

# **2019 Monsoon Trough Rainfall and Flood Review**

**Report 3: 2018–19**

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## Content

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17 June 2019



**Inspector-General  
Emergency Management**

The Honourable Craig Crawford MP  
Minister for Fire and Emergency Services  
PO Box 15457  
CITY EAST QLD 4001

Dear Minister

In accordance with your instruction of 7 February 2019, I present a report into the effectiveness of preparedness activity for and response to the monsoon trough rainfall and flooding event that occurred in Queensland in January and February 2019.

The report contains an assessment of the preparation, planning and procedures of state and local governments in the context of this event. It includes the results of a survey of the community and technical evidence relating to hydrology.

The Office has focussed on identifying the many examples of good practice and innovation that were evident during this event and opportunities for improvement.

The recommendations in this report are aimed at keeping the people of Queensland safe and making communities more resilient to disaster risks and impact.

Yours sincerely

Iain S MacKenzie AFSM  
**Inspector-General Emergency Management**



*An almost dry watercourse in the Georgina River region exemplifies the drought conditions afflicting much of Queensland in November 2018, just a few weeks prior to the onset of the monsoon trough's prolonged rainfall.*

*Inspector-General Emergency Management*



## Acknowledgement

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The Office of the Inspector-General Emergency Management acknowledges the Aboriginal peoples and Torres Strait Islander peoples as the Traditional Owners and Custodians of this Country. We recognise and honour their ancient cultures, and their connection to land, sea and community. We pay our respect to them, their cultures, and to their Elders, past, present and emerging.


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*Early afternoon sunlight shimmers  
from the vast expanse of the Flinders River  
flood plain at Malpas-Trenton, north east  
of Julia Creek, on 7 March 2019.*

*Salvation Army Outback Flying Service*



# Foreword

Reviewing and assessing the Monsoon Trough event has been a challenging exercise.

More than half of Queensland's geographic area was affected by the event which in turn meant local impacts across the State varied markedly in terms of nature, scale and specific issues.

We have seen a great variance of impacts and challenges, from Carpentaria to those encountered in Townsville. These are different again in Winton and very different yet again in Daintree Village. Mount Isa encountered its own unique challenges from the event, as did Wujal Wujal.

Despite this wide variance, the application of disaster management arrangements in all phases of planning, preparation, response and recovery was shown to be highly encouraging.

And a thread of commonality in achieving this positive position has been the plethora of beneficial outcomes arising from localised empowerment and the ability to provide immediate response and action.

The actions of the Australian Defence Force (ADF) are a good example.

The ADF told us that while they were able to maintain their strictly defined support role during the event, they were also provided with a "freedom of action" enabling them to immediately address issues and challenges as they encountered them.

The empowerment through this freedom of action enabled quicker response to on-the-ground issues and a more efficient supply of services to those most in immediate need.

This freedom of action philosophy would also do well to be extended across all agencies and Government arms in a similar way.

We saw the benefits of this philosophy in the work of the Department of Transport and Main Roads to quickly reopen the rail line to Mount Isa.

A joint regional coordination centre was established in Townsville to guide and locally direct operations to re-establish road and rail functions as quickly as possible for the community and commercial purposes.

From the centre, a staged plan based on local decisions and direction was established to allow timely road repairs. This also allowed vital heavy machinery and equipment to be sent quickly to targeted locations to repair and rebuild some of the 307km of damaged rail line.

Through this local knowledge and decision making, large sections of the rail line were quickly reopened, allowing mining, livestock and other critical supplies and resupplies to again be transported across the rail network.

Likewise, this review saw significant evidence involving local authorities such as Richmond Shire Council, where a decentralisation of decision-making to the local level and a freedom of action led to vastly quicker and improved actions and outcomes, for the benefit of communities.

Meanwhile, the value of planning was once again highlighted, not so much for the presence of plans, which inevitably needed to be altered during the event, but for the relationships formed during the planning process and for the depth of knowledge built among practitioners during these conversations.

Sadly, I am also aware that, during the time of these events, a number of people lost loved ones under varying circumstances. The impact of such losses in these trying times is difficult to imagine and the Office of the Inspector-General Emergency Management offers sincere condolences to all those affected. Given that these events are under review or investigation by appropriate authorities, this report does not examine or make comment on these events.

Queensland has a proud history of overcoming adversity caused by extreme natural weather events. These events only become disasters where their impacts intersect with our communities and the infrastructure our communities rely on.

As we prepare for future extreme events to become more frequent and more severe, the challenge will be for all of us to be able to imagine what this may look like and to act to prevent, or at least mitigate, against them and to ensure that collectively, we have the plans and relationships to overcome them when they do happen.

**Iain MacKenzie**  
Inspector-General Emergency Management



*Telescopic view of the swollen, 900m-wide torrent of the Burdekin River at 8.00am on 7 February 2019, looking east across the submerged Flinders Highway at Macrossan Bridge, 32km north-east of Charters Towers.*

Queensland Police Service



# Executive Summary

In late January 2019, tropical Queensland received an extended period of heavy rainfall as a result of an intense slow-moving monsoon and tropical lows. This event continued to affect Queensland until 9 February 2019.

Some locations, including Townsville, exceeded their average annual rainfall during the event, recording more than 2000mm. The Gulf Country and northwest Queensland, including long-term drought affected regions, also received record breaking rainfall, with some locations recording accumulated totals more than four times their normal February average.

The extreme rainfall caused major flooding across coastal locations, including the Herbert, Ross, Black, Haughton, Burdekin and Daintree rivers and Bluewater Creek. Elsewhere, the rainfall also caused major flooding across the Gulf River catchments including the Flinders, Cloncurry and Leichardt Rivers. The longest river in Queensland, the Flinders River, recorded its most significant flood in at least 50 years.

Floodwaters 700 kilometres long and 70 kilometres wide covered 15,000 square kilometres in the Flinders and Norman river basins.

In all, 39 local government areas covering 100 million hectares were activated under Disaster Recovery Funding Arrangements. These local government areas make up 56 per cent Queensland's land mass.

In summary, the 2019 Monsoon Trough Rainfall and Flood event (Monsoon Trough event) was a significant event for many Queenslanders and brought widespread damage and loss.

In response to the event, the Minister for Fire and Emergency Services, the Honourable Craig Crawford, tasked the Inspector-General Emergency Management on 7 February 2019 to assess disaster management elements of the Monsoon Trough event including:

- the preparation and planning by state and local governments and the community
- the response to the weather event, including measures taken to inform the community, protect life and private and public property, and manage the supply of essential services
- dam operations, in particular for the Ross River Dam, and associated emergency procedures
- resourcing, overall coordination and deployment of personnel and equipment, and
- other related matters the Inspector-General Emergency Management considers relevant, including land use planning and building codes.

The Office of the Inspector-General Emergency Management (the Office) consulted extensively across the affected areas and engaged with individuals and entities throughout the disaster management sector. This included targeted interviews with key stakeholders and subject matter experts. The Office commissioned a firm with expertise in hydrology and flood management to inform technical aspects of the review.

To ensure public comment was captured for the review, a market research firm was engaged to undertake a telephone survey of 500 residents in five heavily-impacted local government areas. As with all complex reviews conducted by the Office, comprehensive evidence was collated and assessed against the Standard for Disaster Management in Queensland.

The Ross River Dam is owned by the Townsville City Council. However, SunWater is responsible for the day to day operations of the dam under agreement with the Townsville City Council.<sup>1</sup> While the dam owner is required to have an approved Emergency Action Plan (EAP) which must be reviewed before 1 October each year, SunWater provides the emergency management services, in line with the agreed EAP.<sup>2</sup>

The EAP identifies how the dam owner will respond if a dam hazard event or emergency event happens. The dam safety regulator considers the EAP for Ross River Dam best practice.

