INDEPENDENT REVIEW INTO 2021 NSW FLOODING

afac

ACKNOWLEDGEMENTS

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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, October 2021

Cover images:

Flooding in Hawkesbury Nepean Valley (Images courtesy of NSW SES Hawkesbury Unit)

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1. INTRODUCTION AND RECOMMENDATIONS

1.1 This Independent Review into the NSW 2021 flooding event was commissioned by New South Wales State Emergency Service (NSW SES), coordinated by the Australasian Fire and Emergency Services Authority Council (AFAC), and informed by the AFAC Independent Operational Review Guidelines. In addition, NSW SES undertook a program of After Action Reviews (AARs) that complemented and augmented the Independent Review.

1.2 The aim of the Independent Review and the AAR program is to assist NSW SES to identify key observations, learning opportunities that sustain good practice, and changes to address areas identified as requiring improvement.

1.3 NSW SES is the lead agency for floods, storms and tsunamis as specified by the State Emergency Service Act 1989. The service has 259 volunteer Units and 10,214 volunteer members and a fulltime equivalent workforce of 333 staff as at 30 June 2021. The state has five Zones – Metro, Northern, Western, Southern and South-Eastern, and the State Headquarters are in Wollongong.

1.4 The La Niña weather system that impacted Australia during 2020/2021 resulted in NSW SES responding to many storm and flood events, culminating in a campaign flood event that ran from March to June 2021. In the five months leading up to the campaign flooding, members of NSW SES had been involved in over one hundred days of operational response activities. These sustained and recurring severe weather and flooding events undoubtably placed significant pressures on the organisation, in particular its people both staff and volunteers.

1.5 This was the second wettest March since 1900, resulting in thirty of the state's thirty-seven catchments experiencing flooding. Across the catchments rainfall records were broken and record flood levels were observed. The community impacts were significant, at one stage during this event flood warnings covered a population of six million people. Throughout the duration of the event over 25,500 residents across the state were subject to evacuation orders.

1.6 There were two flood-related fatalities during this event, which are subject to coronial inquiries. As at 3 September 2021, the Insurance Council of Australia reported over 56,000 claims lodged with $650 million damages incurred; while grants distributed to individuals, primary producers and businesses amounted to over $490 million.

1.7 The dedication and commitment of staff and volunteers to prepare NSW for flooding and to keep the community safe during this event is to be highly commended. Nowhere is this more evident in the outstanding response to the community of NSW who tendered 14,500 requests for assistance and made over 26,000 calls to 132500 with more than 1,000 flood rescue activations. Over 4,100 NSW SES volunteers were deployed in response to this event. Six other emergency service agencies from across the state supported the flood response. Interstate support was coordinated through the National Resource Sharing Centre, with over 350 personnel deployed from across Australia to support NSW SES and the communities of NSW. The Australian Defence Force (ADF) also provided aviation and recovery support.

1.8 The Review identified practices that should be retained and opportunities for improvement. Areas of positive performance include work to build community resilience in preparation for flood events, close working relationships with the Bureau of Meteorology and the operation of virtual incident management teams. Opportunities for improvement are related to insufficient human resources, deficiencies in training in Incident Management Team (IMT) roles, inadequate facilities and enhancement required in the public information and warning function. The report details 28 recommendations to address these findings.

1.9 The strongest kudos go to the members (both staff and volunteers) of NSW SES, for their dedication and outstanding commitment to the safety and wellbeing of the NSW community.

RECOMMENDATIONS

Recommendation 1

NSW SES investigate and prepare business case/s to address organisational structures and increased staffing levels to support emergency planning, preparedness, training and response, as well as provide appropriate levels of support to volunteers and Units.

Recommendation 2

NSW SES mature its approach to strategic resource management, including the use of internal (including volunteers for IMT roles), interagency and interstate resources.

Recommendation 3

NSW SES undertake further training and exercising of all IMT roles including liaison officers, aviation operations, flood rescue management and virtual IMT operations.

Recommendation 4

Maintain, and grow, the embedded Meteorologist role in NSW SES State Operations Centre, and explore options to also embed a full-time hydrology capability.

Recommendation 5

Where possible, emergency operations centres should be co-located with the combat agency's incident control centres.

Recommendation 6

NSW SES should work with the State Emergency Management Committee to review the triggers for opening local and regional emergency operations centres, including resource requirements for Liaison Officers.

Recommendation 7

That NSW SES continue the work to develop pre-prepared public information products, and where possible expand this to include a number of flood scenarios.

Recommendation 8

NSW SES should consider having a permanent staff presence at the State Air Desk.

Recommendation 9

NSW SES seeks to improve aviation capability for severe weather and night time search and rescue operations.

Recommendation 10

NSW SES should use the flood rescue experiences from this event to review the Flood Rescue Management Procedure and identify learnings for future exercises and events.

Recommendation 11

NSW SES work with other members of the State Emergency Management Committee to confirm, document and exercise arrangements for transition to recovery, relief and recovery arrangements in future events, including the provision of a Recovery Liaison Officer to IMTs and SCC.

Recommendation 12

NSW SES formalises the roles of Deputy State Duty Commander Transition to Recovery and Deputy Incident Controller for Transition to Recovery.

Recommendation 13

NSW SES expands the targeted community engagement preparedness programs in high flood risk areas.

Recommendation 14

NSW SES builds its capability to commence public information messaging as early in events as possible.

Recommendation 15

NSW SES work with the Bureau of Meteorology to explore opportunities to expand severe weather and flood prediction tools and services, and develop an approach to increasing awareness of flood risks and flood plans for staff in Zones.

Recommendation 16

NSW SES upgrade their website, undertaking a detailed analysis of issues raised in relation to the March 2021 flood event and consulting with end users to ensure it meets their needs.

Recommendation 17

NSW SES consider implementing an integrated, streamlined system to improve the productivity and quality of public information products.

Recommendation 18

NSW SES builds on and utilises research undertaken in connection with the development of the Australian Warnings System, to ensure public information products are consistent and clearly articulate to the public the likely consequences and the actions required and maximise distribution through the use of digital media platforms.

Recommendation 19

As part of the implementation of the Australian Warnings System review the doctrine involved in the development, approval and issuing of public information and warnings products.

Recommendation 20

NSW SES should progress the recommendations outlined in the NSW SES Facilities Review.

Recommendation 21

Explore available resource management systems, including links to the proposed availability system, and develop a business case to develop and/or implement the preferred system.

Recommendation 22

Develop a procedure identifying decontamination requirements and facilities/equipment required.

Recommendation 23

NSW SES prepare a business case for additional resources to be allocated to the updating of flood plans, flood intelligence and action cards.

Recommendation 24

In line with the NSW SES 2021-2024 Strategic Plan, the Service implement a contemporary community-focused flood planning framework which is user friendly and makes information readily accessible.

Recommendation 25

Ensure that flood plans form the basis for internal and external exercises.

Recommendation 26

NSW SES includes National Resource Sharing Centre arrangements in their exercise program.

Recommendation 27

NSW SES continue to develop their internal procedures for deployment of National Resource Sharing Centre resources.

Recommendation 28

That NSW SES continue to undertake/participate in multi-agency exercising for a range of hazards.

2. ABOUT THE INCIDENT

2.1 New South Wales (NSW) experienced extreme rainfall on the east coast of Australia beginning on 18 March 2021, together with significant rainfall in many other parts of the state. This led to widespread flooding in NSW affecting regions from the Queensland border through to the Sydney metropolitan area, parts of the South Coast and multiple locations in inland NSW. The floods occurred less than 18 months after Australia was affected by the Black Summer bushfires, impacting many towns still recovering from that disaster. Severe weather had been associated with La Niña, which resulted in minor to major flooding in many parts of northern NSW in early 2021. NSW SES had had 100 days of operational response activities in the 5 months before this flood event.

2.2 The extreme weather conditions delivered significant amounts of rain in a rapid period over an already saturated landscape and catchments, causing evacuations, isolations, and disruption to communities at a time when the state was also being challenged by a complex global pandemic. At one stage flood warnings covered an area of NSW that included a population of 6 million people. Across the event over 25,500 residents of the state were subject to evacuation orders.

THE WEATHER SYSTEMS

2.3 A major rain event affected significant areas of Australia in the second half of March 2021. The highest rainfall totals occurred in eastern New South Wales, with almost the whole coastline and adjacent ranges receiving significant falls. Extensive heavy rainfall also occurred over large areas of inland NSW. Thirty of thirty-seven river catchments in NSW experienced significant flooding as a result of the severe weather system. Numerous flood records were broken.

2.4 Moist easterly flow became established over coastal New South Wales on 17 March 2021, associated with a strong, slow-moving high-pressure system in the southern Tasman Sea. This onshore flow persisted for nearly a week. Troughs formed near the coast from time to time, and a small low-pressure system moved slowly south along the New South Wales coast on 19 and 20 March. Some of the heaviest rain occurred during these two days. The low did not reach the intensity required to be formally classified as an East Coast Low.

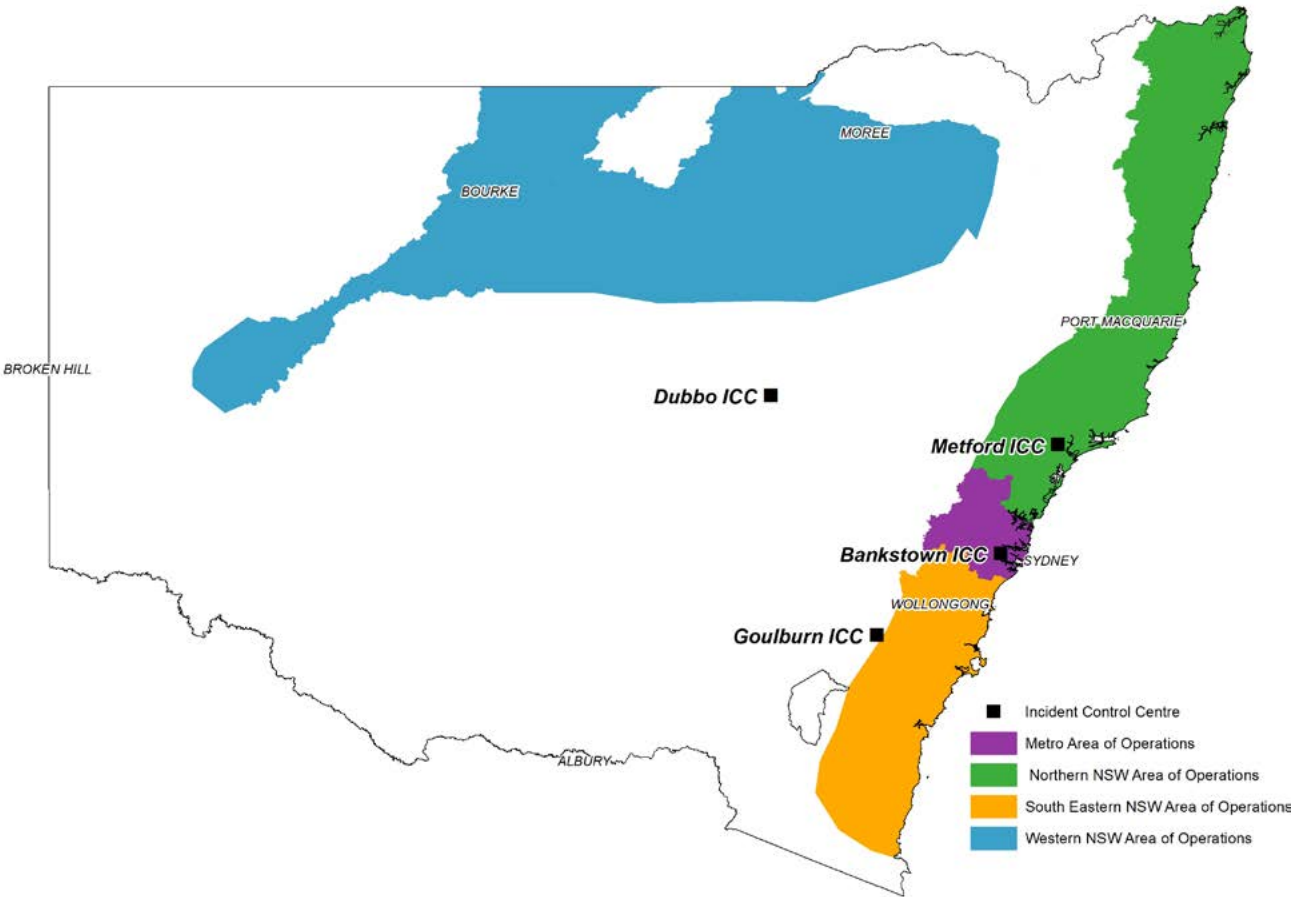


Figure 1: Concurrent areas of operation for the NSW floods of 2021

2.5 Meanwhile, a separate area of low pressure formed over central Australia on 22 March, with a trough and associated north-west cloud band extending from the Kimberley in north-western Australia to the far south-west of Queensland. This consolidated over the following 24 hours into a low-pressure system over inland areas of southern Queensland and northern New South Wales. The low then moved south over inland New South Wales, reaching Bass Strait early on 24 March.

