was active. This was a fire in a highrise building. We heard a suggestion that volunteer brigades were used as part of that response when they did not have the required training for highrise operations. While career crews were present (and responsible for managing the response) the concern was expressed to us that it was a safety issue if crews without specialist highrise training were called to such an incident.

4.78 In our view this is a training issue, not an issue about whether crews were whole time or volunteer. With so many of Auckland's resources committed to the NZICC fire, it was inevitable that volunteer crews from further afield would be called in to provide additional capacity and to attend concurrent incidents. Any other large incident would have put significant stress on the system, and volunteer brigades would have provided a key part of the operational capacity required to manage it.

4.79 It has subsequently been suggested to us that the volunteer crew dispatched to the fire was adequately trained for the purpose. We do not think that it is necessary to resolve that as a factual issue, because it is not suggested that any safety incident did in fact occur, and the incident controller, who is responsible for tasking crews safely according to their capabilities, had the appropriate training to do so. We noted this, however, as a potential cultural issue within Fire and Emergency New Zealand where questions may be raised about the capability and training of volunteer crews to support major incidents in metro areas that they do not usually work in.

4 *Preparedness of the Scottish Fire and Rescue Service for the XX Commonwealth Games*, HM Fire Service Inspectorate, 2014

4.80 We agree that it is important that crews that may be dispatched to an incident should have the training and equipment to allow them to operate safely at it. Equally, crews should not be left idle because they do not have necessary training or equipment – we also heard that volunteer crews trained in the use of breathing apparatus were not called to the NZICC fire because they did not have telemetry breathing apparatus sets. While that has later been challenged as a valid reason for not calling those crews on, we are satisfied that it did happen, and potentially represents a disconnect between organisational intent and the policy applied at this incident.

4.81 In our view, all firefighting resources, whether career or volunteer, need to be understood as part of Fire and New Zealand's response capacity and capability to manage concurrent multiple incidents. Fire and Emergency New Zealand should provide clear direction to communications staff and commanders about the availability of these resources, and should also ensure that any specialist training required to equip brigades to respond to hazards in their area, or neighbouring areas, is provided to them.

Recommendation 6

Fire and Emergency New Zealand should provide clear direction to communications staff and commanders about the capability of Fire and Emergency New Zealand brigades in their area to respond to a range of hazards, and should also ensure that any specialist training required to equip brigades to respond to hazards in their area and neighbouring areas is provided to them.

TOR 4: ON THE GROUND COMMUNICATION WITH RESPONSE PARTNERS

4.82 On the ground communication, coordination and collaboration between Fire and Emergency New Zealand and other response partners such as:

- Auckland Emergency Management
- New Zealand Police
- MCDEM (now NEMA)
- Watercare
- Auckland Transport
- St John

with regard to the actions by Fire and Emergency New Zealand[5].

Discussion

4.83 Historically, the main activity of an urban fire and rescue service has been tactical firefighting in the built environment. Over the past 20 years, however, both in Australasia and further afield, a recognition has grown that broader emergency management activities are required by urban fire services, and others, to maintain community confidence and meet the objective of keeping the community safe.

4.84 This can only be done by collaboration between the various emergency management agencies involved; and a number of these partner agencies are specifically named in this term of reference. In the course of the Review we made contact with a number of these partner agencies, and had discussions with key agencies including Auckland Emergency Management, New Zealand Police, Auckland Transport and Fletchers (the project managers for the building) to gauge how they felt the liaison aspects of the incident had been managed by Fire and Emergency New Zealand.

4.85 It was clear to us, both from speaking to Fire and Emergency New Zealand personnel and partner agencies, that there was a recognition of the importance of liaison. All partner agencies reported that they were involved in liaison activities with Fire and Emergency New Zealand, and there were evidently close relationships forged, particularly with Fletchers.

Command structure and location

4.86 However, we gained the impression that the incident became too complex for the Auckland Command Unit as a command location. Although Fire and Emergency New Zealand activated the Regional Coordination Centre (RCC) (discussed later in this report) we think that the IMT should have been relocated to a fixed command facility once it became clear that the incident would not be resolved quickly – this would have been late in the afternoon of the first day, on a similar timeframe to that in which the RCC was set up.

5 It is out of scope for this Review to consider the perspective or actions of any other agency.

4.87 The IMT could have had representatives from all response partners embedded in it so that they could communicate more directly. Auckland Transport in particular felt that it was not appropriate to discuss complex issues about the transport security of the city via a field liaison officer attending at a Command Unit.

4.88 There are different ways of creating command structures like this, and these can operate within civil disaster arrangements or can be part of the agency incident management structure. For example, a recommendation could have been made by Fire and Emergency New Zealand to the Mayor of Auckland that the Mayor declare a state of local emergency, leading to the local CDEM group setting up a formal CIMS structure. In Victoria, Australia, doctrine requires an Incident Controller to set up a parallel Emergency Management Team (EMT) of key response partners that supports broader emergency management around the incident. Again, this would ideally be based in a permanent incident command/control/coordination centre, not a mobile unit. In the UK, under the Bronze-Silver-Gold system, Gold Commanders liaise with each other and contribute to strategic emergency management decision-making, while Silver and Bronze Commanders liaise and make operational and tactical plans and decisions at their respective levels of command.