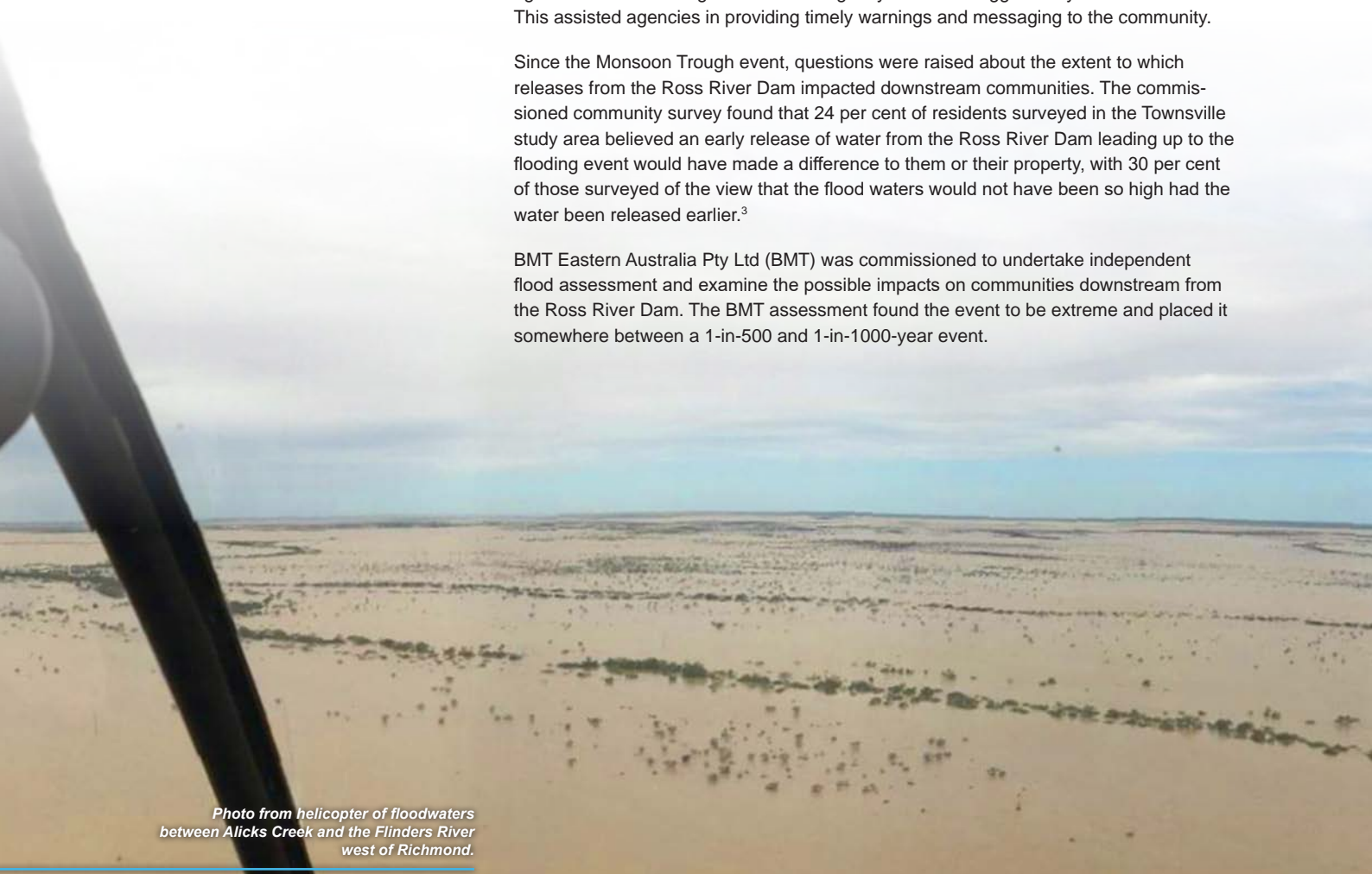
The successful operation of the Ross River Dam was at the heart of flooding in Townsville during the Monsoon Trough event. Accordingly, efficient operations and adherence to the EAP had the potential for significant implications for many thousands of residents downstream of the dam wall. The Review Team found the EAP was activated on 30 January 2019 with the automatic operation of the spillway gates during the flood event occurring in accordance with the EAP. Additionally, SunWater operated the spillway gates manually on four occasions during the flood event, at the direction of the Townsville City Council, in an endeavour to reduce the anticipated peak of the downstream flooding.

This flexible approach in implementation of the EAP was in accordance with the intent of the EAP. Any operation outside the EAP would be in exceptional circumstances, unforeseen in the EAP and only after very careful consideration by expert engineers. It should not be used as a precedent for other gated structures across Queensland. Each case would need to be assessed and decisions made based on the individual circumstances of each matter.

SunWater provided early warning to Townsville City Council and disaster management agencies as to when agreed flood emergency activation triggers may be reached. This assisted agencies in providing timely warnings and messaging to the community.

Since the Monsoon Trough event, questions were raised about the extent to which releases from the Ross River Dam impacted downstream communities. The commissioned community survey found that 24 per cent of residents surveyed in the Townsville study area believed an early release of water from the Ross River Dam leading up to the flooding event would have made a difference to them or their property, with 30 per cent of those surveyed of the view that the flood waters would not have been so high had the water been released earlier.<sup>3</sup>

BMT Eastern Australia Pty Ltd (BMT) was commissioned to undertake independent flood assessment and examine the possible impacts on communities downstream from the Ross River Dam. The BMT assessment found the event to be extreme and placed it somewhere between a 1-in-500 and 1-in-1000-year event.



*Photo from helicopter of floodwaters  
between Alicks Creek and the Flinders River  
west of Richmond.*

*Richmond Shire Council / Mayor John Wharton*



BMT considered three scenarios for the operation of the dam and identified that:

- significantly more flooding would have occurred if there was no Ross River Dam.
- arguably, there would have been increased flooding if the standard operating procedures were followed and there was no manual gate operation of the Ross River Dam.
- the impacts would not have differed appreciably from the actual event had an increased volume of water been released earlier from the Ross River Dam.

Townsville City Council also completed an emergency event report which indicated that the Ross River Dam was operated in accordance with the EAP requirements. In summary, the report found the dam performed satisfactorily during the flood event.

In terms of town and land use planning, the *Townsville City Plan 2014*'s strategic framework includes planning of future land uses to ensure adequate supply for development, while considering broader outcomes sought by the local government area. One theme the *Townsville City Plan 2014* seeks to ensure is: "*Exposure of communities to natural hazards, such as ... flood ... will be avoided wherever possible.*"<sup>4</sup>

A key element of development standards in Townsville involves 'Defined Flood Levels' and requires that habitable floor levels (or freeboard) accommodate a 1-in-a-100-year flood Average Recurrence Interval flood event plus a minimum 300mm for the lowest floor above the flood level. In adopting these standards, a risk management decision, which balances the flood risk and the cost of living has been made.

Results of the community survey found a significant portion of affected residents surveyed did not understand the terms used to communicate flood risk probability. It was also found that property searches based on address or lot plan could be undertaken using the flood hazard maps in Townsville City Plan and that property level flood reports were provided as part of a property search report which is commonly requested as part of the standard conveyancing searches for a property transfer. However, the MCR survey outcomes indicated there was limited public understanding of the flood descriptors of a 'Q100' or a '1-in-100' flood event.

Townsville City experienced a riverine flooding event greater in size and nature than anything experienced in the last 120 years. Previously, the Townsville LDMG and DDMG have focused on cyclone-related activities, primarily due to the higher likelihood and consequence of cyclones.<sup>5</sup> The review found that Townsville residents did not heed the flood warnings and messaging as strongly as cyclone messaging and accordingly greater emphasis on developing riverine flood messaging may be required in future.

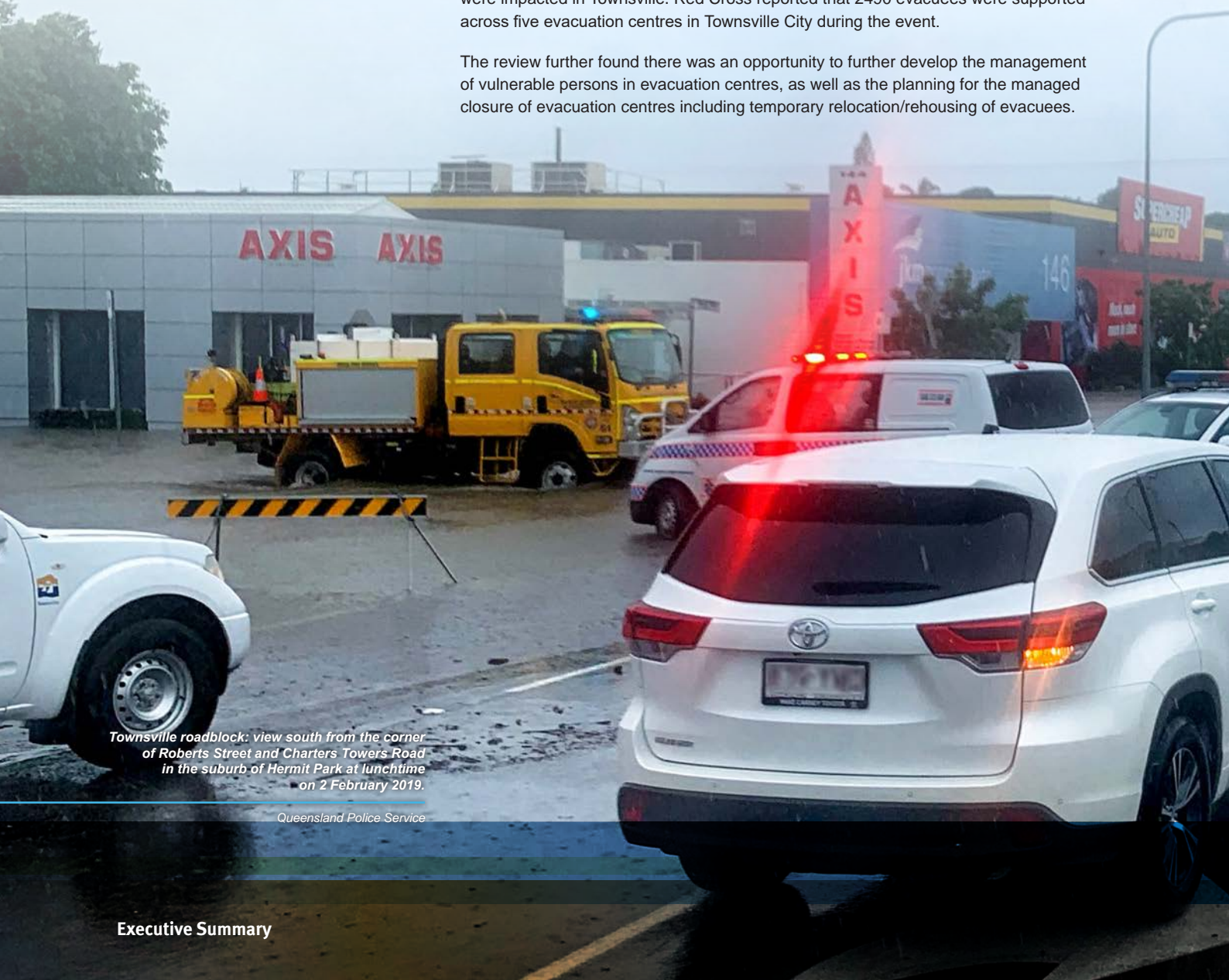
In north west Queensland, major flood waters devastated primary producers. This included the loss of up to 500,000 cattle and 30,000 sheep. The severity of this flood and the impact it had on primary producers provides an opportunity for further education in disaster planning, preparation and resilience in these affected areas, which is especially important when considering climate change.<sup>6</sup> Accordingly, the review found that agencies and disaster management groups should regularly consider the effects of climate change and the consequence of events which exceed those previously encountered or currently planned for.