2.6 Significant rain began along parts of the New South Wales coast on 17 and 18 March. There was also significant thunderstorm activity in northern inland New South Wales during this period, with local heavy falls. The heaviest rain began on 19 March, focused on the Mid North Coast. Heavy falls extended south to the Sydney region on 21 and 22 March, and inland NSW on 22 and 23 March. The South Coast received regular rain during this event, with the heaviest falls on 24 March. By 25 March rain had largely cleared from New South Wales, except for isolated, locally severe thunderstorm activity on parts of the South Coast that afternoon.

2.7 The influx of moisture from a high-pressure system in the Tasman Sea and a low-pressure system in the Timor Sea led to very high daily rainfall totals on several days during the event across south-east Australia. Daily totals exceeded 150 mm somewhere in New South Wales on each day from 18 to 24 March. One of the most significant aspects of this event in coastal NSW was its persistence, which resulted in many very high multi-day rainfall totals. Many locations received several days of heavy rain, particularly on the Mid North Coast, where a number of sites had four consecutive days with 100mm or more.

2.8 The heaviest rainfalls away from the coast occurred on 23 March, with daily totals exceeding 100mm in the North West Slopes and Upper Western regions of NSW. The town of Moree received 150mm of rain on 23 March – more than it did in all of the severe drought year of 2019 (125.4mm). Daily totals above 50mm were widespread through other parts of inland NSW.

2.9 Several records were broken during this flood event. New South Wales had its second-wettest day, third-wettest week and second- wettest March on record since 1900.

Table 1: Rainfall Records March 2021

Location, Rainfall March 2021	Previous Record Rainfall
Wingham 609.2mm	574.8 mm
Craven (Longview) 392mm	374.6mm
Yarras (Mt Seaview) 889.4mm	609.2mm
Krambach (Tipperary) 506mm	463.2mm
Comboyne 943mm	875.3mm

Flooding

2.10 The extent of the March flooding in NSW was vast, with at one point flood warnings covering an area of NSW that included a population of 6 million people. A number of locations saw almost record flood levels (see Table 2). The heavy rain fell against a backdrop of relatively wet antecedent conditions across most of the affected regions, associated with a La Niña which developed in the second half of 2020. Soils became more saturated during 2020, and water storage levels generally increased. This contributed to flooding being more widespread and severe than had been the case during a broadly comparable rain event in February 2020.

2.11 In the Northern Rivers area of NSW, there was minor to major flooding along several river systems. NSW State Emergency Service (NSW SES) issued three evacuation orders and a further evacuation warning for communities in the area, affecting approximately 800 people. 16 communities were isolated due to flooding.

2.12 Numerous communities in the Mid North Coast were impacted by flooding. Multiple evacuation warnings and orders were issued in this area, impacting over 18,000 people. 23 communities/locations were isolated due to flooding, requiring resupply by NSW SES.

2.13 Rainfall in the Hunter-Central Coast area resulted in moderate to major flooding along the Hunter River, and moderate flooding was also experienced in the Tuggerah Lakes area. A number of evacuation warnings were issued in the area, however none progressed to an evacuation order. One small community was isolated due to flooding.

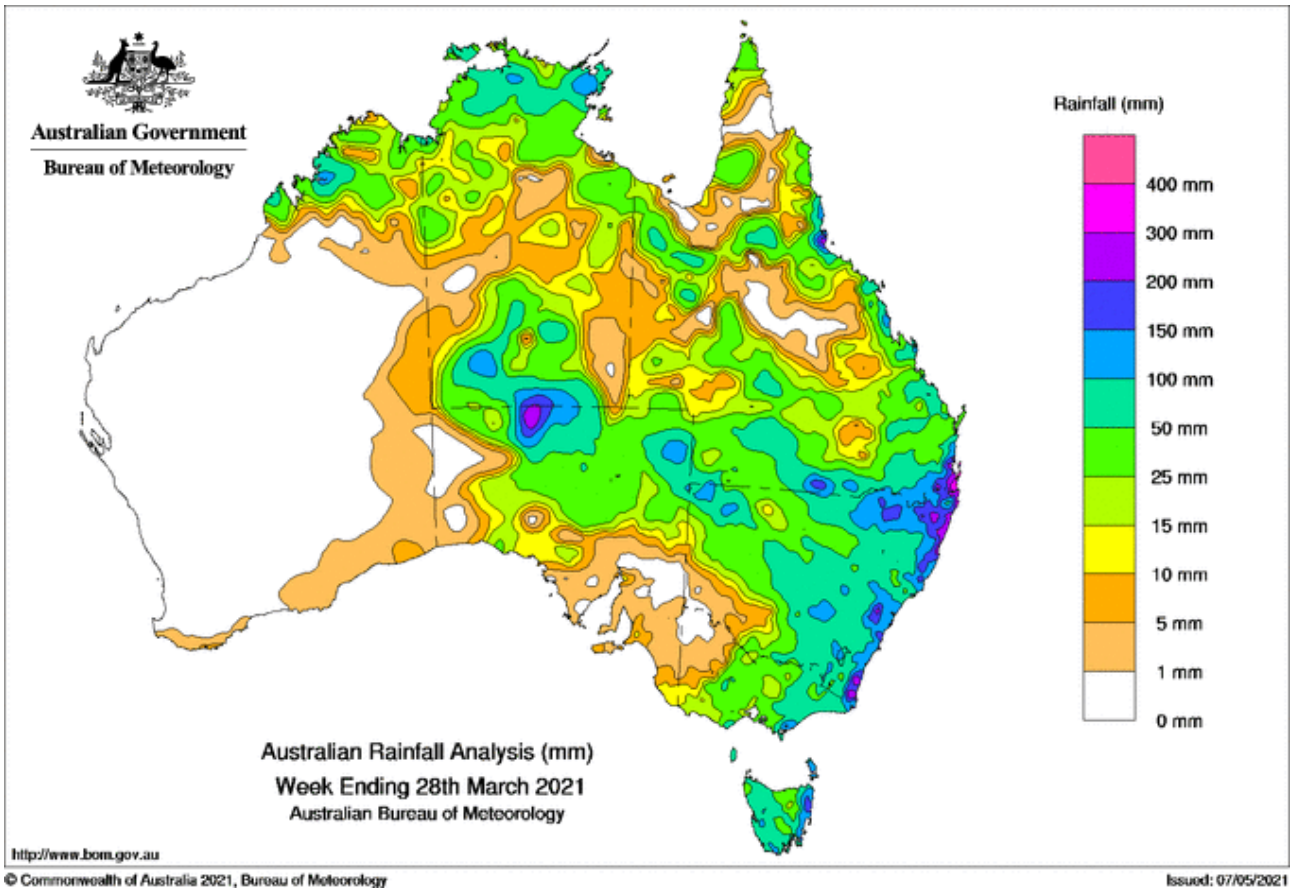


Figure 2: Weekly rainfall totals, week ending 28 March 2021

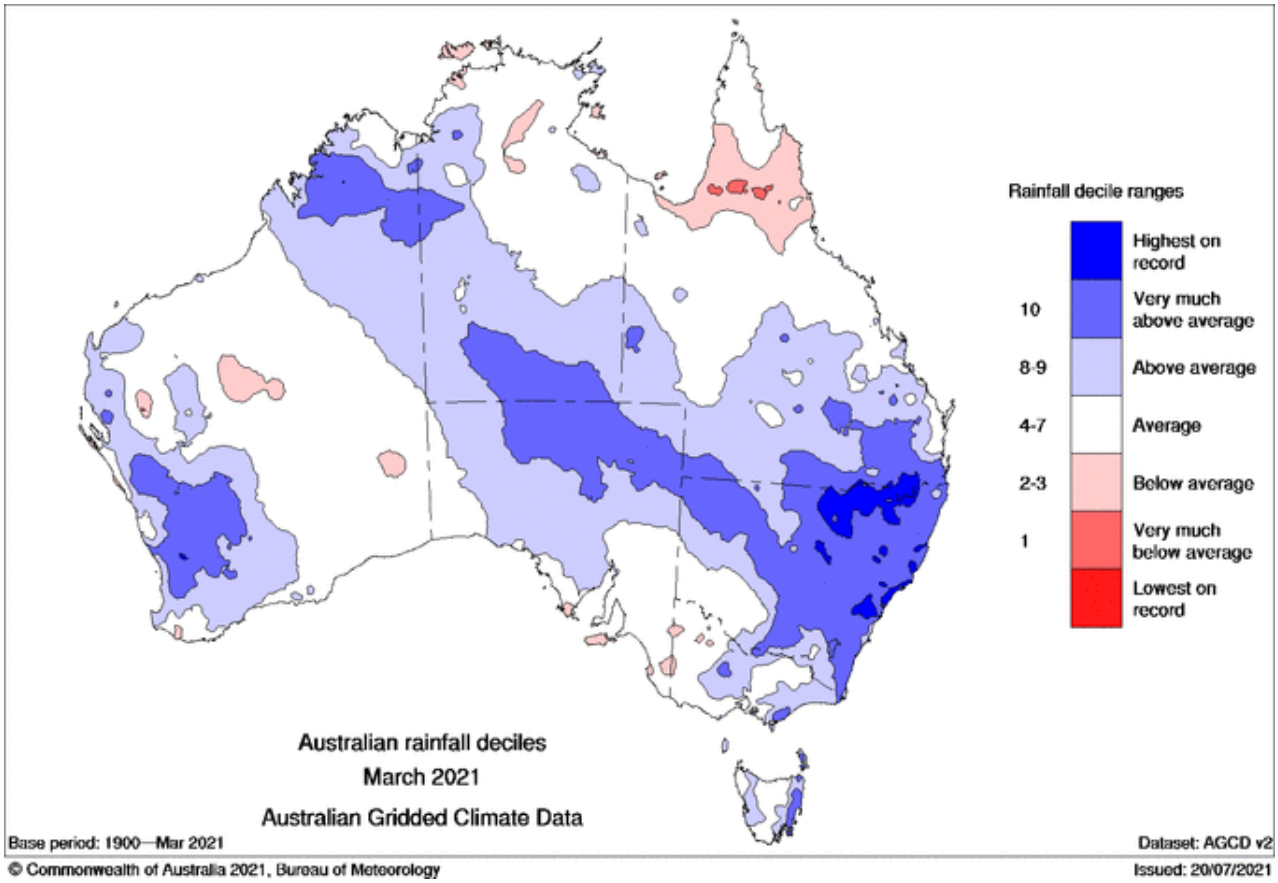


Figure 3: Rainfall deciles for March 2021 compared to historical observations from 1900

2.14 Flooding in the Hawkesbury-Nepean Valley and across Sydney impacted numerous communities. The Warragamba Dam spilled, the first significant overflow of the reservoir since 1990, which contributed to the flooding. The Hawkesbury River had multiple flood peaks with waters receding and then rising again in a number of locations.

2.15 Approximately 65,000 people were subject to evacuation warnings and evacuation orders across Sydney, with the majority in the Hawkesbury-Nepean Valley. 35 communities were isolated for varying lengths of time as a result of the flooding.

2.16 In the south-east of the state rainfall resulted in minor to moderate flooding in river systems from Wollongong to Bega and inland to the Southern Highlands and Queanbeyan. Rises in Stonequarry Creek in the Picton area resulted in an evacuation warning being issued, however evacuations were not required. Flooding and resultant infrastructure damage resulted in a number of communities being isolated.

2.17 Flooding in the river systems in Western parts of NSW was much slower moving. Towns and communities along the Darling, Paroo and Barwon River systems faced flooding and subsequent isolation for approximately 6 weeks after the rainfall and flooding impacted the eastern coast of NSW. The final flood warnings for these rivers were issued at the end of May 2021. Parts of Moree were subject to an evacuation order, impacting 4,000 residents. Other areas of the town were isolated during the flooding, with NSW SES assisting residents with resupply.

Table 2: Significant Flood Peaks During the Event

River	Location	Height (m)	Date	Status
Manning	Wingham	14.3	20 Mar	Highest since 1978
Manning	Taree	5.7	20 Mar	Highest since 1929
Manning	Gloucester	6.4	20 Mar	Highest on record
Hastings	Kindee Bridge	12.1	19 Mar	Highest since 1968
Hastings	Wauchope Railway Bridge	8.6	19 Mar	Highest since 1968
Hastings	Settlement Point	2.5	22 Mar	Highest since 1968
Camden Haven	Logans Crossing	8.8	20 Mar	Highest on record
Clarence	Grafton	6.5	24 Mar	Highest since 2013
Coxs	Kelpie Point	7.6	21 Mar	Highest since 1986
Coxs	Island Hill	3.1	23 Mar	Highest since 1998
Coxs	Glenroy Bridge	2.8	23 Mar	Highest since 1998
Hawkesbury	North Richmond WPS	14.0	21 Mar	Highest since 1998
Hawkesbury	Windsor PWD	12.7	24 Mar	Highest since 1990
Hawkesbury	Sackville	9.7	24 Mar	Highest since 1990
Gwydir	Pallamallawa	10.5	24 Mar	0.2m below 1955 record
Gwydir	Yarraman Bridge	10.0	23-26 Mar	0.2m below 1955 record
Mehi	Moree	14.2	25 Mar	0.4m below 1955 record
Macintyre	Yeman Bridge	10.0	24 Mar	Highest since 2000

THE RESPONSE TO THE SEVERE WEATHER

2.18 NSW SES received over 14,500 requests for assistance during this flood event, with over 26,000 calls to 132 500. There were over 1,000 flood rescue activations across the impacted communities.