4.89 What all of these approaches have in common is that they allow for liaison between senior representatives of partner emergency management agencies to take place in a controlled and structured environment. It will usually be the case that emergency management partners meet on a regular basis to discuss current and emerging issues, and to track progress against objectives. By having liaison officers from partner agencies co-located in an emergency operations centre, incident controllers can tap into their expertise and the resources of their agency, as well as being kept abreast of issues that may not have high prominence for the fire and rescue service but may be key to the community.

Recommendation 7

Fire and Emergency New Zealand should review its doctrine relating to liaison with emergency management partners, to ensure that the importance of liaison, and having appropriate command facilities for liaison activities to be carried out, is embedded throughout Fire and Emergency New Zealand; and to formalise a liaison structure with emergency management partners for major incidents where Fire and Emergency New Zealand is the control agency.

Air quality

4.90 A theme to which people we spoke to in the course of the Review frequently returned was the amount of smoke generated. This was both in the context of the initial appearance of the incident, but more importantly, later on when many streets in central Auckland were filled with dense smoke.

4.91 In speaking to Fire and Emergency New Zealand staff, and other stakeholders, there appeared to us to be a gap in the broader emergency management arrangements for Auckland, in terms of whose responsibility it was to measure air quality and provide warnings and information to the public about smoke. It was stated to us that the local council is responsible for monitoring air quality; regardless of that, the public may have an expectation that the fire service would have an understanding and appreciation of whether smoke being generated from a fire incident was toxic or not.

4.92 There is a narrower operational issue for Fire and Emergency New Zealand, in that recently air-purifying respirators (APRs) have been rolled out to operational crews, for use to filter out smoke and contaminants in atmospheres that are not dangerous enough to require the use of full breathing apparatus. However, APRs are not suitable for use in all atmospheres, and some form of atmospheric monitoring and testing is required to be able to verify that it is safe to use APRs.

4.93 This more localised monitoring can be accomplished by hand-held devices that would not be suitable for more general atmospheric monitoring; however, given the need for Fire and Emergency New Zealand to be able to carry out monitoring of some kind, there may be a synergy here with broader community needs.

4.94 Regardless of that, we consider that from Fire and Emergency New Zealand's point of view, there is a need to obtain clarity about who is responsible for atmospheric monitoring whether at the scene of a small fire, or for a large incident such as the NZICC. Additional to that, there needs to be clarity about who is responsible for warning the public if air quality is dangerous. We understand that under current arrangements Fire and Emergency New Zealand may not be the responsible body, but we think that there is a reasonable expectation that Fire and Emergency New Zealand will know who is responsible, and will take steps to ensure that monitoring is taking place in the event of a significant fire generating large amounts of smoke.

4.95 Overall, in our view Fire and Emergency New Zealand should engage with government to obtain confirmation both about responsibility and capability for atmospheric monitoring, and should use its influence to ensure that a national air quality monitoring capability exists and can be activated on an emergency basis for incidents such as the NZICC fire.

Recommendation 8

Fire and Emergency New Zealand should engage with government to obtain confirmation about both responsibility and capability for atmospheric monitoring, and should use its influence to ensure that a national air quality monitoring capability exists and can be activated on an emergency basis for incidents such as the NZICC fire.

TOR 5: CONNECTION WITH COORDINATION CENTRES

4.96 Connection with and coordination between:

- the on the ground firefighting operations (IMT)
- the Fire and Emergency New Zealand Regional Coordination Centre (RCC)
- the Fire and Emergency New Zealand National Coordination Centre (NCC).

Discussion

Regional Coordination Centre

4.97 As we have noted, Fire and Emergency New Zealand set up the RCC early in this incident, which is commendable. However, we consider that additional thought should be given to the respective roles of the IMT and the RCC, and where they are located.

4.98 We have already noted that coordination would have been easier if the IMT had set up and worked at the RCC facility, and that the facility provided by the City of Auckland Command Unit, while appropriate for a short-duration incident requiring a mobile command facility, was not well-suited to an IMT running a complex incident over many days.

4.99 One good example of issues encountered related to the coordination of crew rotations and reliefs. This is a key role for an incident management team, which, in the case of the NZICC fire, was allocated to the RCC. However, this exposed an organisational weakness: some Fire and Emergency New Zealand staff who worked in the RCC did not have access to HR systems to organise reliefs, because this access is limited to operational staff.