The review found that disaster management groups across all levels had plans in place associated with all phases of disaster management. These plans had been shared amongst relevant stakeholders and were generally found to be easily accessible to all stakeholders and the community, with plans available online.

Over the past five years, a number of Local disaster Management Groups (LDMGs) had undertaken exercises to test disaster management plans with learnings identified and implemented during this event. In recent years, significant attention has been applied to developing partnerships between aged care facilities in the Townsville Disaster District. This has led to noticeably improved outcomes during the Monsoon Trough event.

LDMGs are the lead for evacuation management in Queensland, including the planning for both voluntary and directed evacuations.<sup>7</sup> In general, evacuation plans were found across the local level, with support from district level plans, to provide guidance of the management of evacuations, including integration with other plans (e.g. transport routes and evacuation centres/shelters management). Evacuation became a key component of the response phase for Townsville City in this event. Approximately 8000 residences were impacted in Townsville. Red Cross reported that 2490 evacuees were supported across five evacuation centres in Townsville City during the event.

The review further found there was an opportunity to further develop the management of vulnerable persons in evacuation centres, as well as the planning for the managed closure of evacuation centres including temporary relocation/rehousing of evacuees.



Townsville roadblock: view south from the corner of Roberts Street and Charters Towers Road in the suburb of Hermit Park at lunchtime on 2 February 2019.

Queensland Police Service



Councils are primarily responsible for managing disaster events in their local government areas. They are ideally placed to manage disasters at the community level, given their knowledge and understanding of social, environmental and economic issues.<sup>8</sup> Given the size of this event and the varying capacities of the affected communities, LDMGs in general responded effectively.

For many agencies and disaster management groups, the unpredictable nature of the Monsoon Trough event created a dynamic and challenging environment. However, agencies and disaster management groups mobilised a significant amount of resources and worked well together to provide a high level of safety to the community. Disaster response capability and capacity across agencies and disaster management groups in Queensland has matured, particularly for responding to floods, severe storms and cyclones.

In most instances, the coordination of services was undertaken well. Agencies worked collaboratively to deliver resources, enabling services to be delivered to those in need. Formal and informal relationships were utilised to meet these service delivery outcomes. Leadership was demonstrated with clear aims and objectives informing effective decision-making which was communicated in a timely manner.

Developing accurate forecasts and associated preparations in the lead-up to the Monsoon Trough event were extremely challenging. There were commendable efforts in public warning and information for this event, particularly of smaller and less well-resourced councils. Emergency dashboards were promoted as the source of truth for community messaging during this event. This should be encouraged as good practice more broadly.

The Emergency Alert process worked well across both larger and smaller local authorities. In total, 78 Emergency Alerts were issued between 26 January 2019 and 11 February 2019 with almost 1.5 million text messages and more than 230,000 voice messages.





Communication between agencies and groups was evident and there are many examples of effective exchange of information. Agencies and groups should look beyond simply direct information flows and continually consider the issue of supportive and effective communication in all phases of disaster management. There is also room for improvement in the interoperability between the three key information systems used by local, district and State.

ADF support was well received by local governments. In Townsville City, the ADF assisted with the supply and distribution of sandbags, established a supplementary evacuation centre at the Lavarack Barracks gym, supported the management of evacuation, and provided fuel to an aged care facility at risk of generator failure.<sup>9</sup> In recovery, the ADF also assisted with bulk waste disposal. In north west Queensland, the ADF assisted graziers to sustain livestock cut off by floodwaters, delivering more than 41 tonnes of livestock feed, as well as personal protective equipment and fuel to flood-affected communities.<sup>10</sup> A particularly positive outcome of the event was the enabling of the ADF to operate with "freedom of action", within its prescribed support role. This led to significant timely on-the-ground benefits to those most in need of immediate action.

The sharing of relevant, accurate and timely information that is easily understood and able to be used by people to take necessary action is critical. Community engagement processes not only prepare people to respond to an event but is fundamental to empowering a community and reducing their reliance on council and state resources. The review found that in some locations a lack of weather radar services impacted response activities. A number of issues with flood warning infrastructure were experienced across the State. The issues included:

- river gauges being damaged due to the flooding
- lack of infrastructure to provide adequate warnings
- inaccurate readings or loss of communications, and
- reliance of manual river height gauges.





Recovery from a disaster is a complex and lengthy process.<sup>11</sup> Some of the affected local recovery groups have never experienced or planned for recovery from an event of this size or impact. It is acknowledged that the impacts of the event and outcomes relating to recovery will not be clearly understood for a number of years. For this reason, the Office looked only at post-impact relief and early recovery from this event.

The most effective local recovery groups were found to have strong plans in place, including memorandums of understanding, service contracts and other arrangements with non-government agencies, state organisations and other stakeholders. This level of preparedness and planning and investment in the development of capacity and capability of local staff were vital in effectively establishing disaster relief and recovery.

Unique to this event was the collective impact experienced in communities which saw significant damage and losses in north west Queensland. The North Queensland Regional Organisation of Councils provided an existing network and community of practice which leveraged established relationships and a regional approach to supporting similarly impacted communities.

The early stages of relief and recovery saw a significant outpouring of goodwill in the form of financial donations, donations of goods and services and volunteering offers. Coordinating offers of assistance for donated goods and volunteer support continues to be a challenge at the local level. Most councils in the north west of Queensland did not have plans or arrangements in place with groups to support prior to the event. The Office identified that opportunity exists for District Disaster Management Groups (DDMGs) to be involved in supporting LDMGs in recovery.

Government agencies involved in relief and recovery drew upon existing professional informal and formal relationships to develop relief and recovery strategies to respond to the unique problems and issues presented by this event.

Overall, this review found that generally disaster management arrangements in north and north west Queensland were effective in preparing for and responding to the Monsoon Trough event.

A maturing of Queensland's disaster management arrangements was clearly evident in the review assessment of the event, with local leaders and agencies demonstrating the learning of lessons identified from past events. This helped shape performance and underpinned effective preparation and decision making. This has resulted in the refinement of arrangements and operations in sharing responsibility to keep the community safe.



*A farm worker moves in to receive the fodder blocks delivered to a property in the Cloncurry district on 11 February 2019 as the Army MRH-90 crew member prepares to reboard the helicopter for another restocking delivery flight.*

*Australian Defence Force*



## Findings and Recommendations

### PREPARATION AND PLANNING

#### Dams in Queensland

*Finding 1: The Ross River Dam Emergency Action Plan complies with legislative requirements, and has undergone appropriate consultation, testing and review.*

- No Recommendation

#### Land use planning - defined flood level

*Finding 2: The definition of the flood descriptors Q100, Q500, one-in-100 flood event and one-in-500 flood event are not widely or consistently understood by the public.*

- No Recommendation

#### Publicly available information

*Finding 3: Residents had low levels of understanding of the terms used to describe actual flood risk, despite them expressing very high levels of confidence about their understanding of flood risk.*

#### Recommendation 1

**Further work be undertaken to develop effective public flood risk messaging and community education materials that are easy to understand and tested with the community to ensure flood risk is understood.**

#### Disaster management planning – Disaster management plans

*Finding 4: Plans that are tested for integration with other stakeholders and across disaster management levels are more robust and provide for better outcomes.*

*Finding 5: Some local plans would benefit from further development to ensure appropriate and sufficient consideration is given to disaster recovery. Local Recovery plans established before an event should consider likely effort required across all functional recovery groups.*

*Finding 6: Whilst Townsville City Council's Tropical Cyclone community education program is commendable, an opportunity exists to enhance community preparedness regarding riverine flooding.*

*Finding 7: Climate change will exacerbate the frequency and severity of disaster events in Queensland.*

#### Recommendation 2

**State Government agencies with key roles and responsibilities around disaster recovery provide increased support in the development of recovery at the local level (pre-event).**

#### Recommendation 3

**Entities with disaster management responsibilities need to integrate the eight priorities identified within the *Emergency Management Sector Adaptation Plan for Climate Change* into their disaster management planning cycle.**

#### Disaster management planning - Business continuity planning

*Finding 8: Stakeholders who look for opportunities to build resilience and reduce dependencies on partners typically have more robust business continuity plans.*

- No Recommendation

#### Disaster management planning – Application of lessons learned

*Finding 9: State agencies and local governments that consider the People with vulnerabilities: A framework for an effective local response and engage with stakeholders during the planning phase are better placed to meet the needs of the vulnerable.<sup>101</sup>*

*Finding 10: Benefits would be gained in developing information and education programs for vulnerable groups to reduce their disaster-related risks and to build individual preparedness and resilience.*