2.19 More than 940 public information products were issued by NSW SES, approximately half of which were for the northern part of the state.

2.20 This flood event saw the largest number of people covered by NSW SES evacuation warnings and orders in any one weather event. 28 evacuation warnings were issued, impacting approximately 62,000 people. There were 24 evacuation orders issued, impacting over 25,500 residents in impacted communities.

2.21 Over 4,100 members from across NSW SES were deployed in response to the flooding. This included field teams, flood rescue operators, aviation support personnel and Incident Management Team members. Other emergency services from across the state provided support including flood rescue, storm response and incident management teams. These included NSW Police Force, Fire and Rescue NSW, Ambulance NSW, Volunteer Rescue Association, Marine Rescue NSW, and Surf Lifesaving NSW. All functional areas provided support at Incident Control Centres, Emergency Operations Centres, and the State Emergency Operations Centre. Interstate support was also provided by the National Resource Sharing Centre, with over 350 personnel deployed from across Australia to support NSW SES and the communities of NSW. The Australian Defence Force (ADF) provided aircraft to assist with search and rescue and resupply and was also deployed to assist with relief and recovery efforts in many of the impacted communities.

2.22 Aircraft were used to support the response to the flooding with tasks including resupply, reconnaissance, moving personnel into isolated communities and evacuations.

2.23 Spontaneous volunteers helped their fellow community members filling sandbags to protect properties and assisting with cleaning up flood and storm damage.

2.24 There were two flood-related fatalities during this event which are the subject of coronial inquiries.

Impacts on the Communities of NSW

2.25 A total of 15,616 rapid damage assessments were carried out across the impacted areas. Of these 1,277 houses were initially found to be not habitable.

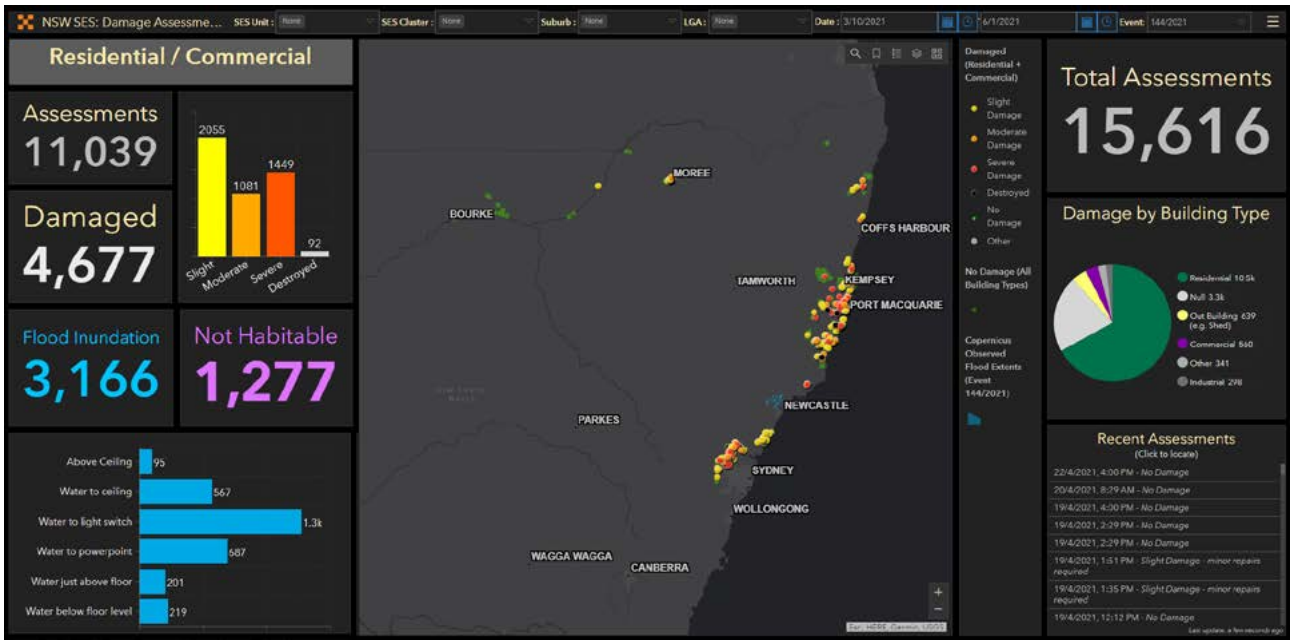


Figure 4: Rapid Damage Assessment Dashboard

2.26 Infrastructure impacts included numerous instances of power outages across the impacted communities. Roads and other infrastructure were damaged by flooding across the impacted areas. Landslides occurred in some locations resulting in road damage and isolated communities. Interruptions to commercial aviation services were also reported in several areas.

2.27 Flood damage to port infrastructure at Port Macquarie prevented the cargo vessel Island Trader, carrying out its usual resupply of Lord Howe Island. Residents faced food and supply shortages over the Easter period. The Royal Australian Airforce provided a C-130J Hercules to fly essential food and gas supplies to the residents and holidaymakers on the island.

Figure 5: Infrastructure Damage, Foreshore Drive, Corlette (Image courtesy of Port Stephens Council)

RELIEF AND RECOVERY

2.28 Natural Disaster Declarations were made by the NSW Government for 78 local government areas impacted by this storm event. This provided affected communities and individuals with a range of special assistance measures including access to financial assistance. The NSW government adopted a policy where recovery work was to be contracted to local small and medium enterprises as a priority to assist the recovery of local communities.

2.29 Multi-agency Rapid Relief Teams assisted with damage assessments and assisted householders and property owners to commence the recovery effort by cleaning out homes and businesses and moving debris in many locations.

2.30 On 22 March 2021, the Insurance Council of Australia declared an Insurance Catastrophe for large parts of NSW. As at 3 September 2021, the Insurance Council of Australia reported over 56,000 claims lodged with $650 million damages incurred; while grants distributed to individuals, primary producers and businesses amounted to over $490 million.

3. ABOUT THE REVIEW

3.1 NSW SES undertook a program of After Action Reviews (AARs) for this significant flooding event. This program was supplemented and complemented by this Independent Review, coordinated by the Australasian Fire and Emergency Services Authority Council (AFAC) and informed by the AFAC Independent Operational Review Guidelines.

3.2 The aim of the Independent Review and the AAR program was to assist NSW SES to identify key observations, learning opportunities and good practices and inform the ongoing cycle of learning and improvement within the NSW SES. It will assist in validating and evaluating existing doctrine, arrangements, policy, procedure, and incident/emergency management application. The outcomes will provide evidence to inform a range of activities including continuous improvement actions, training, and exercising.

3.3 The Independent Review provided the opportunity to have peers from within the emergency management sector review the NSW SES planning for and response to the operational event, providing an increased level of assurance regarding operational performance. The Independent Review Team focussed on the strategic aspects of this flooding event. The Team was led by a Coordinator with experience in flood planning and incident management, and experience in working with volunteers. There was also a team of lessons management practitioners from across a range of response agencies who undertook the analysis of the data and developed the lessons identified in this report. The Review Team were supported by the NSW SES Operational Improvement and Lessons (OIL) Team (see Acknowledgements for Review Team members).

SCOPE

3.4 The following matters were in scope:

The management of consequences and impacts in relation to flooding in the following areas:

- NSW SES Northern Zone
- NSW SES Metropolitan Zone
- NSW SES South Eastern Zone
- NSW SES Western Zone

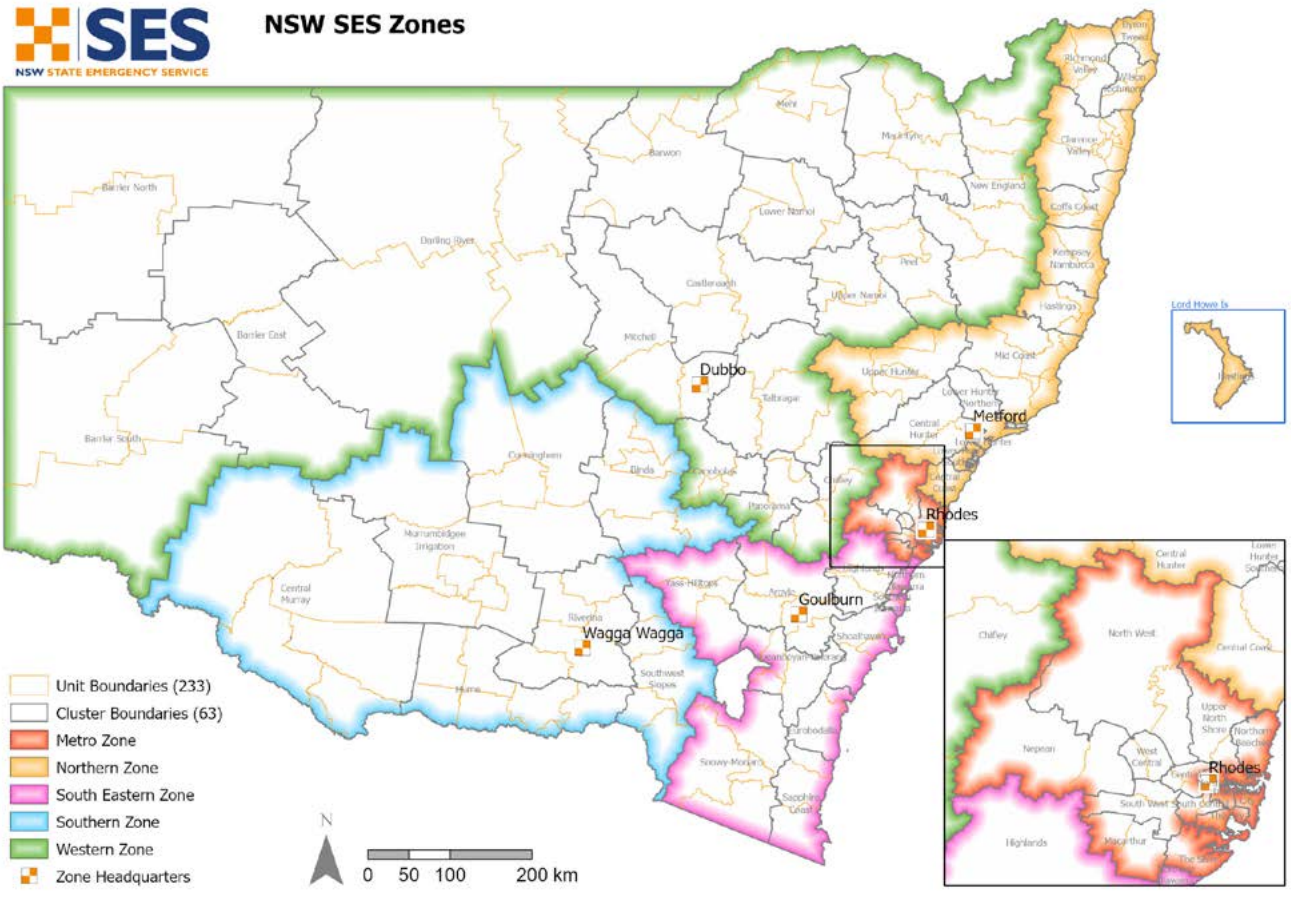


Figure 6: NSW SES Zones

3.5 The evidence base for the Review included:

- Observations from after action reviews relating to the above
- Outcomes from semi-structured interviews
- Review of relevant documentation relating to the above including but not limited to: concept of operations, incident action plans; situation reports; warnings and public information; operational policies and procedures

3.6 The following matters were out of scope:

- Operational activities outside of those listed above
- Individual performance of personnel associated with the events listed above
- Internal agency issues that did not impact the areas listed above
- Developing additional learning products e.g. case studies
- Tasking, conducting, or tracking any actions associated with any lessons
- Any legal or other investigation processes, including occupational health and safety
- NSW Emergency Management Arrangements (e.g. NSW EMPLAN, State Flood Plan, State Recovery Plan)

REVIEW THEMES

3.7 The following themes/topics were addressed during the Independent Review:

- Command & Control arrangements, including incident management structure, flood rescue coordination, with multiple/concurrent areas of operations, including availability of resources
- Warnings and public information
- Fleet, equipment, and facilities
- Processes and systems of work
- Use, and effectiveness, of flood plans in planning for and responding to events
- Interagency Operations, including activation of National Resource Sharing arrangements

METHODOLOGY

3.8 The Independent Review and AARs were conducted in line with the principles outlined in the NSW SES Lessons Management Framework:

- Learning culture - a consistent approach to the management of lessons is an essential component of an organisation that has a culture of learning. Lessons management can facilitate learning and improvement resulting in more efficient and effective practices, improved safety, and improved capture and mobilisation of knowledge. Organisations are seen to be learning when their structures, processes and culture evolve based on learning acquired from experience
- Involvement of all members – all members of the Service need to be involved in learning lessons. The lessons process is a tool to support organisational improvement and learning
- Just culture - An organisation that encourages learning from experience embraces mistakes as an opportunity to improve. A non-judgemental just culture encourages learning and maximises the potential for ongoing improvement. Lessons management is not a process that intends to lay blame or punish people or the organisation. It does not involve evaluation of an individual's performance or auditing of organisational performance, rather it focuses on the performance of systems and processes.