4.100 It should go without saying that personnel who are asked to fill a role should have access to critical systems. Addressing this access issue is an also opportunity for Fire and Emergency New Zealand to improve the culture of inclusion, with all staff working one agency able to contribute to the successful management of an incident. Another issue that this demonstrates is that if the IMT had been working out of the same facility (and by extension, the function of organising reliefs could have been part of a Resources Unit in the Planning Section of the IMT), the incident controller would have become rapidly aware of the issue and could both have arranged to fix the problem with access, but might also have had better visibility of the significant difficulty in organising reliefs because of the number of personnel already working overtime shifts.

4.101 There was a broader issue we noted with the staffing of the RCC by Fire and Emergency New Zealand staff who did not have operational roles. We were told that non-uniform staff who worked in the RCC or who undertook other support roles above and beyond their usual hours of work were not paid for doing so. We have had provided to us a copy of Fire and Emergency New Zealand's Schedule of Conditions M1-4 SCc which covers compensation for non-operational employees deploying to coordination centres. Our impression was that these provisions were not known to everyone who was affected.

4.102 While operational staff can claim overtime when required to work additional hours on operational activities, the position as set out in M1-4 SCc is somewhat more nuanced for non-operational staff and it appears in particular that employees need to be away from home for more than 24 hours to benefit. This might not apply for employees tasked to work at a coordination centre within their home location, even if they were working long hours. We would invite Fire and Emergency New Zealand to consider whether the provisions of M1-4 SCc provide equitable remuneration as between uniformed and non-uniformed staff working on the same incident.

4.103 A broader structural issue is whether it is justifiable, or efficient, to have an RCC in operation at the same time that an IMT is in place managing a significant incident in a region. If the two are to co-exist, then their functions should not overlap. The IMT should be managing the fire; the RCC's role should be to coordinate matters that cannot be resolved at incident level. There was a recommendation in the independent operational review of the Tasman fires of 2019 that doctrine needed to be developed to clarify the interplay between IMT, RCC and NCC, and we think that the events of the NZICC fire reinforce that need. This may require a cultural pivot towards understanding that non-uniform staff may fill key roles within IMTs that might traditionally have been seen as an 'operational' domain, but which, in the context of a developed IMT managing a major incident, need to be understood as involving a 'whole-of-organisation' effort regardless of 'operational' status.

National Coordination Centre

4.104 Coordination between the RCC and NCC appeared to be effective so far as it was required, although the incident was managed largely at regional level with few if any significant decisions being taken at national level. We think that this was appropriate for the scale of the incident.

4.105 One point that was put to us which has some merit is that Fire and Emergency New Zealand could have drawn surge capacity from other Regions. This is particularly true of aerial appliance operators, but could have been considered for other roles as well. While a small number of executive officers were deployed from other Regions to Auckland, consideration of national deployments of firefighters to boost surge capacity does not appear to have occurred.

4.106 We have already commented on the potential obstacles and reasons why this national capacity may not have been forthcoming, but the consideration of whether national surge capacity should be provided, and if so the decision where it was to come from, would have been ideally placed to be made at national level. Resourcing and logistics is frequently a matter of concern at long duration and high consequence incidents, and we think that national doctrine should underline the potential role that NCC can play in coordinating resource movements if the incident indicates that it has a need for resources from beyond the affected Region.

TOR 6: CONNECTION WITH NHQ

4.107
- Connection with, and use of, other functions and teams within Fire and Emergency New Zealand's National Headquarters (NHQ), including:
  - the National Communications Team
  - the Public Information Management (PIM) function.
- Whether Fire and Emergency New Zealand adhered to relevant internal policies.

Discussion

Media management

4.108 A number of people we spoke to in Auckland spoke very positively of the support they had received from the national media team in Wellington. A member of the team deployed to Auckland on the first afternoon of the fire, in order to provide support for officers who were conducting media interviews, and media management more generally.

4.109 All of the people who had received that support said that it had made a significant difference to them in terms of making it easier to manage the needs of the media. It was clear to us that this is a valued capability, and Fire and Emergency New Zealand should continue to provide public information and media support to incidents of this nature.

4.110 It was suggested to us that a permanent media support presence in Auckland would be appropriate given the location of a number of national media outlets in the city. This Review is not best placed to make judgements of that kind, and we understand why there is a national team serving the different Regions of Fire and Emergency New Zealand. It may be worthwhile considering, without abandoning the principle of a national team, whether members could be placed on detached duty in Auckland or otherwise rotated through the city.

4.111 What did become clear to us in speaking with the people involved, was that there was a lack of policy and procedure around when members of the National Communications Team should deploy, and also provision of equipment to team members. The first person to deploy was relatively new to Fire and Emergency New Zealand and had not been issued with any corporate clothing or ID. Nor had they been provided with any training such as maintaining safety at an incident scene, which we would consider was desirable for anyone in a fire and rescue service setting carrying out media management.

4.112 In the AFAC independent review of the Tasman fires, it was noted that a similar situation arose where national media staff effectively made the (correct) decision to deploy to the incident, in the absence of clear organisational guidelines. We do not think that it should be left to the initiative and discretion of individuals to deploy, and it is not reasonable to expect them to take the responsibility of deciding whether or not to do so. There should be some objective trigger points for a deployment and a highly streamlined signoff process for the decision, providing staff with the confidence that they know when it is appropriate to go, and they can initiate activities such as booking transport without having to delay to go through an approvals process.