- No Recommendation

#### Disaster management planning – Evacuation

*Finding 11: Effective evacuation plans consider additional instructions and specific measures to accommodate vulnerable persons in evacuation centres, including measures to safely store medications and separate evacuees with additional needs from others (e.g. evacuation centre for aged persons).*

#### Recommendation 4

**Evacuation centre plans be revised to better manage vulnerable persons, including the safe storage of medications and providing alternate arrangements for evacuees with additional needs. (e.g. evacuation centre for aged persons).**

### RESPONSE

#### Dam operations and flood warning infrastructure

*Finding 12: Significantly more flooding would have occurred if there was no Ross River Dam.*

*Finding 13: Arguably, there would have been increased flooding if the standard operating procedures were followed and there was no manual gate operation of the Ross River Dam.*

*Finding 14: If there had been increased water releases earlier from the Ross River Dam, there would have been no appreciable difference to flooding impacts.*

- No Recommendation

#### Communication between SunWater and Townsville City Council

*Finding 15: The Ross River Dam was operated in accordance with the Emergency Action Plan and a flexible approach to implementation of the Emergency Action Plan was undertaken. The Emergency Action Plan's implementation provided improved outcomes, particularly in terms of communication and notification and in the flexible operation of the dam which resulted in reduced flooding.*

- No Recommendation

#### Ross River Dam – Emergency event report

#### Recommendation 5

**As part of the annual Emergency Action Plan review for the Ross River Dam, consideration should be given to the potential impacts of operating the gate outside automatic mode and whether this event has provided any new information and learnings which can be incorporated into the Emergency Action Plan. This should occur prior to the 2019/20 wet season.**

#### Disaster management arrangements

*Finding 16: District Disaster Management Groups activated to an appropriate level and provided support to Local Disaster Management Groups during the response phase of this event.*

*Finding 17: Information regarding activation levels is not collected and recorded consistently through the various systems in use.*

*Finding 18: Some inconsistency of the use of the terms 'stand up', 'activation' and 'activated' contributed to confusion and misunderstanding between stakeholders.*

#### Recommendation 6

**A single point of truth be established for accurately capturing and reporting on disaster management group activation levels for any given timeframe.**

#### Disaster coordination centres

*Finding 19: Consideration of location and facilities of coordination centres and how they will be operated during an event are valuable planning exercises. This helps identify both strengths and opportunities of issues such as co-location or administrative requirements.*

- No Recommendation



## Findings and Recommendations

### Public warnings and communication

*Finding 20: Local disaster dashboards provided on Council websites proved valuable in informing the community and were recognised as the 'point of truth' by much of the public in this event.*

#### Recommendation 7

**Councils, with the support of stakeholders, continue to develop and promote local disaster dashboards as the 'point of truth' for community information and messaging during disaster events. Greater use during recovery should be considered.**

#### Emergency alert

*Finding 21: More effective use of Emergency Alert during this event through improvements to process and timely outputs was observed.*

*Finding 22: Greater consistency of understanding can be achieved through the continued delivery of the detailed Emergency Alert training being provided to Queensland Fire and Emergency Services Emergency Management Coordinators and other key positions.*

- No Recommendation

### Information sharing and requests for assistance

*Finding 23: Informal support was provided by neighbouring Local Disaster Management Groups, in a cooperative environment, which achieved better results for affected communities.*

*Finding 24: Advantages were gained by agencies establishing operation centres at locations best suited for delivering the necessary functions, with appropriately authorised, skilled and experienced manager/s placed at these centres to support local leadership and direction.*

*Finding 25: There were some delays identified in timely actioning of requests for assistance due to a range of technical and administrative obstacles leading to misunderstandings between local, district and State levels. These issues have been previously identified in The Cyclone Debbie Review and are under consideration.*

#### Recommendation 8

**The provision of system-wide tools, education, guidance and testing for requests for assistance is strengthened to enhance understanding and outcomes.**

#### Resourcing, coordination and deployment

*Finding 26: Agencies that responded most effectively had invested significant effort to ensure persons deployed have been previously identified, trained and had opportunity to build relationships with stakeholders.*

- No Recommendation

### Australian Defence Force and Defence assistance to the community

*Finding 27: The successful outcomes achieved in response and early relief measures were in no small part due to the engagement, effort and professionalism of the Australian Defence Force personnel involved.*

*Finding 28: The 'freedom of action' afforded to the Australian Defence Force commander resulted in timely and effective deployment of personnel and equipment to best suit the task at hand.*

*Finding 29: There is a risk of over reliance on, or expectations of, Australian Defence Force availability in terms of both capability and capacity. There are many factors domestically and internationally that may influence this availability.*

#### Recommendation 9

**Greater emphasis be placed on pre-planned and pre-determined arrangements between the Australian Defence Force and State and local agencies.**

#### Evacuation

*Finding 30: The actions of Energy Queensland staff during assisted evacuations provided increased safety to evacuees and responders.*

*Finding 31: Improved planning for the managed closure of evacuation centres will deliver benefits to evacuees and those responsible for managing these centres.*

#### Recommendation 10

**Energy Queensland and local groups consider establishing formal arrangements that embed measures that assist evacuation plans to increase levels of safety.**

#### Recommendation 11

**The Department of Housing and Public Works should be included within Local Disaster Management Group evacuation centre planning and plans and assist with decision making around the relocation of evacuees from evacuation centres.**

### RELIEF AND RECOVERY

#### Recovery governance in Queensland

*Finding 32: Local Disaster Management Groups and District Disaster Management Groups functioned best when agencies were able to provide consistent locally based attendance.*

*Finding 33: Agency planning should consider the identification of the depth of resourcing required for protracted and complex events. This should include the provision of suitably trained, equipped and experienced personnel to support Local Disaster Management Groups as required.*

*Finding 34: Some Local Disaster Management Groups required additional support beyond existing planning to develop effective relief and early recovery planning and operations.*

*Finding 35: Some Local Disaster Management Groups were better positioned than others to manage offers of assistance. This was largely due to an understanding of the need to pre-plan and establish partnerships with organisations that understand local need.*

#### Recommendation 12

**The progress of recovery for this event be reviewed incrementally over the next 2 to 3 years, with a formal, independent report provided on the effectiveness of the recovery after 3 years.**

#### Recommendation 13

**Local groups should plan for and establish clear arrangements to effectively manage offers of assistance including the management of goods, services and volunteers.**

#### Collaboration, coordination and innovation

*Finding 36: Agencies often relied on informal interpersonal relationships to develop innovative solutions to overcome significant challenges in managing relief and recovery activities.*

*Finding 37: Local spontaneous volunteers could have been better managed to make the best use of their time and skills and to leverage community involvement to meet local community needs.*

#### Recommendation 14

**Councils should formalise arrangements with entities that have the skills, capability and capacity to effectively manage spontaneous volunteers. These should be documented and integrated into planning and exercising.**





*View south on 31 January 2019 over the floodwater-engulfed locality of Maxwellton, 50km west of Richmond on the Flinders Highway.*