3.9 The process of moving from identifying to learning lessons is guided by the NSW SES Lessons Management Framework. The Framework includes a lesson development cycle which includes the following stages: collecting observations, analysing observations, developing insights and lessons, validating insights and lessons, developing recommendations, implementation and monitoring. The OILL Process (observation – insight – lessons identified – lessons learned), outlined in the Lessons Management Handbook (AIDR, 2019) is used to develop insights and lessons from observations.

Data Collection

3.10 Observations for the Review were collected through a series of AARs with NSW SES members (15 conducted); three interagency AARs; 18 semi-structured interviews and document reviews. The list of AARs and interviews undertaken can be found in Attachment 1.

3.11 Overall, 2,033 observations have been captured throughout the Review program. See Attachment 2 for a breakdown of the observations collected.

Data Analysis

3.12 To support analysing insights and identifying lessons, as per the Debrief Plan, the national lessons management process of observation, insights and lessons (OIL) was utilised to analyse the data collected, see Figure 6 OILL Process for an illustrative example and the Australian Institute for Disaster Resilience Handbook – Lessons Management[1] for more information.

3.13 Once individual observations regarding an event or activity have been collected, they need to be analysed for insights and synthesised to identify what the lessons are for an organisation. Not only is it time and resource intensive to work on individual observations, but one observation may reflect a random occurrence or aberration, rather than a systemic gap in performance that needs to be addressed. One approach to synthesising observations, analysing for insights and identifying lessons is the OILL process (observation – insight – lesson identified – lesson learned). This approach is widely used by military organisations, many emergency management agencies and private sector organisations.

3.14 Definitions of these terms are:

Observation: a record of a noteworthy fact or occurrence that someone has heard, seen, noticed or experienced as an opportunity for improvement or an example of good practice.

Insight: a deduction drawn from the evidence collected (observations), which needs to be further considered. An insight defines the issue, not the solution. Insights occur when there are multiple observations (pieces of evidence), which are similarly themed. As a rule, a minimum of three observations (from multiple sources) should be used for an insight, although an insight may be developed when a single observation poses a high risk to the organisation. Insights can be positive or negative, and can contribute to reinforcing positive behaviour or changing practices.

Lesson: a lesson is knowledge or understanding gained by experience. The experience may be positive (a good practice) or negative (a gap in performance or doctrine).

Lesson identified: a conclusion with a determined root cause based on the analysis of one or more insights and a viable course of action that can either sustain a positive action or address an area for improvement.

3.15 In the case of this Review, the process concludes at Lesson Identified, as a lesson is only learned once the approved change is implemented and embedded in the Service. Depending on the changes required, it may take several years for the change to be institutionalised across the organisation. A full iteration of a lessons learned cycle would involve the identification of a lesson, an action proposed and agreed, the solution implemented and then tested/validated to ensure the change is an improvement and the desired behaviour is sustained across the Service.

3.16 Generally, this process is effective in identifying lessons as it allows:

- Transparency in how lessons are identified
- Extensive evidence base to support lessons
- Allows all contributions to be included and considered

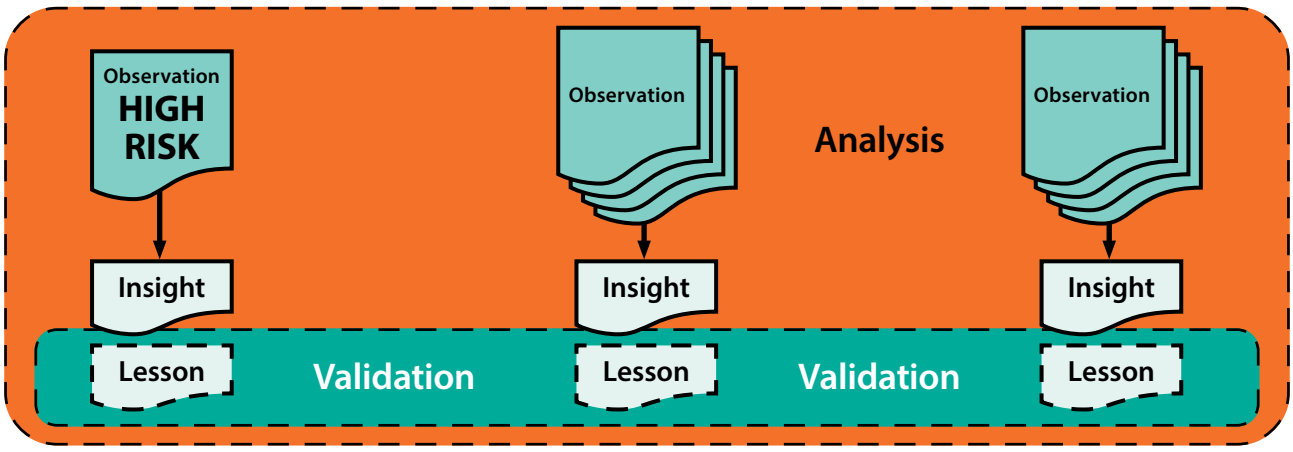


Figure 7: OILL Process

Validation of Lessons Identified

3.17 To test emerging themes and develop recommendations, a series of validation interviews were undertaken with key stakeholders and subject matter experts within NSW SES. This ensured that the lessons identified are accurate and reflect work practices or procedures and confirm that the recommendation is appropriate.

1 https://knowledge.aidr.org.au/resources/lessons-management-handbook/

4. THEMES AND LESSONS IDENTIFIED

4.1 The following sections provide a summary of each Review theme and the related lessons.

THEME 1: COMMAND AND CONTROL ARRANGEMENTS

Background

4.2 NSW State Emergency Management Plan (EMPLAN) sets out the comprehensive approach to emergency management of Prevention, Preparedness, Response and Recovery. The EMPLAN establishes the roles and responsibilities including combat agencies. The NSW SES is the responsible agency for Flood, Storm and Tsunami.

4.3 Over the past few years NSW SES has experienced an Organisational Review (2018) and an Organisational Realignment in 2019. The previous organisational structure was 17 operational regions, the current structure has the state divided into five Zones. Each Zone is managed by a Zone Commander, supported by Deputy Zone Commanders and a Zone Team. The 2021 event is the first widespread and concurrent flooding incident to be managed under the current structure and exposed vulnerabilities in the organisational structure and resourcing arrangements.

4.4 The NSW SES issues a Concept of Operations (CONOP) that informs the way the event will be managed through the stated objectives and provides guidance on prioritising response operations. This event was managed through the State Operations Centre, four of the five Zones established Incident Management Teams (IMTs) and multiple emergency operation centres. The organisation's ability to scale up to an event of this complexity proved to be challenging and resulted in insufficient numbers of appropriately trained personnel and an inability to have a full complement of teams.

4.5 Early establishment of IMTs prior to an event impacting facilitates preparedness activities and allows for event planning, and early preparedness public information messaging. The period of heavy activation with members of NSW SES having been involved in over 100 days of operational response activities presented a tension in fatigue management and the timely establishment of IMTs. Good practices in fatigue management were severely challenged throughout this event.

4.6 The NSW SES has invested in an embedded meteorologist from the Bureau of Meteorology which proved to be very beneficial in managing the event. The additional engagement of the services of a hydrologist with subject matter expertise to support the organisation also proved invaluable. The adoption of new technology with interactive dashboards enhanced the situational awareness and supported the strategic view of a concurrent and widespread event.

4.7 The transition to recovery in any event starts early and needs to engage the combat agency, be well coordinated and communicated. This event exposed vulnerabilities in the current arrangements and highlighted the need for improved cross agency coordination.

Impact of organisational structure on operational management

Lesson to Improve *Number of supporting observations (approx.) - 60*

4.8 New South Wales State Emergency Service (NSW SES) has been restructured a number of times in recent years. The considerations and requirements for efficient administration and those for effective command and control of operations are not necessarily the same across all Zones. Hazards and risks vary, as do geographic size, population density and demographics. For example, Metro Zone has potentially Australia's most significant flood risk with the Hawkesbury Nepean Valley Flood Plain, while Northern Zone contains 19 river systems. However, all Zones have very similar staffing levels, regardless of the risks in the Zone.

4.9 Staffing levels in all NSW SES Zones and the State Headquarters, impact on preparedness activities for events. Few staff are able to develop a sound understanding of all local flood risks and flood plans; there are insufficient staff to update flood plans within the required five year time frame, or update flood intelligence and action cards following events. There are tasks that do not fall into the "business as usual" roles for any staff in Zones, or the State Headquarters, including maintenance of aviation equipment kits; development of pre-prepared flood bulletins and associated warning products; ownership of distribution lists for warning products; maintenance of public information on Zone Facebook sites; removal of flood warning products from the NSW SES website or addressing any gaps or areas for improvement identified during events. With large numbers of units and/or geographically dispersed Units it is not possible for staff to maintain a detailed overview of resources or capabilities at each Unit, or of their operational readiness. These factors all impact on the ability to prepare for, and respond to, weather events.

4.10 Numerous observations in the AARs and Review interviews identify that incident management at the IMT level for this protracted and widespread flooding event was not effective, and consequently exposed the organisation and the community to significant potential risk. The area of operations, and associated span of control far exceeded accepted levels for a number of Incident Management Teams (IMTs). For example, in the Northern Zone there was one IMT managing the operational response for an area reaching from the Queensland Border to the Central Coast. Even with three Divisions established, each with a number of sectors, the area was too large to manage the response effectively. Despite utilising all available staff in the Zone, supplemented by volunteers and interagency resources, there were insufficient incident management personnel to effectively manage the roles and tasks they were allocated. For example, one Intelligence Support Officer in this IMT was responsible for monitoring nine river systems during this event, all of which were at moderate to major flood level. This, and similar situations, were not manageable and contributed to delays in issuing information and warnings to impacted communities.

4.11 Observations also indicated that there are a number of areas related to operational activity where there is limited capacity within the corporate structure to carry out process improvements post an event. Examples include upgrading business systems such as Dploy101, updating flood plans and intelligence products, or developing required processes and procedures. There were a number of observations that indicate staff are feeling overwhelmed and fatigued by the high level of operational activity that has occurred over the last 12 months, and the need to balance this with their business as usual (BAU) workloads. This is symptomatic of the lean structure of the organisation, together with the significant size of each Zone, whether it be geographic area, or number of Units and volunteers they contain.

4.12 In addition, all NSW SES Zones span multiple Emergency Management Regions, which further complicates preparing for and responding to events. It is difficult for the Zone staff to establish sound working relationships with their counterparts in each Region (see Attachment 3 for image depicting differences in emergency agency boundaries). It is widely agreed that strong working relationships between agencies is critical for effective emergency management operations.

4.13 This event demonstrated that with the current structure of NSW SES, staffing levels, and incident management skills of staff, it is very challenging for the Service to be able to manage a number of concurrent high level incidents.

Recommendation

1. NSW SES investigate and prepare business case/s to address organisational structures and increased staffing levels to support emergency planning, preparedness, training and response, as well as provide appropriate levels of support to volunteers and Units.

Figure 8: NSW SES Northern Zone - managed by one IMT

Figure 9: Hawkesbury-Nepean Valley Flood Briefing

Incident Management resourcing during a campaign event was challenging

Lesson to Improve *Number of supporting observations (approx.) -122*

4.14 Resourcing at the State Command Centre (SCC), Incident Management Team (IMTs) and sector levels during the March to June 2021 New South Wales Flood Event was difficult due to the scale, duration and complexity of the event. With four IMTs and the SCC operating concurrently there were insufficient personnel to fully expand each of these teams. The lack of resources prevented the establishment of additional IMTs, resulting in each IMT and their area of operations exceeding the span of control. A range of other emergency service organisations and agencies provided support to NSW SES during this event.

4.15 With 24/7 operations for multiple, concurrent IMTs the demand for resources exceeded the supply available.

4.16 Observations recorded challenges in finding adequate resources for the Division Commander role in all IMTs, with a lack of depth of resources to provide 24/7 coverage in this role, or to provide coverage for rest days. This was experienced across all IMTs.

4.17 The Intelligence Officer role was also extremely challenging to fill, with very few appropriately skilled and experienced members in the Service. Most Intelligence Officer and Intelligence Support roles were filled by members with limited experience, and no training. In many instances the Public Information Officer had to also cover the Intelligence Officer role due to lack of resources. For example, in one IMT, an officer had to monitor and keep track of nine river systems (all at moderate to major flooding) and the impact on communities within the various flood plains. This gap appears to have contributed to a number of significant flood triggers being missed during the event, resulting in late or no evacuation products being issued to impacted communities and posing a significant risk to communities. There were shortages of available trained Emergency Alert (EA) operators within NSW SES, with the majority of trained operators already undertaking their roles in the State Operations Centre. Additional EA operators were provided by the NSW Rural Fire Service, however the processes used by the two agencies vary, which presented challenges to interoperability for this role.