4.113 In our view:

- there should be clearly established written policy with trigger points for deploying PIM and media staff
- Fire and Emergency New Zealand should provide PIM and media staff with all the tools they need e.g. corporate clothing, ID, training in fireground safety immediately on joining the organisation
- joint training should be carried out between IMTs and PIM/media staff in order to build familiarity with the capability away from the context of an emergency incident.

TOR 7: SAFETY, HEALTH AND WELLBEING

4.114 All aspects of safety, health and wellbeing of staff, including response to or management of:

- any safety concerns, such as fatigue management
- resources
- crew rotation
- ablution facilities
- meals and refreshments.

Discussion

4.115 Overall, it is important to recognise that throughout the incident, Fire and Emergency New Zealand personnel at all levels demonstrated their commitment to safety. This was a very large and complex building under construction, with a challenging fire. The incident lasted 11 days, and hundreds of firefighters rotated through the scene. Two firefighters were taken to hospital for treament following injuries sustained at the incident but there were no major injuries reported. While any injury to firefighters is regrettable, overall the low number of injuries was a commendable achievement.

4.116 All the submissions to the Review team identified firefighter safety as a priority, and the actions they recounted demonstrated a real commitment to this.

Decision to remove firefighters from the roof

4.117 Earlier in this report we discussed the technical advice and reasons why firefighting operations were withdrawn from the roof of the NZICC. We also commented on the widespread belief among firefighters that they could have remained on the roof and made headway against the fire.

4.118 With such strongly focussed and committed crews, there was a real danger that firefighters could be reluctant to comply with the order to withdraw, and seek to stay on the roof, or that others may have tried to 'freelance' and keep working on the roof. It is a credit to all the firefighters and officers, and reflects positively on Fire and Emergency New Zealand's discipline and safety culture, that firefighters complied immediately with the order to withdraw from the roof.

4.119 Officers were diligent in ensuring that all of the firefighters were off the roof. The Safety Officer was also thorough in checking that all staff had left the roof and that she was the last one to leave.

Fatigue management

4.120 We have already discussed the problems that were encountered with rotating crews, that were exacerbated by the common practice of firefighters working an overtime night shift immediately after their day shift, which meant that a number of firefighters were rostered to work 24 hours straight.

4.121 The practice of firefighters working 24-hour shifts makes it harder to manage fatigue. However, Fire and Emergency New Zealand should still be able to expect that firefighters nominating for a shift will be able to work that shift in a fully effective way. In other words, if working back-to-back shifts has the practical effect of compromising crews' ability to work safely and effectively throughout the 24 hours they are on duty, that may be thought to cast doubt on the practice in the first place. A solution suggested to us was to have greater surge capacity to allow for more rotation of crews on the fireground. We accept that there ought to be capacity at a major incident to provide regular relief to crews who are doing hard physical work and wearing BA, but we think that the issue of working double shifts warrants attention too. We suggest that Fire and Emergency New Zealand should engage with representative bodies to review the practice of working double shifts, to ensure that personnel working overtime are fully effective.

4.122 A number of people told us that commanders only worked six-hour rotations, while crews were expected to work 10- or 14-hour shifts on the fireground with only short breaks. At the same time, some commanders told us that six-hour rotations were too short, and did not allow for a meaningful length of time working after a handover that could last an hour or more. We cannot immediately see why commanders needed to work shorter rotations than firefighters and note that in Australian IMTs 12-hour shifts are normal.

4.123 We think that Fire and Emergency New Zealand should review shift lengths and rotations for future incidents. Fatigue management is a safety issue; firefighters must be able to rest and recuperate properly while working. For this to happen, there must be enough firefighters on scene to cover the shift, and commanders must be able to track the shifts individuals work over a multi-day event. This is a key function of the resources unit in an incident management team formed using the principles of the Australasian Inter-service Incident Management System (AIIMS) which Fire and Emergency New Zealand has decided to adopt for all incidents that it manages. When providing training for people who work in the Resources unit, Fire and Emergency New Zealand should identify the different considerations that apply to resource management for rural and urban incidents, and develop people's skills so that they can manage either.

4.124 Another reflection that the Review had in relation to fatigue management is that we were unsure that individuals, crew leaders and sector commanders were all aware of their responsibilities in this regard. We did hear some accounts of individuals, particularly aerial operators, requesting reliefs and these not being provided; but overall we gained the impression that people were not always escalating their requirements for fatigue management up the chain of command.

4.125 Individual firefighters are responsible for advising their crew leader if they are fatigued; crew leaders are responsible for monitoring their crews and escalating any requirement for relief; and sector commanders are responsible for the welfare of their sectors including fatigue management. We think that these principles should be reinforced across Fire and Emergency New Zealand. Personnel need to recognise that on occasion they will not get relieved straight away, and in a developing emergency it may be necessary to work long shifts outside normal parameters. That does not, however, mean that the issue should not be identified and a plan developed to address it.