Queensland Rail



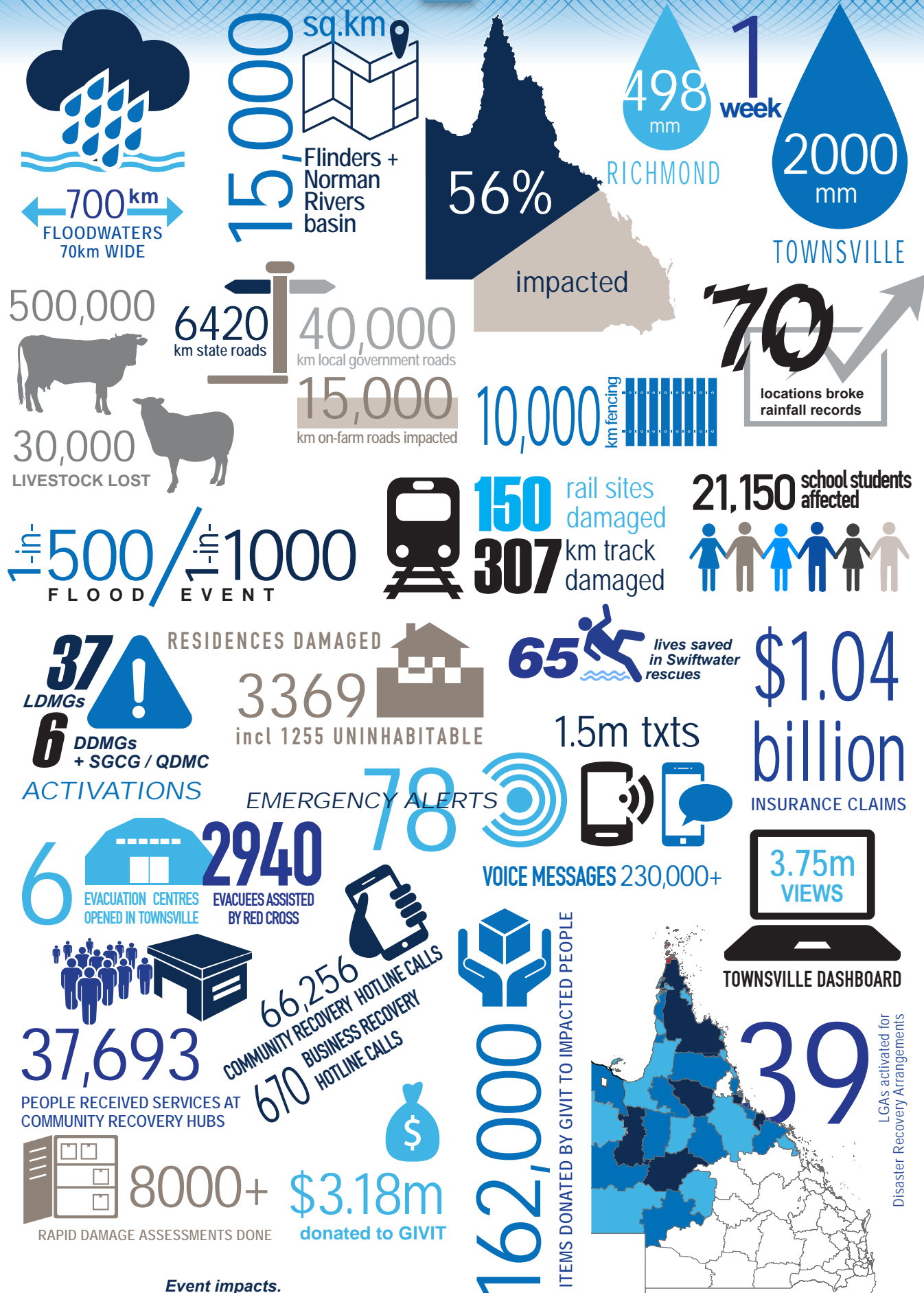
## Introduction

In late January 2019, tropical Queensland received an extended period of heavy rainfall as a result of an intense slow-moving monsoon and tropical low. It continued to affect Queensland until 9 February 2019. Some locations, including Townsville, exceeded their average annual rainfall in less than a week with more than 2000mm.<sup>12</sup> The rainfall caused major flooding across coastal locations including the Herbert, Ross, Black, Haughton, Burdekin and Daintree Rivers and Bluewater Creek.

The Gulf Country and north west Queensland, including long-term drought-affected regions, received record-breaking rainfall. Some sites in north west Queensland received accumulated totals more than four times the February average.<sup>13</sup> The rainfall caused major flooding across the Gulf River catchments including the Flinders, Cloncurry and Leichardt Rivers. The longest river in Queensland, the Flinders River, recorded its most significant flood in at least 50 years.

The rainfall from this event was exceptional. Between 23 January and 14 February 2019, 39 local government areas were affected by the monsoon trough and significant rainfall and flooding.<sup>14</sup> Prior to the onset of this event, the majority of the impacted areas had received below-average rainfall dating back to April 2012.<sup>15</sup>





Event impacts.



## Purpose

The purpose of the review is to independently assess the effectiveness of preparedness activity for and response to the Monsoon Trough in January and February 2019 that occurred in north and north west Queensland.

This report examines how the Queensland Disaster Management System prepared for, responded to and provided early relief and recovery to those impacted by the monsoon rainfall and flood event.

The report also includes other matters the Inspector-General Emergency Management (IGEM) considered relevant to the Monsoon Trough event including land use planning.

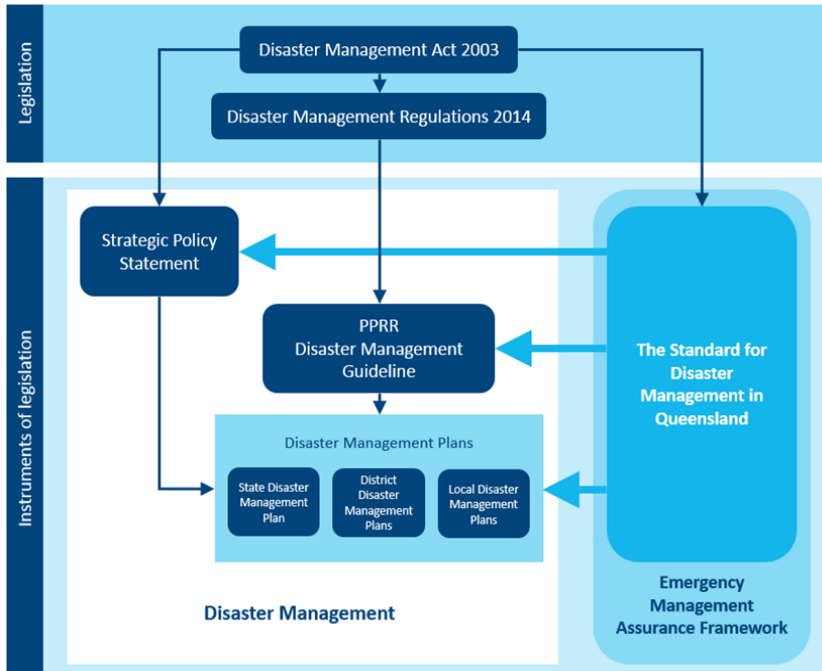
## Authority

The Office has a legislated function under the *Disaster Management Act 2003* (Qld) (DM Act), to work with entities performing emergency services, departments and the community to identify and improve disaster management capabilities.<sup>16</sup>

Functions relevant to this review include:

- regularly review and assess the effectiveness of disaster management by the State - s.16C(a)
- regularly review and assess the effectiveness of disaster management by District Disaster Management Groups (DDMGs) and Local Disaster Management Groups (LDMGs) - s.16C(b)
- regularly review and assess cooperation between entities, including compatibility and consistency of systems and procedures - s.16C(c)
- review, assess and report on performance by entities responsible for disaster management against the disaster management standards - s.16C(f)
- work with entities performing emergency services, departments and the community to identify and improve disaster management capabilities, including volunteer capabilities - s.16C(g)
- monitor compliance by departments with their disaster management responsibilities – s.16C(h)
- identify opportunities for cooperative partnerships to improve disaster management outcomes - s.16C(i).

The review is bound by the [Standard for Disaster Management in Queensland](#) (the Standard), the DM Act, and other relevant doctrine including the Office of the Inspector-General Emergency Management's *Stakeholder Engagement Framework 2014–2018*.<sup>17</sup>



*How the Standard sits against the DM Act, DM Guideline and plans.*

Office of the Inspector-General Emergency Management

## Scope

The review aligns with the functions of the Office of the Inspector-General Emergency Management (the Office) as outlined in section 16 of the DM Act. The review terms of reference were designed to ensure a robust approach to continuous improvement across all aspects of Queensland's disaster management system.

## Terms of Reference

The Office was tasked on 7 February 2019 by the Honourable Craig Crawford MP, Minister for Fire and Emergency Services, to assess the effectiveness of preparedness activity for and response to the Monsoon Trough event in January and February 2019 that occurred in north and north west Queensland.

Working closely with the Queensland Police Service, Queensland Fire and Emergency Services, local, state and federal government agencies, and other relevant entities from impacted communities and surveyed members of the community, the Office assessed:

- the preparation and planning by state and local governments and the community
- the response to the weather event, including measures taken to:
  - inform the community
  - protect life and private and public property
  - manage the supply of essential services
- dam operations, in particular for the Ross River Dam, and associated emergency procedures
- resourcing, overall coordination and deployment of personnel and equipment
- other related matters the IGEM considers relevant, including, for example, land use planning and building codes.

The Terms of Reference for this review are included in Appendix A.

## Out of scope

A review into the internal operations of specific agencies was out of scope.

Due to timing of the review, only early relief and recovery activities and arrangements have been considered.

## Methodology

The scope informed the approach and structure of this review.

In total, 39 local government areas were activated for disaster recovery funding following the Monsoon Trough event. The IGEM and review team members travelled to many of the activated areas to hear the experiences and impacts across the communities. These visits assisted in shaping the areas of focus and structural approach for this review.

In consultation with the Queensland Reconstruction Authority (QRA), and based on early assessments of the impacted areas, 13 local government areas were identified as particularly affected by the Monsoon Trough event. From this, the Office designed a comprehensive engagement program with key stakeholders to collect data to inform the review.

### Engagement and data collection

The engagement program was developed to hear how the Monsoon Trough event had impacted key stakeholders and their communities; identify issues associated with the event and disaster management arrangements; and highlight lessons identified and good practice examples. Data collection for the review included:

- engagement with 78 entities across the sector, including 39 local government authorities and LDMGs, six disaster districts, 17 state government agencies, three Commonwealth agencies and 13 non-government organisations (NGOs)
- legislation, policy, plans, guidelines, doctrine and other associated data
- insights collected through a commissioned community survey
- document analysis and stakeholder interviews to analyse barriers, enablers and good practice
- previous reviews undertaken by the Office and other entities
- scientific research commissioned by the Office.

Information obtained through engagement and data analysis assisted to identify themes and lessons for this review.



These themes and lessons were most strongly representative in the local government areas of Cloncurry, McKinlay, Richmond, Flinders, Winton, Douglas, Carpentaria, Burke and Townsville. The Office focused on these areas for the purposes of the review, and in doing so assessed capability and performance of the disaster management system in these areas against the Standard.

Aligned to the terms of reference, the Office also considered the operations of the Ross River Dam and associated emergency procedures, the flood impacts and modelling around Townsville, land use planning, and the coordination of resourcing and deployment of personnel and equipment for the Monsoon Trough event.

### Community consultation

As with all emergent reviews, the Office was keen to clearly understand the impact of events and associated planning and disaster management arrangements on members of the community. The approach to public consultation was four-fold:

- a telephone survey by an independent market research company — Market and Communications Research (MCR) — of residents in the heavily-impacted areas of Townsville, Cloncurry, McKinlay, Richmond and Flinders
- attendance at meetings and debriefs by key local and district disaster groups and State agencies
- consultation and interviews with individuals and key agency representatives involved with or affected by elements of the monsoon
- formal submissions from the public and representative groups.