4.18 The capacity of NSW SES to provide adequate numbers of suitably trained and experienced Public Information Officers posed a risk to the timeliness, accuracy and trustworthiness of critical information provided to the public. The volume of work often exceeded the capacity allocated to the public information sections. For example, one media officer mentioned doing 42 radio interviews in a single day. Observations also noted a lack of trained or experienced community liaison officers to be deployed into impacted communities to help explain the public information messages.

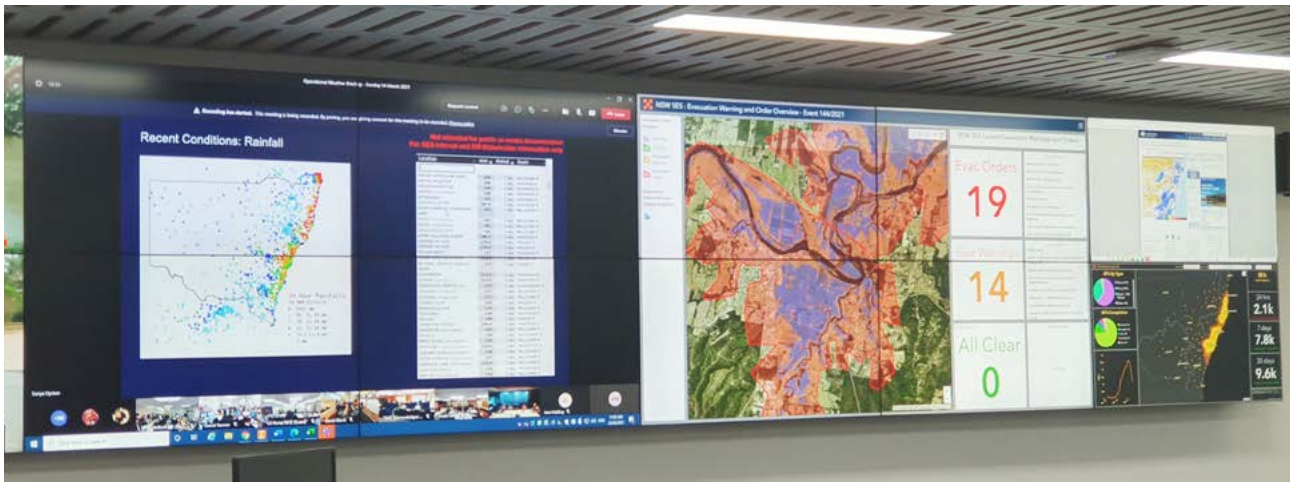


Figure 10: Situation displays in the NSW SES State Command Centre

4.19 Embedding Liaison Officers (LOs) in emergency operations centres and incident control centres increases situational awareness, enhances cross agency coordination, improves communication flows and contributes to quicker decision making. Multiple observations were made highlighting the importance of the LO role, in particular the contribution of information and knowledge and expertise. However, observations also noted the importance of ensuring LOs are appropriately trained, understand their roles and responsibilities and are suitably equipped to perform their roles. With the number of Emergency Operations Centres in operation NSW SES was unable to provide the number of skilled LOs required during this event. This impacted the communication flow and situational awareness for both the EOCs and the combat agency.

4.20 The lack of resources also contributed to challenges managing fatigue during events. While the safety of personnel remained a priority, shift lengths were often extended or stand-down days limited due to resourcing challenges. Observations also indicated that multiple personnel were performing multiple roles in IMTs in a single shift or for extended shifts. The extended shifts being worked by some NSW SES members was also noted by external agencies.

4.21 For a number of years, limited training opportunities have been available for members wishing to undertake incident management roles. While this has recently been addressed, observations indicate that there is a significant backlog of members yet to be trained. Many members were willing to participate in IMT roles without training, however observations note that due to the tempo of the event there was little opportunity for these people to receive role specific, on the job training or coaching. The State Duty Commander noted that in this event, it was through the goodwill and willingness of people with limited training that tasks were achieved.

4.22 Interagency and interstate resources were utilised extensively to enable the NSW SES to effectively manage this campaign event. Observations noted that requests for these resources were received with short notice and a number were for short-term relief in IMTs. There appeared to be a lack of adequate forward planning for resources during this event.

4.23 Recommendation 1 addresses aspects of this lesson.

Recommendations

2. NSW SES mature its approach to strategic resource management, including the use of internal (including volunteers for IMT roles), interagency and interstate resources.
3. NSW SES undertake further training and exercising of all IMT roles including liaison officers, aviation operations, flood rescue management and virtual IMT operations.

Assistance from the Bureau of Meteorology was beneficial in lead up to and during the event

Lesson to Sustain *Number of supporting observations (approx.) - 19*

4.24 Collaboration with, and input from the Bureau of Meteorology (the Bureau) was immensely beneficial in the lead up to and during the flood event. Numerous observations noted that the daily briefings from the Bureau of Meteorology provided all Incident Management Teams (IMTs) and the State Command Centre (SCC) with a clear picture of the forecasted weather event and its potential impact areas, which assisted planning and preparation for the event. These briefings were interactive, allowing specific questions to be answered for each impact area. As the extent and tempo of the event increased the Bureau of Meteorology were able to facilitate individual briefings for each IMT which further improved their situational awareness and addressed specific questions.

4.25 A number of observations also noted that having a Bureau Meteorologist and Hydrologist embedded within the State Command Centre was of great benefit. It allowed rapid access to current situational information and intelligence, which facilitated operational decision making during this rapidly escalating event. Both the Bureau of Meteorology and NSW SES personnel noted that the embedded staff also have a greater understanding of the information needed by NSW SES, as well as increased awareness of the impact on communities and response.

Recommendation

4. Maintain, and grow, the embedded Meteorologist role in NSW SES State Operations Centre, and explore options to also embed a full-time hydrology capability.

Emergency Operations Centres

Lesson to Improve *Number of supporting observations (approx.) - 9*

4.26 Emergency management practices and policy recommend that it is preferable that Emergency Operations Centres (EOCs) co-locate with the combat agency, which for NSW State Emergency Service is located in Wollongong, approximately 90 km from Sydney.

Figure 11: State Command Centre, including embedded Meteorologist

4.27 Early in the response phase Liaison Officers were located at the NSW SES State Command Centre in Wollongong. As the incident escalated the State Emergency Operations Centre (SEOC) was separated from the SCC to Sydney Olympic Park. This required NSW SES, and other agencies, to find additional appropriate resources to place in the SEOC, further stretching the agency's resources. Both the combat agency and Liaison Officers from other agencies/functional areas noted that the relocation of the SEOC away from the combat agency headquarters impacted on their situation awareness and communication with the combat agency. Hinderance of communication likely resulted in delays in the provision of information and advice to relevant stakeholders.

4.28 During this flooding event, the NSW SES Incident Control Centres were unable to accommodate the number of Liaison Officers required for an EOC for these large scale events in metropolitan and regional locations. This resulted in both Regional and Local EOCs being established across the impacted areas. With the scale of the event, and the number of EOCs operating NSW SES was unable to provide LOs to all EOCs. This impacted the communication flow and situational awareness for both the EOCs and the combat agency.

Recommendations

5. Where possible emergency operations centres should be co-located with the combat agency's incident control centres.
6. NSW SES should work with the State Emergency Management Committee to review the triggers for opening local and regional emergency operations centres, including resource requirements for Liaison Officers.

Benefits of pre-prepared public information products

Lesson to Sustain *Number of supporting observations (approx.) - 8*

4.29 All NSW SES Zones impacted by this flood event have spent considerable time developing a suite of pre-prepared public information products, including flood bulletins, evacuation warnings and orders for known flood locations, and polygons for use to issue the evacuation products via the Emergency Alert System.

4.30 Observations noted that having these products pre-prepared and needing only contextualisation in line with flood warnings assisted the Public Information Sections in these IMTs to more readily issue what is often time critical information to impacted communities. There were instances identified when recent changes to flood plans had not yet been reflected in the pre-prepared products, or there were errors/missing information in products. This required products to be developed or amended during the event, which slowed their release to impacted communities. It was also noted that, in most instances, the pre-prepared products were only for one or two flood scenarios/levels in a location. With the near-record flood levels reached in numerous areas there was the requirement to amend products and develop new polygons for many locations. This again delayed getting warning messages to impacted communities.

4.31 It should be noted that NSW SES has commenced a project to implement the Australian Warnings System (AWS). As part of this project pre-prepared warning products will be reviewed and updated into the new AWS templates.

Recommendation

7. That NSW SES continue the work to develop pre-prepared public information products, and where possible expand this to include a number of flood scenarios.

The operational structure for aviation was not clearly understood

Lesson to Improve *Number of supporting observations (approx.) - 20*

4.32 Aircraft were engaged extensively in response activities for the flooding across NSW, including from interstate and the Australian Defence Force (ADF). Weather conditions prevented the ability to utilise aircraft in a number of locations, including those from the ADF. This identified gaps within the capability of the existing fleet and crews in relation to both severe weather and night time search and rescue operations.

4.33 Observations indicate that unclear tasking and operational structure of aviation caused confusion among operators, which resulted in inefficient use of resources and duplication of efforts.

4.34 Airbase Managers (ABMs) at the airbases expressed varying degrees of visibility of the Aviation Annex to the Incident Action Plan. Inadequate documentation and document control practices potentially impacted the ABMs' awareness of changes in requirements/priorities of the aviation assets and aviation roles in the IMT. This is likely to have contributed to ABMs not being involved in tasking or tracking of aircraft, which would have impacted their ability to effectively and efficiently utilise and monitor the aircraft and its usage.

4.35 In another instance, an ABM noted that they often lacked situational awareness, as aircraft were being tasked directly by the Operations Officer and Division Commander without the knowledge of the ABM. As a result of essential information, such as assets tasked, flight and passenger details, not being communicated to ABMs, it consequently hindered their role to monitor the aircraft and tasking.

4.36 In a further example, one State Aviation Coordinator based in the State Command Centre observed a lack of awareness of policies and procedures for the tasking of aircraft. This apparent lack of awareness in the IMTs of the aviation procedure appeared to contribute to the challenges experienced by the Airbase Managers in effectively undertaking their role tasking and tracking aircraft movements.

4.37 NSW SES released its Aviation and Remote Piloted Aircraft System Policy and Procedures in September 2020. This may not have been widely known or exercised at the time of the flooding. Exercising of aviation activities has since commenced.

4.38 Recommendation 3 regarding IMT training and exercising will also address this lesson.

Recommendations

8. NSW SES should consider having a permanent staff presence at the State Air Desk.
9. NSW SES seeks to improve aviation capability for severe weather and night time search and rescue operations.

Figure 12: Night flood operations in Hawkesbury Nepean Valley (image courtesy of NSW SES Manly Unit)

Flood rescue coordination

Lesson to Improve *Number of supporting observations (approx.) - 24*

4.39 The NSW SES Flood Rescue Management Procedure outlines a number of options for managing flood rescues. During this flooding event, three separate approaches were taken – Dubbo Incident Management Team (IMT) did not establish an area of operations and had flood rescue activations managed through NSW Police Radio VKG; Metford IMT did not establish an area of operations and embedded a liaison officer with NSW Police Radio VKG to assist with triage of flood rescues; while Metro and Goulburn IMTs established an area of operations and had a dedicated Flood Rescue Coordination section in the IMT. Observations on each of the approaches pointed to both benefits and disadvantages of each approach.

4.40 Concerns were raised by some of the Liaison Officers embedded at Police Radio VKG that they had received no training in the role, and that they were unaware of any processes to guide them in the role. It was also noted that the approach of embedding a Liaison Officer at VKG is not yet widely understood across NSW SES and can cause challenges when some IMT members are not familiar with this approach. NSW SES does not as yet have an established flood rescue and triage procedure.

4.41 Observations also noted that there is no cross-agency visibility of flood rescue resources. This is essential for effective coordination of flood rescues.

4.42 The NSW SES Flood Rescue Management Procedure was finalised in August 2020. This event was the first opportunity for each IMT to implement the approach that best suited their needs. This presents an opportunity for NSW SES to review the different approaches and identify learnings that can be used in future events.

Recommendation

10. NSW SES should use the flood rescue experiences from this event to review the Flood Rescue Management Procedure and identify learnings for future exercises and events.

The transition from response to relief and recovery was not well coordinated

Lesson to Improve *Number of supporting observations (approx.) - 81*

4.43 The transition from response, to relief and recovery at all levels of operations during the March to June 2021 New South Wales Flood Event was not well coordinated, communicated or understood.

4.44 At the State Emergency Operations Centre, there were inconsistencies in agency attendance at planning meetings for relief and recovery, due to lack of communication. A number of observations noted that there was inadequate engagement with the combat agency regarding planning for the implementation of the rapid relief teams, and whole of government messaging around relief and recovery. As a result, there was disconnect experienced at all levels of the event, on the roles and responsibilities associated with the transition to recovery.

4.45 Observations from the Metford and Metro Incident Management Teams (IMTs), as well as agencies supporting the response and relief efforts, indicated that the disconnect reached the teams in the field, and the community, where the mission of the Rapid Relief Teams was not clear. This resulted in confusion about who the rapid relief teams were being coordinated by and the interaction with teams still undertaking response activities. This resulted in challenges with appropriate and timely tasking for a number of field teams.