4.126 Of particular concern were some of the stories we heard of aerial operators working excessive hours to the point they could not operate safely. While we have already noted that aerial operators were in short supply, if fatigue develops to the point where an operator believes they are unsafe then that has to be addressed and in a worst-case scenario, the relevant appliance would need to be shut down until relief crews could be made available. We suggest that risk management decisions like this should be included in general training on managing fatigue, particularly for officers who may be making relevant decisions.

Catering and facilities

4.127 Some comments we saw in after-action reviews of the NZICC fire criticised the catering, but on investigation we did not think that these criticisms were well-founded. Efforts were made to provide catering and the Auckland Operational Support Unit provided a catering van for several days. Some comment was passed on the need to provide balanced meals, but we think that people need to be realistic about what can be provided in a fireground setting, and what is appropriate to plan for given that catering will usually only be provided in an urban setting over a single shift.

4.128 There is, however, room for review of catering arrangements, particularly at longer-term incidents. It would be reasonable for discussions to take place between Fire and Emergency New Zealand and representative bodies to establish a realistic baseline for catering provision, and if people want to have input into the nature and type of catering provided in the field, they should have the opportunity to do this through constructive discussions before an incident occurs.

4.129 We heard that two volunteer units had offered their services – one to provide catering and the other to provide ablution and shower facilities to the fireground – and their support had been rejected. This was perhaps unfortunate given later criticism about catering and ablution facilities at the incident. A more structured process for responding and using catering and other facilities would prevent these issues arising in future.

4.130 There was a lot of discussion about toilet and changing facilities. We found that there were toilet facilities available at the incident, but this was not always well-communicated. Fire and Emergency New Zealand has portable toilets, but these are limited in scale and were under maintenance, so were not available for the NZICC incident. We think that Fire and Emergency New Zealand should have 'call when needed' contracts with portable toilet suppliers, and it should be part of command training to make sure that these facilities are available for all major incidents.

4.131 An example of good innovative practice at this incident was the uniform trailer carrying clean dry personal protective clothing that crews could change into. Most of the people we spoke to praised this initiative, and we think Fire and Emergency New Zealand should repeat it for all significant incidents. A further improvement would be to provide underclothing such as shorts and t-shirts, as well as privacy facilities such as a tent for changing. Fire and Emergency New Zealand and representative bodies could usefully discuss what is appropriate to provide and what the triggers should be for that to happen, recognising that it might be more difficult away from major centres. With an increasingly diverse workforce, health and safety requirements and changing community expectations, it is important for Fire and Emergency New Zealand to have an appropriate policy and robust response procedures to provide dignified facilities at protracted incidents.

4.132 Incident management systems worldwide are increasingly acknowledging the need for the rest, feeding, health monitoring and hygiene needs of firefighters and other responders at lengthy incidents. One way of managing this in the Incident Command System is for a Rehabilitation Sector to be established. This is a functional sector with a Sector Commander who is responsible for oversight of all supporting welfare functions and ensuring they are being delivered appropriately. We consider that Fire and Emergency New Zealand should review its incident management doctrine to include the creation of a Rehabilitation Sector at major incidents, and provide role statements and checklists for the Rehabilitation Sector Commander.

Recommendation 9

Fire and Emergency New Zealand should develop doctrine on supporting welfare functions and their organisation as a formal Rehabilitation Sector at an incident.

TOR 8: FINANCE

4.133 **Financial management and processes (including managing resources that supported the incident, for example the use of volunteer firefighters, and relief and standby decisions).**

Discussion

4.134 Throughout the conversations we had with personnel who had had command roles during the NZICC fire, we heard no evidence that financial considerations had played any part in decision-making or resource management.

4.135 Some people we spoke to raised the question of whether financial matters influenced decisions about crew rotations, or more specifically, whether to draw resources into Auckland from further afield. Our conclusion was that people making operational decisions about resourcing were not asking themselves what these decisions were costing – we think they based their decisions on other factors.

4.136 To take one example, it would have been possible to order additional crews so as to provide more frequent crew rotations on the fireground. We do not think, based on the discussions we have had with Auckland Area Commanders, that the fact that more crews were not ordered was for financial reasons; rather, it was because incident controllers were of the view they had ordered enough resources to deliver the incident objectives they were set, and the prevailing belief in the earlier stages of the incident that it would be resolved within the next shift or so. Whether those views were in hindsight justified is a different question, but we do not think that financial considerations underpinned the decision-making.

4.137 Other reviews, notably the Tasman fires Review 2019, have pointed out that financial accountability when managing incidents is relevant for fire services because they are spending public funds. Good financial management at an incident also promotes good options analysis. Having said that, we would not generally consider that a typical urban incident would last long enough for financial management of this sort to become relevant – decisions with financial implications are generally made in advance of the incident and their implications then play out in the options available to incident controllers at the time.