To ensure findings from the community survey were robust and statistically valid, MCR was commissioned to develop a questionnaire and survey. The survey achieved a minimum 95 per cent confidence interval, meaning significant confidence can be placed in the accuracy of the survey findings.

The local government areas of Townsville, Cloncurry, McKinlay, Richmond and Flinders were selected for the survey, broken into two geographic areas:

- study area 1: Townsville region (people living in suburbs that were most heavily impacted — see method for specific suburbs within the MCR Community Research report at Appendix E) (n=400)
- study area 2: Western region (people living in the local government areas of Flinders, Richmond, Cloncurry and McKinlay) (n=100).

The objective of the telephone survey was to:

- understand community engagement with local disaster management arrangements
- measure community awareness and understanding of flood risks
- understand the personal impacts experienced as a result of the recent event
- understand the sources of information consulted by community members in the lead-up to and during the recent event.

MCR also undertook one-on-one qualitative interviews with a small number of people (seven) who attended evacuation centres during the Monsoon Trough event.

An online link to the MCR report can be found at Appendix E.

### Submissions

Submissions were sought from members of the public and agencies regarding experiences, pertinent observations and comment involving aspects of the Monsoon Trough event. The purpose of calling for submissions was to better inform consideration of elements of the Monsoon Trough event and provide greater stakeholder insight for the Office.

As part of the process of seeking public and agency input, a total of 74 entities and representative groups were also directly invited to make submissions. In all, 26 submissions were lodged with the Office.

The Office received nine submissions from members of the public and 12 government agency submissions. Submissions were also received from three NGOs and two professional organisations.

The submissions covered a wide range of matters including:

- dam operations and release protocols
- radio broadcasting and messaging
- animal welfare and cattle classification
- historic local aspects which may have contributed to the flooding
- public rainfall readings and flood comment and observations
- matters pertaining to engineering aspects of the review
- LDMG activations
- evacuation centre commentary
- international best practice.

The Office would like to thank those who prepared and provided submissions and acknowledge the considerable effort and care taken. The insights from these submissions guided the direction of the review and led to inquiries which assisted with the identification of recurring issues and themes.

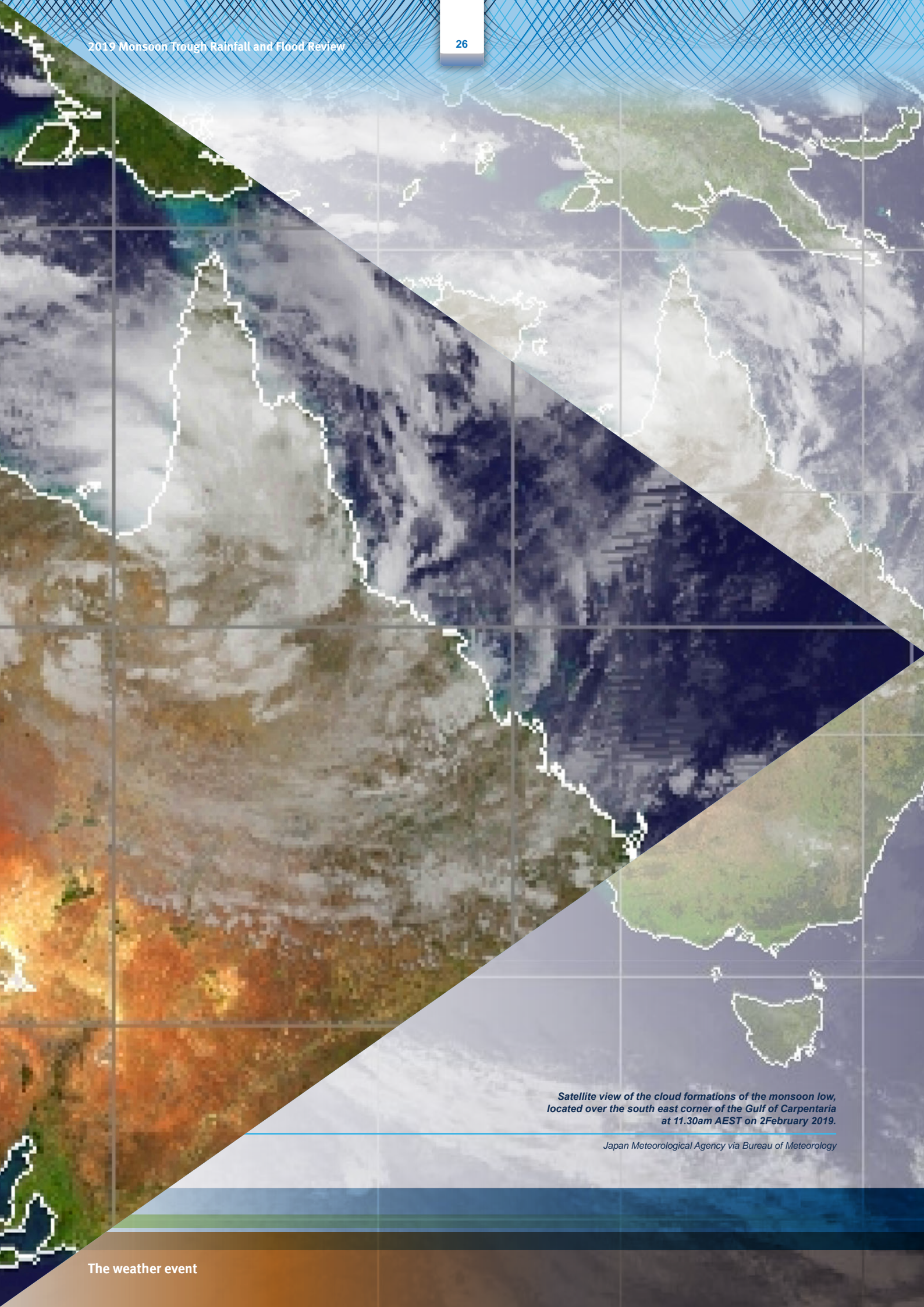
### Research

The Office commissioned research, advice, and commentary from expert independent hydrology and flood management firm BMT Eastern Australia Pty Ltd to:

- report on the impact of the rainfall associated with the Monsoon Trough event and quantify any effect operations of the Ross River Dam had on associated flooding downstream of the dam.
- assess the performance of the Ross River Dam in the lead-up to, and during, the Monsoon Trough event and the impact the dam's operations had on flooding downstream of the dam.

The BMT Eastern Australia Pty Ltd work was led by a suitably qualified person who is a registered professional engineer in Queensland. Relevant public and agency submissions were provided to BMT Eastern Australia Pty Ltd. An online link to the BMT Eastern Australia Pty Ltd report can be found at Appendix E.





*Satellite view of the cloud formations of the monsoon low, located over the south east corner of the Gulf of Carpentaria at 11.30am AEST on 2February 2019.*

*Japan Meteorological Agency via Bureau of Meteorology*



## The weather event

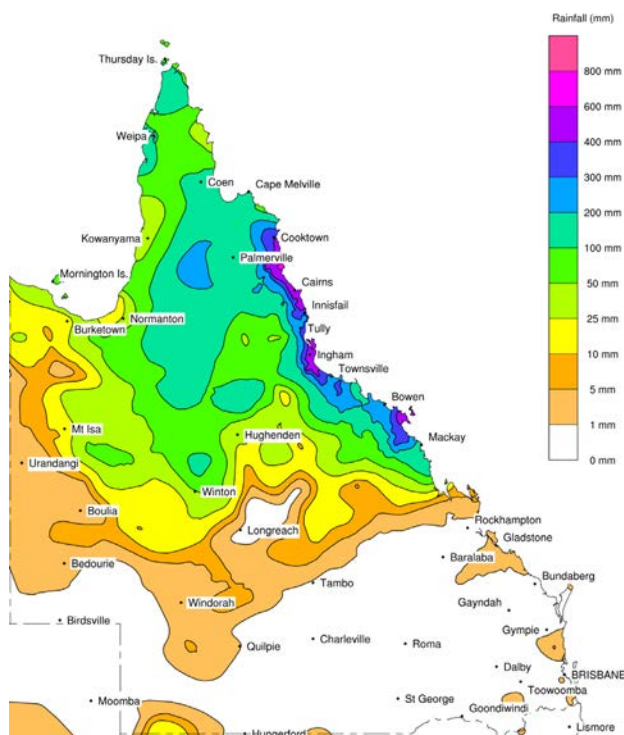
During the period 23 January to 9 February 2019, a vast area of Queensland was impacted by one or more of the following hazards: heavy rainfall, damaging winds, high tides and/or riverine flooding.

The weather system that impacted Queensland was a monsoon trough and tropical lows. A monsoon trough is associated with the inflow of moist winds resulting in heavy rainfall.<sup>18</sup> This very slow-moving monsoon system, combined with two tropical lows, resulted in intense and record-breaking rainfall across northern and western Queensland.

The monsoon trough extended across the northern Gulf of Carpentaria to a tropical low located west south west of Weipa. The monsoon trough continued to strengthen over the next few days. The heaviest rainfall was received around Weipa and Cairns with falls between 130mm to 200mm of rainfall.<sup>19</sup>

Between 24 and 26 January 2019, Tropical Cyclone Advises were issued by the Bureau of Meteorology (the Bureau) for the tropical low located west of Weipa. The low had shown little signs of development and was approaching the western Peninsula coast on 26 January 2019 when the final Tropical Cyclone Advice was issued.<sup>20</sup>

## 26 January – 30 January 2019



By 26 January, the monsoon trough produced torrential rainfall about the north tropical coast, resulting in record flooding on the Daintree River.