4.46 NSW SES also identified concerns regarding challenges capturing intelligence due to lack of communication with Rapid Relief Teams, who operated independently. At the commencement of the transition to recovery the teams were entering and cleaning properties before damage assessment and flood information could be captured. This impacted on the ability to capture effective flood intelligence in a number of areas, which is particularly important with a number of these floods being at, or close to, floods of record. This intelligence is vital for the Review and updating of flood plans which will follow these floods.

4.47 The appointment of a Deputy State Duty Commander Transition to Recovery (DSDC) at the State Command Centre and experienced Deputy Incident Controllers for Transition to Recovery (DIC) in the IMTs improved the coordination of the transition to recovery activities. The DSDC was able to liaise with the Recovery agencies at the State Emergency Management Committee level, and ensure that the needs of the response agency (e.g. flood intelligence) were balanced with the need to assist impacted communities. Until this position was established NSW SES had not had the ability to influence this work at the state level. The position was also able to provide strategic level guidance to the transition to recovery efforts being undertaken by the Incident Management Teams. The appointment of Deputy Incident Controllers for Transition to Recovery (DICTR) at the Incident Management Team level also enabled effective liaison with and consistent messaging to Emergency Operations Centres about how NSW SES was managing the transition to recovery. With the establishment of these positions NSW SES had both a strategic and operational focus on recovery.

Recommendations

11. NSW SES work with other members of the State Emergency Management Committee to confirm, document and exercise arrangements for transition to recovery, relief and recovery arrangements in future events, including the provision of a Recovery Liaison Officer to IMTs and SCC.
12. NSW SES formalises the roles of Deputy State Duty Commander Transition to Recovery and Deputy Incident Controller for Transition to Recovery.

THEME 2: WARNINGS AND PUBLIC INFORMATION

Background

4.48 The Public information functional area needs to provide consistent easily understood guidance messaging to the community. The early distribution of public information products to the community was very effective in the lead up to this event. The management of media and visiting dignitaries to the SCC, IMT or the field was a resource intensive activity for the public information function and coincided with substantial output of information products.

4.49 The complexity and duration of the event exposed the vulnerabilities in the lack of trained and experienced Public Information Officers and inadequate technologies to support timely and accurate distribution of alerts and warnings products.

4.50 Digital media platforms were used with success, as they continue to evolve, greater visibility and analysis of market segmentation will ensure public information products are delivered to maximise their exposure. The website is only one of these digital media platforms; observations were that the website is difficult for the public to navigate, understand and consequently act upon the information, this was evident by the number of community responses regarding the inadequacies of the website.

4.51 The Public Information function is restricted by manual processes that require duplication of effort and actions, creating an environment ripe for operator error in high tempo events.

4.52 An integrated streamlined system would improve the productivity and quality of public information products.

4.53 NSW SES has committed to the implementation of the Australian Warnings System. This will address the issues raised regarding the sequencing of warnings, evacuation orders and all clear messaging. The current authorising process would benefit from a review to ensure facilitation of timely distribution of warning and evacuation orders.

Community resilience building supported

Lesson to Sustain *Number of supporting observations (approx.) - 16*

4.54 The level of community preparedness during the flood event was mixed. While some communities and businesses took on advice around preparedness and public information prior to the event, others ignored it during the event. A lack of understanding around public information and warnings created several consequences for community preparedness with many surprised when high level flooding occurred in their area. This contributed to an increase in flood response operations, urgent evacuations, swift water rescues and other impacts like chemicals, hazardous material and debris washing into rivers and estuaries.

4.55 There were examples of effective operational planning efforts to proactively get information to the community in the preparedness phase with it reinforced in the lead up to the event. This planning information was well received, especially for those at-risk groups (aged care, culturally and linguistically diverse, etc.). NSW SES has worked extensively with Infrastructure NSW to develop an extensive Community Resilience Program, aiming to increase flood awareness and preparedness for residents of the Hawkesbury-Nepean Valley (HNV). This program included: a broad community awareness using a social marketing campaign with a new flood mapping tool, videos and other resources, including a dedicated website (My Flood Risk); a communities of concern program with targeted partnerships addressing the most at risk; a program targeted at young people in schools; and new flood evacuation signage across the floodplain. The value of the investment in this program was seen during the flood event that occurred during March/April 2021 in the HNV. Residents were observed to respond to flood bulletins, preparing their properties and themselves for the flood event and then responding promptly to flood evacuation warnings and orders. Surveys undertaken post the flooding found that many community members reported that the campaign had increased their awareness of the flood risk during this flood event, however there are also still some community members that think flooding is unlikely in their area. This data demonstrates the value of targeted awareness and preparedness programs in increasing community resilience to flood threats in the HNV and has provided guidance for the next campaign "Floods. What's Your Plan?".

Recommendations

13. NSW SES expands the targeted community engagement preparedness programs in high flood risk areas.
14. NSW SES builds its capability to commence public information messaging as early in events as possible.

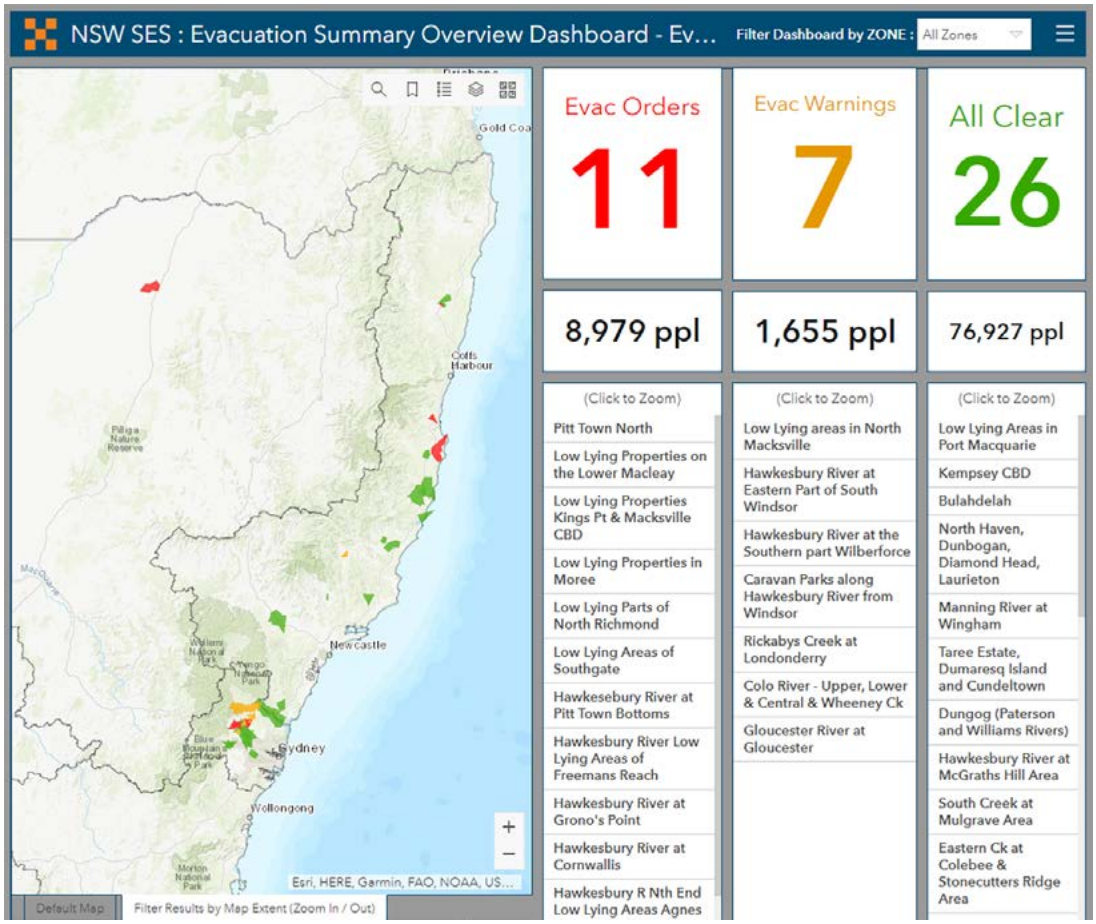


Figure 13: An example of the NSW SES Evacuation Summary Overview Dashboard – at 9pm on 26 March 2021

Opportunities to strengthen Bureau of Meteorology flood warning products

Lesson to Improve *Number of supporting observations (approx.) - 8*

4.56 There was a suite of Bureau of Meteorology (the Bureau) flood warning products issued in the lead up to and during this flooding event. The Bureau acknowledged that these products have a dual purpose, designed to inform the public and to support response operations, and as such may not contain either the detailed intelligence to support and inform operational decision making, nor provide adequate, location specific, information to warn the community. Interoperability of information was also identified as a challenge. The Bureau issued products for multiple river systems and this created significant issues for NSW SES Public Information Officers who had to spend significant time to extrapolate, deconflict and transform information into public information products. Observations from the Bureau noted that having a shared common operating picture would improve situational awareness and intelligence for their staff and help them to provide the type of information that would be most useful to support the NSW SES.

4.57 During this event NSW SES requested an embedded hydrologist be placed in the State Command Centre. The hydrologist was able to provide detailed products and additional hydrology briefings to support operations. For example, a flood scenarios model was developed to assist agencies understand possible flood situations across different river systems. While positive, it was acknowledged that these models are quite technical, require training to be effective and are not always available for all areas or river systems.

Recommendation

15. NSW SES work with the Bureau of Meteorology to explore opportunities to expand severe weather and flood prediction tools and services and develop an approach to increasing awareness of flood risks and flood plans for staff in Zones.

The public facing website is not fit for purpose

Lesson to Improve *Number of supporting observations (approx.) - 253*

4.58 There is an ongoing challenge with technology and an integration of systems, and this is particularly evident with the NSW SES public facing website. A broad range of issues were identified with the website including limited functionality, currency of information, accessibility across platforms, broken and incorrect links, frequency and order of updates and poor-quality maps. Where supporting technology does not function correctly it places extra pressure on officers to perform their duties in fast paced operations. The inadequacy of the public facing platform was supported with over 200 observations provided from the community highlighting the broad range of challenges with the website, including difficulties in navigation, ease of access to warnings and quality of mapping.

Recommendation

16. NSW SES upgrade their website, undertaking a detailed analysis of issues raised in relation to the March 2021 flood event and consulting with end users to ensure it meets their needs.

Opportunities to improve public information

Lesson to Improve *Number of supporting observations (approx.) - 30*

4.59 The shift in the way public information is accessed and understood will continue to present challenges for Public Information Officers during a crisis. While multiple methods were utilised to inform the public, the message was often inconsistent across platforms, and across messages provided by different organisations, making it difficult to interpret. Information, especially technical data, warnings and evacuation orders were at times misunderstood resulting in confusion amongst the community. Sector names and geographic names, rather than common place names, were used for emergency alerts and warnings which the community do not readily recognise or understand. In some instances, communities did not appreciate the actual risks when public information was communicated. For example, many did not understand that minor or moderate flood warnings meant actual impacts to their properties. Social media was used to push information and warnings with some success and opportunities exist to cross link social media information to reach a wider audience. It was observed that the use of plain English, certain messaging or key phrases ("life threatening") gained traction within the media to raise visibility of the flood risks.

4.60 NSW SES has committed to the adoption of the Australian Warnings System which provides a consistent approach with three warnings levels and calls to action and iconography to support messaging.

Recommendations

17. NSW SES consider implementing an integrated, streamlined system to improve the productivity and quality of public information products.
18. NSW SES builds on and utilises research undertaken in connection with the development of the Australian Warnings System, to ensure public information products are consistent and clearly articulate to the public the likely consequences and the actions required and maximise distribution through the use of digital media platforms.

Opportunities to streamline public information processes and procedures

Lesson to Improve *Number of supporting observations (approx.) - 61*

4.61 There are opportunities to improve public information and warnings doctrine, processes and systems of work. Issues across product drafting, production, approvals, distribution, communication arrangements, records and information management are either inconsistent, open to interpretation or based on multiple manual steps. This manual approach impacts timeframes for distribution of products, their consistency, structure, length and overall value to the public. The processes for the communication of evacuation warnings and orders across large geographical areas created challenges for public information teams to disseminate timely and accurate warnings. Each of these processes have several manual steps involved in their development cycle which can lead to mistakes and delayed decisions.

4.62 The delays are further exacerbated by the processes and approval authorities established in doctrine. Numerous observations cited delays in having warning products approved due to a multi-step process involved in having these products ultimately approved by the Commissioner. It is noted that this approvals process is not dissimilar to other agencies in NSW. A number of strategies were implemented in this event to address potential delays, including delegation of approval and pre-approval of evacuation products likely to be issued during a shift.

4.63 The interpretation of doctrine that defines arrangements for approving and issuing public information and warnings creates different perceptions and inconsistencies in the process. For example, there are different perceptions amongst NSW SES members on when and how to issue evacuation orders with some believing a warning must be issued first and others disagreeing. Observations also indicate a lack of clarity around where and when to issue 'All Clear' notifications to advise the public of reduced flood risk in their areas. This is exacerbated by the volume of products issued in such a large-scale event compounded by 24/7 operations. All of this has the potential to create delays in sending critical information to the public. It should be noted that NSW SES did implement strategies during this event to ensure that communities were made aware of reduced flood risks in their area.