4.138 In any event, it is unrealistic to expect commanders working out of a mobile command unit to be undertaking financial analysis. An expanded IMT working from a fixed control facility is able to establish a finance unit which can then carry out such financial analysis as is appropriate and helpful. We have already indicated that for the longest and most complex urban incidents, an IMT in a fixed facility rather than a mobile command unit should be set up; and for any IMT regardless of the hazard, we encourage Fire and Emergency New Zealand to keep thinking about how they can incorporate financial management into operations – not to limit those operations, but to support options analysis and to be able to show afterwards why spending was justified.

TOR 9: REPORTING AND ENGAGEMENT

4.139 Reporting mechanisms and engagement with key stakeholders, including:

- the public
- the Board
- the United Fire Brigades' Association
- the New Zealand Professional Firefighters Union
- the Ministers of Internal Affairs
- Department of Prime Minister and Cabinet
- Department of Internal Affairs (as Fire and Emergency New Zealand's monitoring agency).

Discussion

4.140 The NZICC fire was very high profile given its location and the nature of the asset involved, and political interest was high to the point that the Prime Minister paid a visit to the scene while operations were still ongoing, as did the local Member of Parliament. The Mayor's office overlooked the NZICC and the Mayor was active on social media reporting on the progress of the fire. All of these considerations required careful and appropriate management.

4.141 We have already discussed the role that National Communications Team staff undertook, and this requirement for appropriate political engagement underlines how important that was. While often in a major incident a review of the effectiveness of stakeholder engagement is all about remote briefings and information flow, in the case of the NZICC it was at times a much more direct exercise. Our sense is that by and large it went well, and the reputation of Fire and Emergency New Zealand, and the trust and confidence placed in it by the public, was maintained and enhanced.

Debriefs

4.142 The main way in which we would expect to see Fire and Emergency New Zealand engaging with its people in the aftermath of an event such as this is by debriefing. There were a number of local debriefs after the event and the Review had access to the written outcomes of a number of debriefs which helped us to understand the perspective of the workforce. However, we were told that there had been no multi-agency after-action review where stakeholders across the emergency management sector could debrief about broader emergency management considerations, and we have encouraged Fire and Emergency New Zealand to do this, even if only remotely by video conferencing.

4.143 The Auckland Area Commanders have come together on their own initiative to analyse the various debriefs and to start their own work programme to address the issues raised. We were shown a well-developed matrix of issues raised and proposed solutions, which confirmed that this was a significant commitment in time and effort by the local commanders and was a welcome change from a commonly observed phenomenon associated with debriefs and after-action reviews around the world, where a quite significant debrief of an event may come up with a number of issues to be resolved, but no further action is taken.

4.144 We saw this work as a demonstration of the commanders' professionalism and their genuine willingness to learn from the incident. There has been engagement with the representative bodies over the progress of this work, which is important in terms of ensuring that staff concerns are identified and listened to, and some of the intended outcomes will address issues that this report has raised.

Recovery activities and handover of the site

4.145 We commend Fire and Emergency New Zealand for appointing a Recovery Manager early in this incident – this person was effective in identifying key stakeholders then engaging with them to keep them regularly updated on the progress of the incident, current and anticipated activities, and the likely timetable for a conclusion of emergency operations. Several emergency management partners commented that that this made it easier to plan recovery activities and welcomed the initiative of the appointment of this officer, which we hope will become standard for major incidents in future.

4.146 In order to continue to obtain the benefits of this initiative, we suggest that Fire and Emergency New Zealand should ensure that the appropriate training for the role is part of CIMS and/or AIIMS training, along with other key roles. There was an extent to which the Recovery Manager appointed had to draw on his own good sense and understanding of emergency management to guide his activities. Similarly to the proposal above to create doctrine around a Rehabilitation Sector, we think that it is important for Fire and Emergency New Zealand to create doctrine around the appointment and duties of a Recovery Manager.

Recommendation 10

Fire and Emergency New Zealand should develop doctrine on the functions and responsibilities of the Recovery Officer and identify triggers for the appointment of this role in respect of an incident.

4.147 Fletcher Construction Ltd appreciated the formal process for handing back the site to them once response activities and the risk assessment were finished. This is a first for an urban fire incident in New Zealand and needs to become a regular process.

4.148 The formal handover of control to the building company had significant legal implications, which Fire and Emergency New Zealand managed with a handover document. While the issues associated with this handover were significant due to the scale and complexity of the incident, all incidents usually have the same issues. We suggest that Fire and Emergency New Zealand introduce a pro forma site handover form to use at any significant incident to formally hand back a property to an owner, occupant or the police.