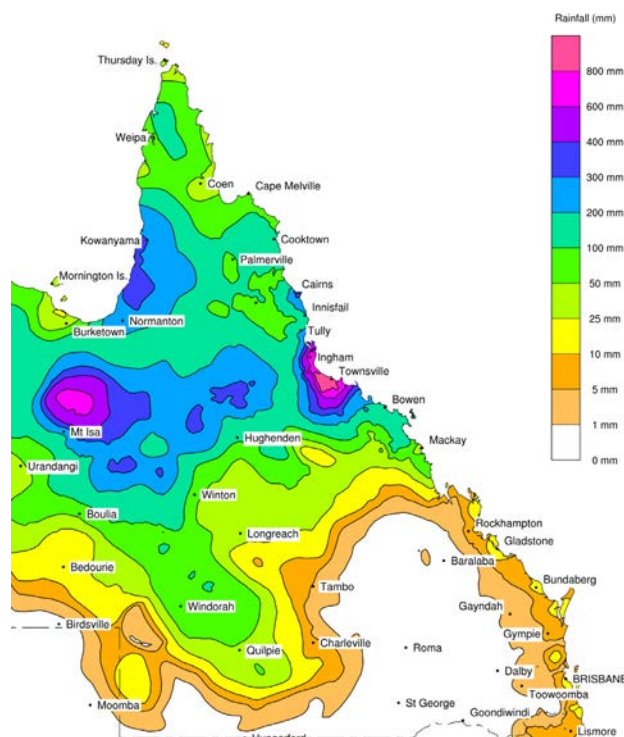
The monsoon trough and embedded tropical low tracked slowly south over Cape York Peninsula. Coastal areas between Innisfail and Cooktown and many locations within the Herbert and Lower Burdekin forecast district received the highest rainfall during this period. Areas as far south as Mackay and north over Cape York Peninsula received widespread falls over 100mm.

By 28 January, the focus of rain was centred around Townsville with falls extending along the coast between Cairns to Mackay.<sup>21</sup>

**Rainfall totals across Queensland during the three distinct phases of the weather event.**

*Bureau of Meteorology*

## 31 January – 4 February 2019



By 31 January, the monsoon trough extended from near Cardwell to the tropical low over the northern interior. Over the next few days very heavy rain fell along the monsoon trough with the heaviest falls received along the coast near Townsville. Extremely high accumulated falls were recorded across the Herbert and Lower Burdekin forecast district. Totals of 500mm or greater also fell in the northern interior.

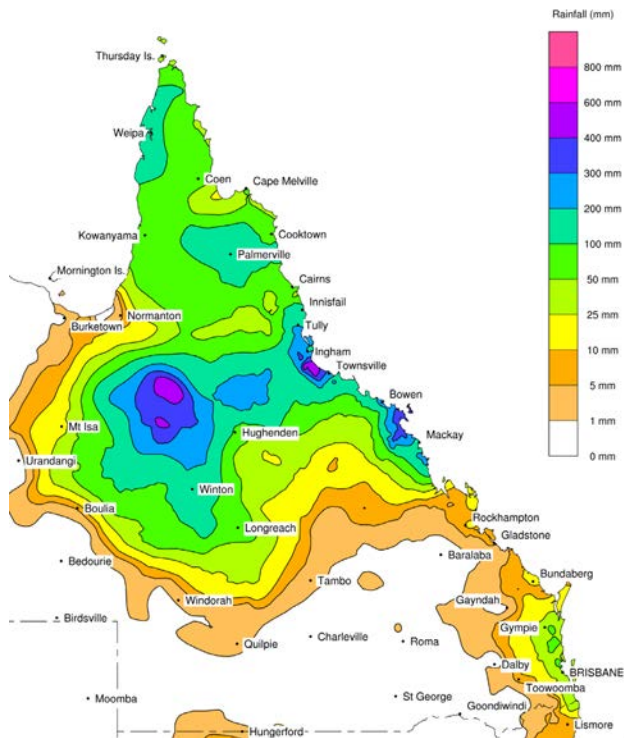
Riverine flooding occurred in the Burdekin, Ross, Bohle, Haughton and Herbert Rivers. Western Rivers were also rising with major flooding experienced in the Flinders River on 2 February.

Abnormally high tides were forecast from 1 to 6 February for the Peninsula and Gulf Country forecast districts. The highest tides of the year were recorded at Mornington Island and Weipa. The highest tide of the year was exceeded overnight on 5 February at Weipa.

On 4 February, large daily rainfall totals continued further inland. The tropical low was most intense on 4 February and gradually weakened in the following days.<sup>22</sup>



## 5 February – 9 February 2019



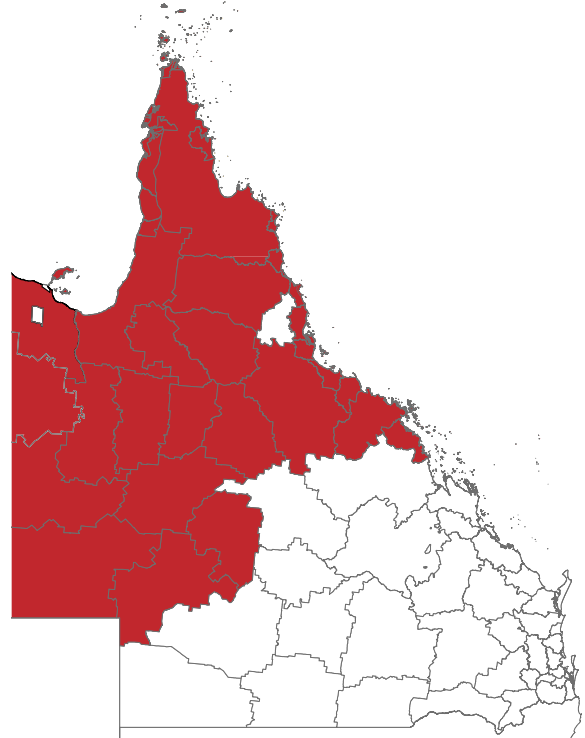
The monsoon trough remained stretched across to the east near Cardwell. The embedded tropical low weakened from 5 February and tracked slowly east. The tropical low was located at the base of Cape York Peninsula by 6 February.

Widespread daily rainfall totals around 100mm fell around the Townsville region with the highest falls recorded from Julia Creek to Richmond. Rainfall increased between Innisfail and Townsville during 7 and 8 February with falls exceeding 100mm in some locations around the Townsville area.

During 7 February, a second tropical low developed on the monsoon trough near Cardwell and moved slightly north during the day.

Rainfall eased significantly by 9 February and the monsoon trough and two embedded lows moved off the Queensland coast.<sup>23</sup>

## 14 February 2019: LGA DRF Activations



***In total, 39 Local Government Areas activated Disaster Recovery Funding Arrangements as a result. Information relating to federal and state funding policy arrangements can be found on pages 150 to 155.***