4.64 NSW SES received significant criticism from impacted residents at post event community forums for the lack of warnings during this event. Numerous examples were cited of significant delays in issuing evacuations and warnings, with a number of residents not receiving a warning prior to the need to evacuate their properties.

4.65 Note: Recommendation 14 also partially addresses this lesson.

Recommendation

19. As part of the implementation of the Australian Warnings System review the doctrine involved in the development, approval and issuing of public information and warnings products.

THEME 3: FLEET, EQUIPMENT AND FACILITIES

Background

4.66 Inadequate facilities have a been a consistent theme of the Review. Notably there were deficiencies in seating capacity and insufficient breakout rooms that severely compromised functionality required of command and control centres. Many facilities are outdated, with inadequate technology hampering efforts to provide an appropriate response. A lack of Level 3 Incident Control Centres impedes the effective management of events and ability to co-locate with emergency operations centres. In recognition of the facilities issue NSW SES initiated an internal NSW SES Facilities Review. The Facilities Review contains multiple recommendations and when implemented, will address these deficiencies. However, it should be noted that in NSW it is the responsibility of local governments to provide facilities for their local SES Unit. NSW SES does not have authority, or funding to provide these premises.

Suitability of NSW facilities

Lesson to Improve *Number of supporting observations (approx.) - 30*

4.67 During the review into the flooding event, it was noted that there are no Incident Control Centres (ICCs) in NSW SES facilities that are suitable for Level 3 incidents, with the exception of the State Command Centre. Observations noted the challenges experienced at these facilities; some examples are:

- Lack of overall seating capacity, media rooms and breakout rooms, parking, bathroom, and kitchen facilities
- Insufficient space to accommodate Liaison Officers/Interstate Liaison Unit
- Insufficient/outdated technology and infrastructure
- Utilising a temporary Headquarters which required significant set up
- Lack of integrated operating systems

4.68 This had a significant impact on incident management during this event, where internal communication and liaison with other stakeholders was challenged by limited space and technologies.

4.69 Observations also noted that a number of NSW SES Incident Control Centres could not accommodate the number of Liaison Officers (LOs) from other agencies/functional areas required for large scale events. This resulted in LOs relocating to Regional and Local Emergency Operations Centres (EOCs). With the scale of the event, and the number of EOCs operating, NSW SES was then unable to provide LOs to all EOCs. This impacted the communication flow and situational awareness for both the EOCs and the combat agency.

4.70 NSW SES had previously recognised the challenges with its facilities and commissioned a review in this area. The NSW SES Facilities Review has been finalised. This is a detailed report with multiple recommendations that will address this insight. However, it should be noted that in NSW it is the responsibility of local governments to provide facilities for their local SES Unit. NSW SES does not have authority, or funding to provide these premises.

Recommendation

20. NSW SES should progress the recommendations outlined in the NSW SES Facilities Review.

Figure 14: NSW SES resupply to impacted communities Mid North Coast (image courtesy of NSW SES Port Macquarie Hastings Unit)

THEME 4: PROCESSES AND SYSTEMS OF WORK

Background

4.71 The agency systems and processes of work need to support the operational activities that require twenty-four/seven operability. The Review data identified systems that are bespoke, usually manual, time consuming and rarely integrated. The lack of investment in systems capability affects resource management and planning, deployments, travel arrangements, procurement processes, documentation and record keeping and access to NSW SES systems. The lack of support outside business hours for the various systems was also noted. These system inadequacies have been identified in previous AARs, and strategies to address them would contribute to better use of scarce resources during complex events.

Resource management systems and processes

Lesson to Improve *Number of supporting observations (approx.) - 14*

4.71 This Review highlighted a number of inefficiencies/challenges with systems and processes of work for resource management during operational activity. There is no centralised system to collect availability, for members or staff. A variety of manual and time-consuming process are used across Units, Zones and State Headquarters to collect this information, which then needs to be amalgamated and is unable to be effectively maintained in real time. Confirming approval for deployment by the relevant person in the chain of command is a further manual process. The Dploy101 system was developed a number of years ago as a temporary solution to deployment management, however the system is not used consistently and is not maintained, nor does it provide the required functionality for approvals. During this event it was initially found to be offline, and when restored, was not fit for purpose. Work is underway to develop an availability system for use at Unit level, however it is unclear if this will feed into the higher-level resource deployment processes.

4.72 Once availability for deployment is provided, there is no system or report for the Resource Planning Officers to confirm that members hold the skills or currency required for the roles they have self- nominated for; or those members that require additional experience to finalise their training and qualifications for a role. This resulted in a number of members without the appropriate skills being deployed to roles in this event, and some members missing out on deployment opportunities that would finalise their training for a role. The ability to identify and deploy relevant personnel in a timely manner is critical to effectively preparing for and responding to events. The lack of this capability diverts limited resources into tactical resource planning activity and contributes to challenges ensuring resources are appropriately deployed. The challenges around resource management systems and processes have been identified in AARs over many years.

4.73 Appropriate tools will support strategic resource management practices referenced in Recommendation 2.

Recommendation

21. Explore available resource management systems, including links to the proposed availability system, and develop a business case to develop and/or implement the preferred system.

Lack of decontamination processes for NSW SES members and equipment

Lesson to Improve *Number of supporting observations (approx.) - 8*

4.74 There were a number of observations from a Safety Officer, field teams and another agency, that decontamination processes were not being followed by NSW SES personnel during this flooding event. There were staging areas and forward command posts established without any decontamination facilities for flood rescue operators, their equipment or floodboats; or for teams undertaking rapid damage assessments. While decontamination is covered in flood rescue training, there are no documented procedures outlining what is required. A Safety Bulletin was issued in this event to provide guidance on decontamination. The lack of documented procedures and decontamination facilities, either mobile or fixed, during this event posed a safety risk to members, which has now been included in the Operational Risk Register. It was also noted by the Review team that few Unit facilities have decontamination or laundering facilities for personnel returning from an incident, which can lead to members taking equipment or PPC home for cleaning.

Recommendation

22. Develop a procedure identifying decontamination requirements and facilities/equipment required.

Virtual Incident Management Teams (IMT) can enhance response capability

Lesson to Sustain *Number of supporting observations (approx.) - 18*

4.75 Systems and processes to enable and support remote work expand the capacity of Incident Management Teams (IMTs) by providing access to resources who may not usually be available because they can't travel (at all or in time) and/or can't be accommodated on site.

4.76 Benefits realised from facilitating remote work with a program like MS Teams and implementing a process such as day-long team meetings resulted in improved communication and situational awareness for team members working remotely, and improvements in recordkeeping practices (e.g. consistent use of shared storage areas).

4.77 Challenges to working remotely were observed in maintaining communication and situation awareness for remote team members and obtaining approvals for work. One example from an Information and Warnings Officer noted that it was often difficult to get bulletins approved when working remotely. The Public Information Officer physically working in the IMT would have to chase down the approvals to avoid delays.

4.78 All IMTs across the event observed the benefits of remote working practices through access to additional resources, virtual meetings of IMTs and EOCs, and sharing and capturing information and records. Further development of work practices, processes and systems to support remote work, and exercising of these processes will continue to enhance the ability to benefit from remote working.

4.79 Note: Recommendation 3 also addresses this lesson.

THEME 5: USE AND EFFECTIVENESS OF FLOOD PLANS

Background

4.80 Flood plans and intelligence are a core function of a combat agency to inform flood operations. This information is invaluable if it is constructed with the end user in mind, contemporary, and currency and accuracy is maintained. The document size, accessibility, search functions and user familiarity can all limit their effectiveness in a high tempo event. The data demonstrated where they were applied, they proved useful, and this was particularly observed by interstate support.

Utility and use of flood plans

Lesson to Improve *Number of supporting observations (approx.) - 38*

4.81 Observations (opinions) varied widely on the utility and useability of flood plans. A number of observations highlight that SES personnel did not have time to read 200-250 page flood plans during the event. Some observations identify Flood Intelligence and Flood Action Cards as a more useful summary of the plans while other observations highlight that using these cards alone, without having the detail contained in the plan, led to gaps in decision making. The utility of flood plans could be improved and have key pieces of information more accessible. There is a friction between the desire to include all the detail required to manage an event and the constraints of high tempo events for users to reference the plans. There were some challenges with finding plans (electronic vs hardcopy) and different approaches to storage. A small number of observations identify that some out of area and interstate personnel took the time to read the relevant flood plan and were able to implement them. In summary, there were inconsistent perceptions on flood plans and their use (detailed vs summary: known before vs accessed during).

4.82 Where flood plans and intelligence were up to date, accessible, usable and known or read they were valuable to inform operations. There are numerous examples where, in the heat of the moment, during high tempo operations, personnel were not able to quickly access, understand and implement the plans. This indicates a lack of personnel with appropriate knowledge and experience of the plans before the event. Recognising the challenges of having sufficient personnel with local knowledge, the increasing use of out of area resources, and for this event, significant increases in the span of control, it is unlikely personnel will have a working knowledge of potentially multiple flood plans of up to 200 plus pages. There is a growing disconnect between the benefits of the detailed flood planning process and the useability of those plans by the people who have to be able to implement them, under pressure.

4.83 Flood plans were either not known, not understood or not used by partner agencies in a number of instances. The challenges of strategic coordination of multi-agency operations aside, maintaining partner agencies understanding of flood plans and the nuances of flood will remain difficult.

Recommendations

23. NSW SES prepare a business case for additional resources to be allocated to the updating of flood plans, flood intelligence and action cards.
24. In line with the NSW SES 2021-2024 Strategic Plan, the Service implement a contemporary community-focused flood planning framework which is user friendly and makes information readily accessible.
25. Ensure that flood plans form the basis for internal and external exercises.

Figure 15: Flood extents Western NSW

THEME 6: INTERAGENCY OPERATIONS

Background

4.84 In a changing climate with more intense and extreme storms the supplementing of state resources with interstate resources will become a critical component of Level 3 incident management.

4.85 This event was the first time NSW SES has requested support through the National Resource Sharing Centre (NRSC). The NRSC was established to coordinate interstate assistance during significant emergency situations, in order to support the jurisdictional response efforts. The NRSC has been utilised by agencies for a variety of emergencies including 2019/20 Bushfire, Tropical Cyclone Seroja and Queensland hailstorms. The establishment of an Interstate Liaison Unit aided the deployment process and could be further matured in the strategic management of resources to ensure better utilisation of interstate resources.

4.86 The data from the Review shows the early engagement of NRSC was a successful strategy, and the assistance provided was well received and positively contributed to the management of the event. Notably it also highlighted the need for improvements in administering deployments, including inductions, communications, access to systems and accommodation procedures.

Interstate assistance arrangements through National Resource Sharing Centre enabled effective resource upscaling

Lesson to Sustain *Number of supporting observations (approx.) - 61*

4.87 Early engagement of the National Resource Sharing Centre (NRSC) by the New South Wales State Emergency Service and early enactment of interstate sharing arrangements, relieved and uplifted resourcing within the impacted zones. Interstate deployment of qualified people in an organised and timely manner allowed fatigued NSW SES members to rest and recoup, which relieved pressure on the Incident Management, field teams and the State Command Centre members and enhanced outcomes for this event. There were a number of observations on the skills of the interstate members and the positive, professional manner in which they supported NSW SES.

4.88 As this was the first time NSW SES has requested support through the NRSC there were a number of procedural challenges identified during the deployments. Some observations from responding agencies identified that unclear communication and process due to tight timeframes caused confusion, which led to unreasonable expectation for delivery of resources. There were also challenges in organising accommodation and relaying deployment confirmation information to the incoming teams and the Incident Management Teams and Units they were being deployed to. In some instances, these resources were not expected when they arrived and were not actively engaged for some time. Observations noted that on occasions interstate personnel were not supported by handovers or local members in the IMT, or by briefings for field teams, which impacted ability to find information, access systems, and complete tasks efficiently.

Figure 16: Interagency resupply operations in the Hawkesbury Nepean Valley

4.89 NSW SES acknowledged the support provided by the NSW Rural Fire Service in establishing an Interstate Liaison Unit and the processes and procedures associated with NRSC deployments.

4.90 This level of interagency operations enabled NSW SES to provide timely and effective support to impacted communities. Members from all agencies worked well together although some challenges were noted. These can be addressed through further joint exercising and training at both an interagency and interstate level.

Recommendations

26. NSW SES includes National Resource Sharing Centre arrangements in their exercise program.
27. NSW SES continue to develop their internal procedures for deployment of National Resource Sharing Centre resources.

Emergency Management exercising assisted personnel in preparing for response activities

Lesson to Sustain *Number of supporting observations (approx.) - 19*

4.91 Well-practised and exercised Incident Management Teams with experienced members increased interagency efforts in responding to the flood event. Members of NSW SES and other agencies and functional areas observed that, as a result of participating in the previous state level flood exercise for the Hawkesbury Nepean Valley they understood the response arrangements, how agencies should work together and adjust their processes to get better outcomes for the impacted communities.