Iwi engagement

4.149 We heard some concerns that Fire and Emergency New Zealand had not engaged with iwi about managing the NZICC fire and its impacts. The Tasman fires Review 2019 also highlighted this issue, where the need for iwi engagement was identified by incident controllers, and proved successful. We think that for any major incident that has effects on the community and environment, it should be standard practice for Fire and Emergency New Zealand to engage with iwi and involve them in aspects of incident management that intersect with iwi interests. We suggest that Fire and Emergency New Zealand incorporate this into standard operating procedures, including standing arrangements for communication between incident managers and iwi. This is another area of engagement that would be enhanced by IMTs working out of a fixed EOC with a developed incident management structure.

Recommendation 11

Fire and Emergency New Zealand should engage with iwi when managing any future major incident with community or environmental impacts.

5. CONCLUSIONS

5.1 The NZICC fire was a difficult and challenging event for Fire and Emergency New Zealand and all its personnel, from front-line firefighters, to operational commanders, and the non-uniformed staff who undertook coordination and administration roles.

5.2 Overall, our impression was that Fire and Emergency New Zealand personnel were able to draw on their expert knowledge of firefighting in the urban environment to manage the incident safely and effectively with the resources to hand.

5.3 We do not think that, given the circumstances they were faced with and the resources available, the commanders of this incident could have prevented the extensive loss and damage to the NZICC that occurred. Nor do we think that there was any gap in resources or doctrine that can be blamed for the outcome.

5.4 The NZICC fire provides an excellent catalyst for learning and for continuous improvement of systems in place. We think that review and, where work is already underway, delivery of the following will service to enhance Fire and Emergency New Zealand capability for incidents such as this in the future:

- strategy to address the challenges of maintaining familiarity with a complex and growing built environment
- updated aerial appliance strategy
- resource management review including consideration of how 24-hour shift working can be balanced safely with the needs of the organisation
- continued focus on the importance of training and skills maintenance for senior officers who may have to deal with infrequent, high complexity incidents
- clarity about the availability of all Fire and Emergency New Zealand resources to support major incidents and provision of necessary training to volunteer brigades
- doctrine about establishing IMTs in fixed EOCs where appropriate and avoiding overlap between IMT and RCC
- doctrine about liaison with emergency management partners
- doctrine for rehabilitation and recovery functions
- strengthening iwi engagement at major incidents.

5.5 We conclude this report by once again expressing our admiration for the women and men of Fire and Emergency New Zealand for the way in which they rose to the challenge of this incident.

ABBREVIATIONS

AAC	Assistant Area Commander
AC	Area Commander
AFAC	Australasian Fire and Emergency Service Authorities Council
APR	Air-purifying respirator
BA	Breathing apparatus
ECO	Entry control officer
EOC	Emergency Operations Centre
IC	Incident Controller
IMT	Incident Management Team
NCC	National Coordination Centre
NZICC	New Zealand International Convention Centre
PDA	Predetermined attendance
PIM	Public information management
RCC	Regional Coordination Centre
SO	Station Officer
SRZ	Special response zone
SSO	Senior Station Officer
TTL	Turntable ladder

REFERENCES

AFAC Independent Operational Review of the Tasman fires, AFAC, 2019

Australasian Inter-service Incident Management System, AFAC, 2017

Fire and Emergency New Zealand Designers' Guide to Firefighting Operations, Fire and Emergency New Zealand, 2019

Preparedness of the Scottish Fire and Rescue Service for the XX Commonwealth Games, HM Fire Service Inspectorate for Scotland, 2014

Report on the fire at Atherstone on Stour 2 November 2007, Warwickshire County Council, 2014

Letter to London Fire Commissioner pursuant to rule 43 of the Coroner's Rules, Her Honour Frances Kirkham CBE, 28 March 2013

Wildfire Today (www.wildfiretoday.com), Gabbert, 2013

ANNEXE A: FIRE AND EMERGENCY NEW ZEALAND

About

The Fire and Emergency New Zealand Act 2017 combined urban and rural fire services into a single, integrated fire and emergency services organisation – Fire and Emergency New Zealand – with a mandate to provide a wide range of services for communities. The Act provides the framework under which Fire and Emergency New Zealand operates and sets out principal objectives, main functions and additional functions.

Principal objectives

- Reducing the incidence of unwanted fires and the associated risk to life and property.
- Protecting and preserving life, and preventing or limiting injury, damage to property, land and the environment.

Main functions

- Promoting fire safety (including guidance on the safe use of fire as a land management tool) and firefighting.
- Delivering fire prevention, response and suppression services.
- Protecting the safety of persons and property endangered by incidents involving hazardous substances.
- Rescuing trapped people as a result of transport accidents or other incidents.
- Undertaking urban search and rescue.

Additional functions

- Responding to
  - medical emergencies
  - maritime incidents
  - weather events, natural hazard events and disasters
  - incidents where substances present a risk to people, property or the environment
  - any other situation where Fire and Emergency New Zealand can assist.
- Promoting safe handling, labelling, signage, storage and transportation of hazardous substances.
- Performing other rescues.
- Providing assistance at transport incidents.

Fire and Emergency New Zealand Statement of Intent

- Reducing the likelihood of unwanted fires
- Reducing consequences from emergencies, and
- Helping build resilient communities.