4.92 Seeking further opportunities for interagency training and exercising will continue to enhance response capability.

Recommendation

28. That NSW SES continue to undertake/participate in multi-agency exercising for a range of hazards.

5. CONCLUDING REMARKS

5.1 The Independent Review into the 2021 NSW Floods has provided the opportunity to review the NSW SES planning for and response to the floods, providing an increased level of assurance regarding operational performance of this widespread and concurrent event. In scope have been areas of command & control arrangements, warnings and public information, fleet, equipment, and facilities, processes and systems of work, use, and effectiveness, of flood plans and interagency operations.

5.2 NSW SES has reaped the benefits of devoting resources to the community engagement products in the Hawkesbury-Nepean Valley, an embedded Meteorologist, pre-prepared public information products and participation in multi-agency exercising. The strongest kudos go to the members (both staff and volunteers) of NSW SES, for their dedication and outstanding commitment to the safety and wellbeing of the NSW community.

5.3 Those who have participated in the Review, have shown a clear desire and willingness to learn from the experiences of this event. The recommendations from this Review relate to, organisation resourcing and structure, facilities fit for purpose, comprehensive program of training and exercising and implementation of the Australian Warning System. It is noted that some of the learnings from previous after action reviews have not been resourced and actioned.

5.4 We suggest that NSW SES should engage with government to consider what additional resourcing and support may be appropriate to address the issues highlighted in this Review.

ATTACHMENT 1

OBSERVATION SOURCES

The program consisted of 33 operational debriefs including:

After Action Reviews	
Metro Incident Management Team	Incident/Deputy Incident Controllers and Principal Officers
Metford Incident Management Team	Incident/Deputy Incident Controllers and Principal Officers
Hunter/Central Coast Command	Sector/Local Commanders
Mid North Coast/Northern Rivers Commands	Sector/Local Commanders
Goulburn Incident Management Team	Incident/Deputy Incident Controllers and Principal Officers
Illawarra/Southern Highlands Commands	Sector /Local Commanders
Dubbo Incident Management Team	Incident/Deputy Incident Controllers and Principal Officers
New England Command	Sector/Local Commanders
Central West Command	Sector/Local Commanders
Far West Command	Sector/Local Commanders
State Command Centre	Aviation
State Command Centre	Principal Officers
State Command Centre	Transition to Recovery
State Command Centre	Logistics/Resource Planning
State Command Centre	Interstate Liaison Unit
State Operations Centre	Coordinator Duty Officers/Call Operators
Interagency	Conducted by NSW SES
Mid North Coast Regional Emergency Operations Centre	Conducted by NSW SES
North West Metropolitan Emergency Management Region	NSW SES submission

Review Interviews	
Bureau of Meteorology	Senior NSW Staff
Metro Incident Management Team	Incident/Deputy Incident Controllers
Metro Incident Management Team	Public Information/Information and Warnings Officers
Metford Incident Management Team	Incident/Deputy Incident Controllers
Metford Incident Management Team	Public Information/Information and Warnings Officers
Goulburn Incident Management Team	Incident/Deputy Incident Controllers
Goulburn Incident Management Team	Public Information/Information and Warnings Officers
Dubbo Incident Management Team	Incident/Deputy Incident Controllers
Dubbo Incident Management Team	Public Information/Information and Warnings Officers
State Command Centre	State/Deputy Duty Commanders
State Command Centre	Public Information/Information and Warnings Officers
State Command Centre	NSW SES Lead Agency representatives - State Emergency Operations Centre
Other	
Online survey	NSW SES members
12 x Community Forum Reports	Feedback from impacted communities in NSW SES Northern Zone
Commissioners and Chief Officers Strategic Committee (CCOSC) Report	AFAC Council Paper May 2021 Interstate Deployments Debrief Summary – NSW Floods

ATTACHMENT 2

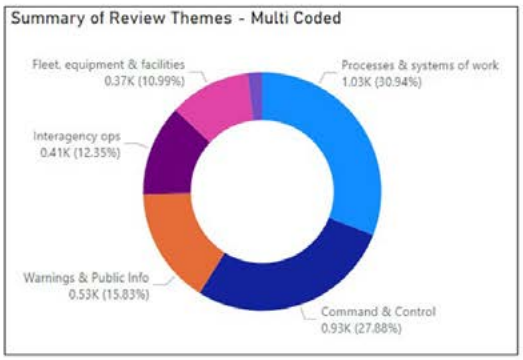
BREAKDOWN OF OBSERVATIONS

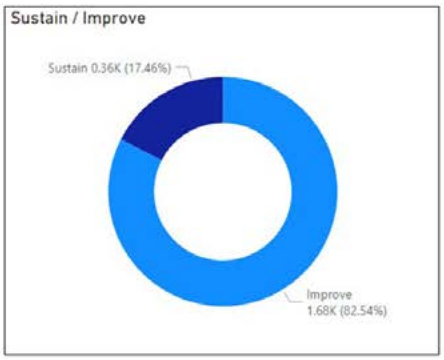
2033
Total Observations

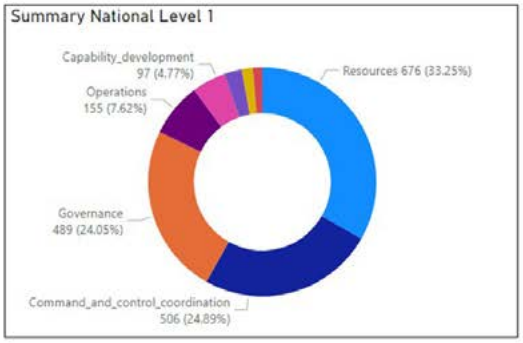
3329
Total Review Theme Tags

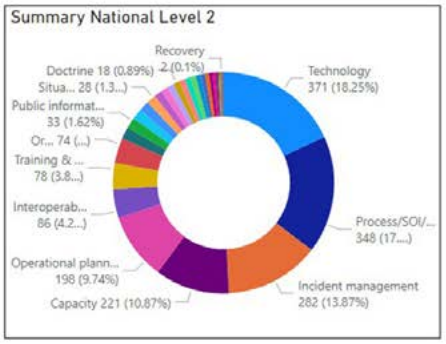
2033
Total Coded Rows (Review Themes)

2033
Total Coded Rows (National Level)



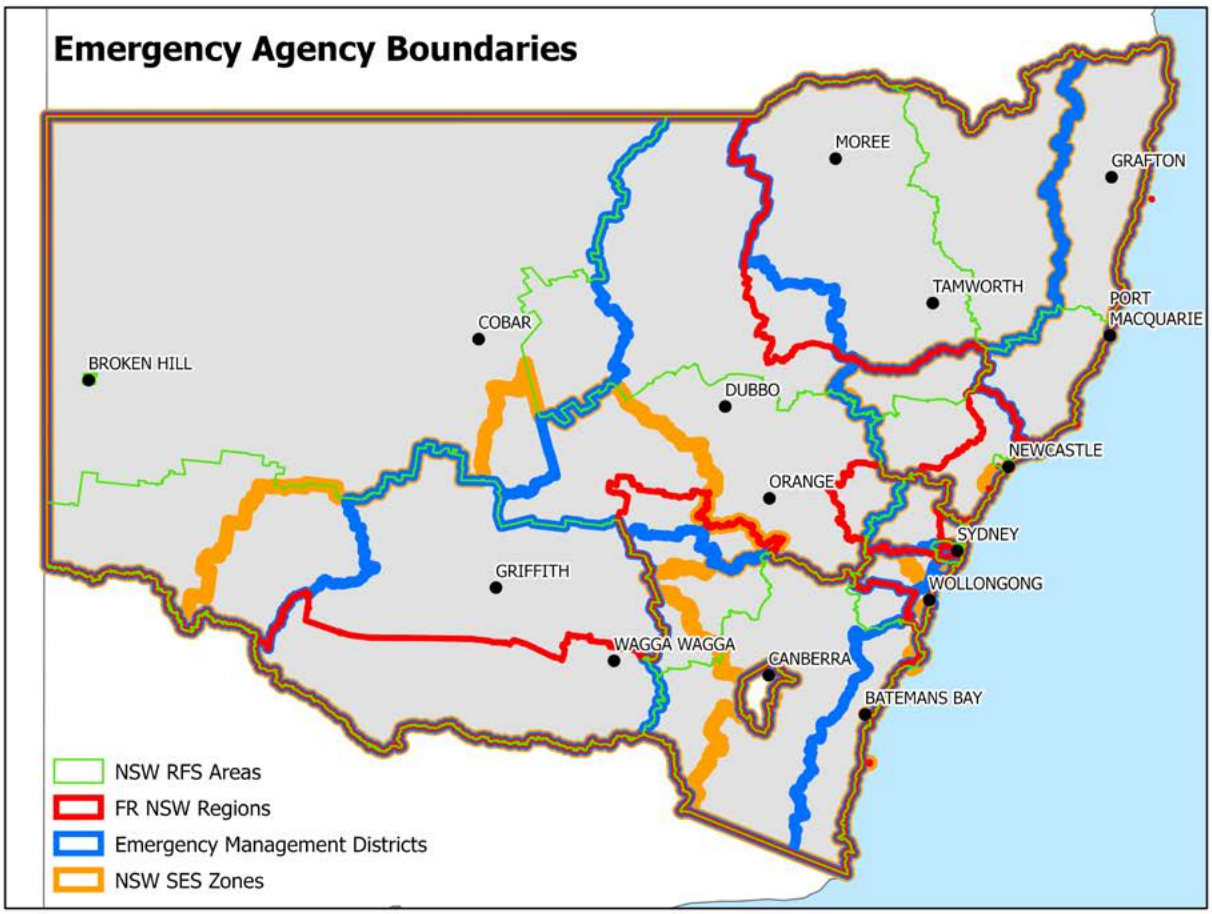


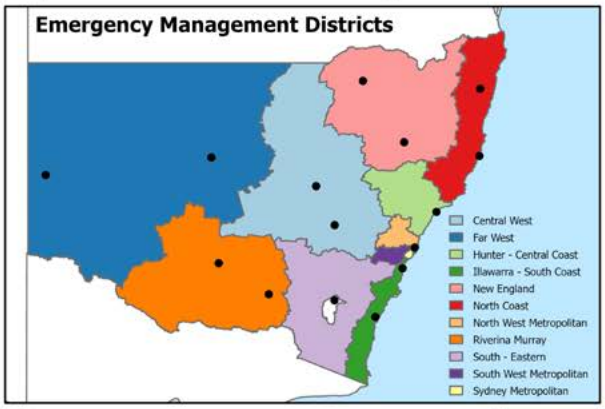


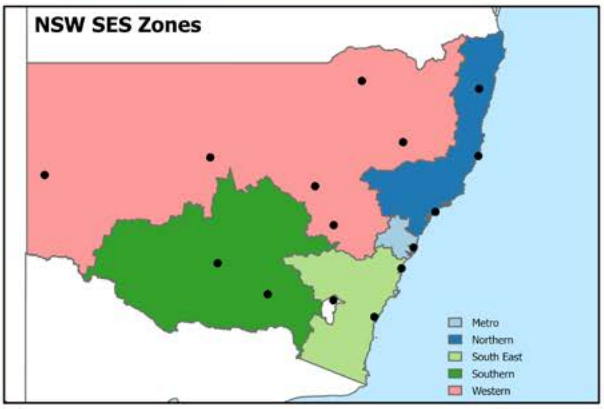


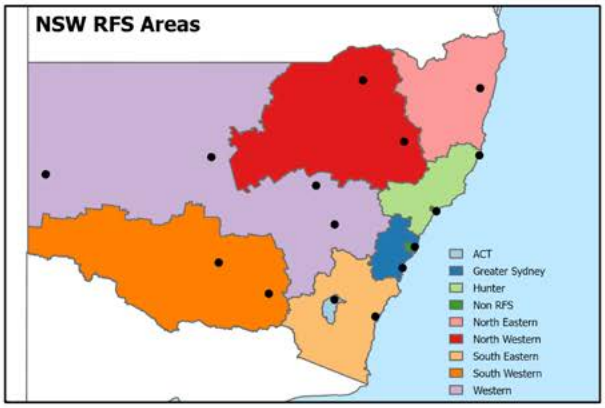
ATTACHMENT 3

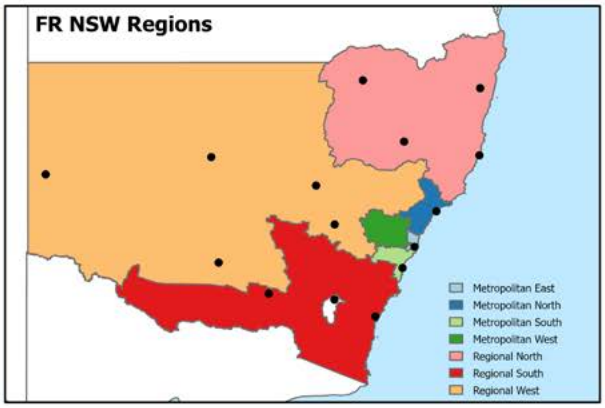
EMERGENCY AGENCY BOUNDARIES











REFERENCES

Document	Location
Lessons Management Handbook, 2nd edition (AIDR, 2019)	Lessons Management Handbook (aidr.org.au)
NSW SES Lessons Management Framework	Available on request
NSW SES Facilities Review	Internal Document
NSW SES 2021-2024 Strategic Plan	https://www.ses.nsw.gov.au/about-us/publications-and-reports/

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