History

For most of New Zealand's history, fire services were funded and managed locally. There was little central coordination, resulting in significant variation between local fire services. The Ballantynes' Fire of 1947, where 41 people lost their lives, was a watershed moment in the history of fire services in New Zealand. It led to the passing of the first fire safety legislation.

A further reform in 1975 amalgamated local authority Fire Boards into a national New Zealand Fire Service. However, Rural Fire Authorities were retained as separate organisations, coordinated by the National Rural Fire Authority. For over 40 years, there were no further significant changes to fire service legislation.

Two reviews of the fire services were undertaken between 2012 and 2015. These considered mandate, rural and urban governance and support structures, legislation modernisation, funding, and coordination with other emergency services. Through extensive consultation with stakeholders, these reviews resulted in wide agreement on the type of fire services needed in New Zealand, and how best those services should be supported and funded. They paved the way for reform.

These reviews also drew on lessons from other fire services internationally on how best to approach the reforms. To be successful, the changes should be co-designed with the sector, incorporate the perspective of communities, and grow an organisation that is reflective of the communities it serves. Following these two reviews, the New Zealand government agreed to unify urban and rural fire services, to use a new funding model, and to create a new law for fire services in New Zealand.

ANNEXE B – THE REVIEW TEAM

JEREMY FEWTRELL, FIRE AND RESCUE NEW SOUTH WALES

Jeremy Fewtrell has worked with Fire and Rescue NSW (FRNSW) since 1997. During this time, he has filled a wide range of operational roles in both metropolitan and regional operations. Jeremy has also filled senior leadership positions in the Community Safety and Operational Capability directorates. In Community Safety he had a focus on fire investigation and enhancing FRNSW's fire safety research capability. As the Capability Manager – Firefighting Jeremy developed FRNSW's Aerial Appliance Strategy which set the organisation's direction of this capability for the next 20 years.

Currently, Jeremy is the Deputy Commissioner Field Operations. Prior to this appointment he was the Deputy Commissioner Strategic Capability and previously the Assistant Commissioner Operational Capability.

Jeremy holds a Bachelor of Natural Resources from University of New England and Masters of Business Administration from Deakin University. He is a graduate of the Institution of Fire Engineers, has been the President of the Institution of Fire Engineers Australia Branch from 2015-2018 and Leader of the Institution's International General Assembly 2017-2018.

PAUL CONSIDINE, AFAC

Paul Considine is qualified as a barrister in England and Wales. He has held positions in Australian state and Commonwealth public services, including as a Director of Investigations in the office of the Commonwealth Ombudsman. Paul joined the Australasian Fire and Emergency Service Authorities Council in 2010 as Manager, Operations (Urban Fire and State Emergency Services). In 2013 he took up a two-year ministerial appointment as an Assistant Inspector of the Scottish Fire and Rescue Service, with HM Fire Service Inspectorate in Scotland; in that capacity he was lead inspector on various inquiries and reports into the SFRS.

Paul returned to AFAC in 2016 to work on the National Resource Sharing Centre, an Australasian initiative for sharing fire and emergency management resources. Paul is currently Director, Capability and Assurance at AFAC with responsibilities across the fields of national capability, resource sharing, and reviews and inquiries. He has worked on a number of AFAC and other Reviews including the Tasmanian fires of 2016, the Tasmanian floods of 2016, the Tasmanian fires of 2018-19, and the Nelson-Tasman fires of 2019.

TREVOR BROWN, FIRE AND EMERGENCY NEW ZEALAND

Trevor Brown was a front-line firefighter and officer in greater Wellington for 20 years before moving into middle and eventually senior leadership roles. He has worked both at National Headquarters and at regional level in New Zealand, predominantly in operational roles culminating in 10 years as a Fire Region Commander in four Regions. His last appointment was as the Fire Region Commander based in Christchurch through 2012 following the 2011 earthquake. Through his career has also held senior leadership roles with national influence in health and safety, communication centres, and as national operations advisor to the National Commander.

Trevor is presently the National Operational Efficiency Manager, and a member of the National Commanders Group. His role has responsibility to the Chief Executive and National Commander for ensuring the operational efficiency and readiness of Fire and Emergency New Zealand. This includes front-line operations, Region, District and Area operations, USAR, training, communications centres, national and regional coordination centres. The Operational Efficiency team also manage operational reviews of a range of significant incidents, or incidents that provide learning opportunities for Fire and Emergency New Zealand.

Trevor is a graduate of the AFAC executive development and leadership programmes with a postgraduate diploma in Executive Leadership, and holds a Member of the Institution of Fire Engineers (MIFireE) qualification.

Credit: John Waldow.

AFAC Limited (ABN 52 060 049 327)
Level 1, 340 Albert Street
East Melbourne Victoria 3002
Telephone: 03 9419 2388
Facsimile: 03 9419 2389
Email: afac@afac.com.au
Web: www.afac.com.au