*Queensland Reconstruction Authority*





# Timeline

| Date      | Time  | Summary   |
|-----------|-------|---|
| 23-Jan-19 | 10:00 | A weak low currently exists within the trough over the northeastern Gulf of Carpentaria. This low is expected to slowly intensify and track towards the southeast or southwest during the next few days. Conditions are expected to become more favourable in the Gulf of Carpentaria from Thursday, and, as a result, the potential for tropical cyclone development in the eastern Gulf of Carpentaria will increase. |
| 24-Jan-19 | 16:55 | TC Advice 1 Tropical low over the northeastern Gulf of Carpentaria to intensify and track south.<br>Watch Zone: Mornington Island to Mapoon, including Weipa, Burketown, Normanton and Kowanyama.   |
|           | 10:00 | Weather Warnings<br>• Severe Weather Warning: Peninsula Forecast District for heavy rainfall, damaging winds and abnormally high tides.<br>• Flood Watch: Northern Cape York Peninsula Catchments.<br>• Marine Wind Warning: South East Gulf of Carpentaria, North East Gulf of Carpentaria, Torres Strait and Peninsula Coast.   |
| 25-Jan-19 |       | Recorded in 24hrs to 0900 today: 135.8mm at Weipa.<br>Recorded since 0900/Friday to 2044/Friday: 206mm Peets Bridge.  |
|           | 04:56 | SWW for heavy rainfall For people in Peninsula and parts of Gulf Country and North Tropical Coast and Tablelands Forecast Districts.  |
| 26-Jan-19 | 20:53 | Severe Weather Warning 1 for damaging winds and heavy rainfall; 6-hour rainfall accumulation totals to 2200: 299mm China Camp • 151mm Black Mountain • 126mm Saddle Mountain.   |
|           | 04:49 | TC Advice 11 – Tropical low has shown little signs of development and is now approaching the western Peninsula coast. It is no longer expected to become a tropical cyclone. Tropical Cyclone Cancelled.  |
|           |       | Thunderstorms on the monsoon trough produced torrential rainfall about the Mossman and Daintree catchments. The tropical low moved back over the Cape York Peninsula near Cape Keerweer.  |
|           |       | Heavy rainfall began on 26-Jan in areas around Cairns and north to Cooktown. Daily totals of more than 100mm at many locations in the Herbert and Lower Burdekin Districts.   |
| 28-Jan-19 | 10:36 | Severe Weather Warning for damaging winds and heavy rainfall for Herbert and Lower Burdekin, Northern Goldfields and Upper Flinders, Central Coast and Whitsundays and Central Highlands and Coalfields Forecast Districts; 88km/h wind gust recorded at Lucinda.<br>In 24hrs to 0900: 168.6mm recorded at Hamilton Island • 164mm at Cardwell Range.   |
|           |       | 135mm of rain recorded at Bulgun Creek in two hours to 1632.  |
| 29-Jan-19 |       | In 24 hours to 0900/29-Jan-19: 373mm at Sandy Plateau (Burdekin River) and 261mm at Upper Major Creek (Haughton River).   |
| 30-Jan-19 |       | Upper Bluewater recorded 102mm in 2 hours to 10:12. Toolakea recorded 147mm in 2 hours to 11:53.  |
|           | 13:00 | Rainfall totals between 9am to 10pm today: 317mm at Upper Bluewater • 236mm at Woolshed • 208mm at Toolakea.  |
|           |       | Daintree River reached its highest recorded height of 12.6 metres on Saturday 27-Jan (previous record was 12.4 metres in 1901).   |
|           |       | In 24hrs to 0900/31-Jan-19: 375mm at Sandy Plateau (Burdekin River), 275mm at Forbes Road (OConnell River).   |
| 31-Jan-19 |       | In 4 hours to 0900/31-Jan-19: 150-300mm+ across large areas near Townsville.  |
|           | 08:56 | *SEWS* Severe Weather Warning for heavy rainfall for Herbert and Lower Burdekin, parts of North Tropical Coast and Tablelands and Northern Goldfields and Upper Flinders Forecast Districts.  |
|           | 08:50 | The monsoon trough is expected to remain slow moving across north Queensland for several days. The heaviest rainfall was occurring in areas between Giru and Ravenswood, with 193mm recorded in the last 3 hours at Major Creek (southwest of Giru).  |
|           | 16:45 | Severe Weather Warning 2 issued for abnormally high tides - Peninsular Forecast District.   |
|           | 20:09 | Severe Weather Warning issued for heavy rainfall - locations likely to be impacted include: Tully, Ingham, Townsville, Ayr, Bowen, Mount Isa, Cloncurry, Julia Creek.   |



| Date      | Time  | Summary  |
|-----------|-------|--|
| 01-Feb-19 | 13:12 | Tropical low deepened with heavy rain around the system (northwest Qld) - renewed monsoon burst in northern Gulf/Torres Strait.  |
|           | 09:18 | Monsoon trough near Cardwell, with the heaviest falls to the south.  |
|           |       | *SEWS* issued for Ross River, Bohle River and Black River Catchments. Record river heights on the Ross River (Townsville).   |
|           |       | From 0900/31-Jan-19 to 0700/01-Feb-19: 300+mm on Bluewater Creek and Black River, 251mm Miranda Creek (north of Mount Isa), 127mm at Cairns.   |
|           | 15:17 | The monsoon trough extends from the north tropical coast in the Cardwell area westward to a tropical low over the northern North West district. Severe Weather Warning updated to include Damaging Winds.<br>Falls in 6 hours to 1500 today: Woolshed 124mm • Bohle River 73mm • Doughboy Creek (north of Mount Isa) 54mm.   |
| 02-Feb-19 | 21:13 | Falls in 11 hours to 2000 today: Woolshed 134mm, Paluma 83mm, Julius Dam 94mm.   |
|           |       | *SEWS* Severe Thunderstorm Warning for heavy rainfall for north tropical coast and tablelands and herbert and lower burdekin forecast districts<br><ul style="list-style-type: none"> <li>• 200mm of rainfall fell in 2 hours at Ingham (84mm in 30 minutes)</li> <li>• 101mm fell in an hour at Cardwell Gap</li> <li>• 107mm fell in 1 hour at South Mission Beach.</li> </ul>   |
|           | 03:17 | The monsoon trough extends from the north tropical coast in the Ingham area westward to a tropical low over the northern North West district.  |
|           | 07:16 | *SEWS* Severe Weather Warning for damaging winds and heavy rain - impact locations included: Charters Towers, Georgetown, Croydon, Julia Creek, Richmond, Kowanyama, Lucinda, Townsville, Bowen.   |
|           | 07:34 | Extremely heavy rainfall and significant flash flooding occurred west of Townsville.   |
|           | 11:14 | The slow-moving trough extends from Ingham to Gregory Springs and into central parts of the NT. A deep, semi-stationary tropical low is also embedded along the monsoon trough, located about 130km east-south east of Century Mine (north west of Mount Isa).   |
|           | 13:48 | In 24 hours to 0900 today: Woolshed 369mm • Paluma 261mm • Cloncurry 182mm • Mount Isa 123mm.  |
|           | 20:58 | A slow moving monsoon trough lies across north Queensland, extending from Ingham to Gregory Springs and into central parts of the Northern Territory. A deep semi-stationary tropical low was also embedded along the monsoon trough resulting in widespread heavy, locally intense rainfall.  |
|           | 11:14 | 92km/hr wind gust recorded at Lucinda at 9pm.  |
|           |       |  |
| 03-Feb-19 | 13:41 | *SEWS* Severe Thunderstorm Warning for heavy rainfall for Herbert and Lower Burdekin Forecast Districts<br>203mm of rainfall fell in 3 hours at Woodlands.<br>Intense, slow moving rainfall being observed over Ross River Dam catchment.  |
|           |       | *SEWS* Severe Thunderstorm Warning for heavy rainfall for Herbert and Lower Burdekin Forecast Districts<br>111mm of rainfall fell in 1 hour at Upper Bluewater.  |
|           | 11:04 | A deep, semi-stationary tropical low is also embedded along the monsoon trough, located 200km north-north east of Mt Isa. Severe Weather Warning for damaging, locally destructive winds and heavy rainfall current for areas including: Townsville, Ingham, Bowen, Proserpine, Charters Towers, Julia Creek, Cloncurry, Winton and Hughenden<br>In 24 hours to 0900 today: Gereta Station 232mm • Cloncurry 106mm • Ingham Pump Station 506mm • South Townsville 226mm. |
|           | 16:49 | Severe Weather Warning 2 - updated to include destructive winds - warning area includes Peninsula and Gulf Country Forecast Districts.   |
|           | 16:56 | Severe Weather Warning 2 - amended to damaging winds - warning area includes peninsula and Gulf Country Forecast Districts.  |
| 04-Feb-19 | 04:54 | The deep, semi-stationary tropical low remained about 200kms north of Mount Isa overnight.   |
|           |       | The highest tide of the year was exceeded at Weipa and Mornington Island today.  |
|           | 14:18 | 83km/h wind gust recorded at Lockhart River.   |
|           | 16:47 | The threat of locally destructive winds eased - heavy rainfall and damaging winds continue to impact areas including: Townsville, Palm Island, Bowen, Whitsunday Islands, Richmond, Hughenden, Winton.   |
|           | 20:55 | Since 0900 today the following rainfall was recorded: Paluma 238mm • Rollingstone 158mm.   |
| 05-Feb-19 |       | The highest tide of the year was exceeded at Weipa again today.  |
|           |       | A 95km/h wind gust was recorded at Horn Island.  |
|           | 10:48 | A deep tropical low, located about 180kms north of Cloncurry, with a vigorous monsoon trough eastward through to about Ingham. Both features were slow moving.   |
|           | 10:48 | In 24 hours to 0900 today: Paluma 384mm • Upper Bluewater 364mm • Rollingstone 240mm • Julia Creek Airport 233mm.  |
| 06-Feb-19 | 04:55 | A deep tropical low, located about 150km north east of Julia Creek, with a vigorous monsoon trough eastward through to about Rollingstone. Both features were slow moving.   |
|           | 04:55 | 79mm of rainfall fell at Richmond in the 6 hours to 0200.<br>120mm of rainfall fell at Michael Creek in the 6 hours to 0100.   |
|           |       | The highest tide of the year was exceeded at Weipa overnight   |
|           | 20:47 | Severe Weather Warning Cancelled - Damaging winds and abnormally high tides.   |
| 07-Feb-19 | 05:15 | Severe Weather Warning for damaging winds and heavy rainfall was cancelled   |
|           | 05:15 | A tropical low, located near Richmond, extended the monsoon trough, eastwards through the North Tropical Coast. The low continued moving in a northerly direction while weakening.   |

# LEGEND

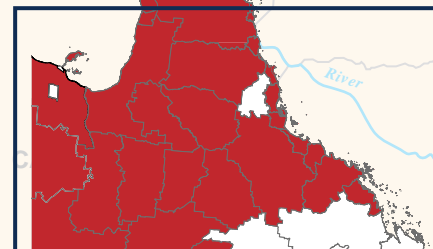
-  DRFA-activated LGA
-  Non-activated LGA
-  Rail line / stops
-  Mine sites

32

KOWANYAMA ASC

COOK SC

MAP ENLARGEMENT



MORNINGTON SC

DOOMADGEE ASC

Karumba

Normanton

CARPENTARIA SC

ETHERIDGE SC

CROYDON SC

Croydon

BURKE SC



CLONCURRY SC

Kajabbi

Etta Plains

Malpas-Trenton

McKINLAY SC

RICHMOND SC

MOUNT ISA CC

MOUNT ISA

Cloncurry

Julia Creek

Nelia

Maxwelton

Richmond



BOULIA SC

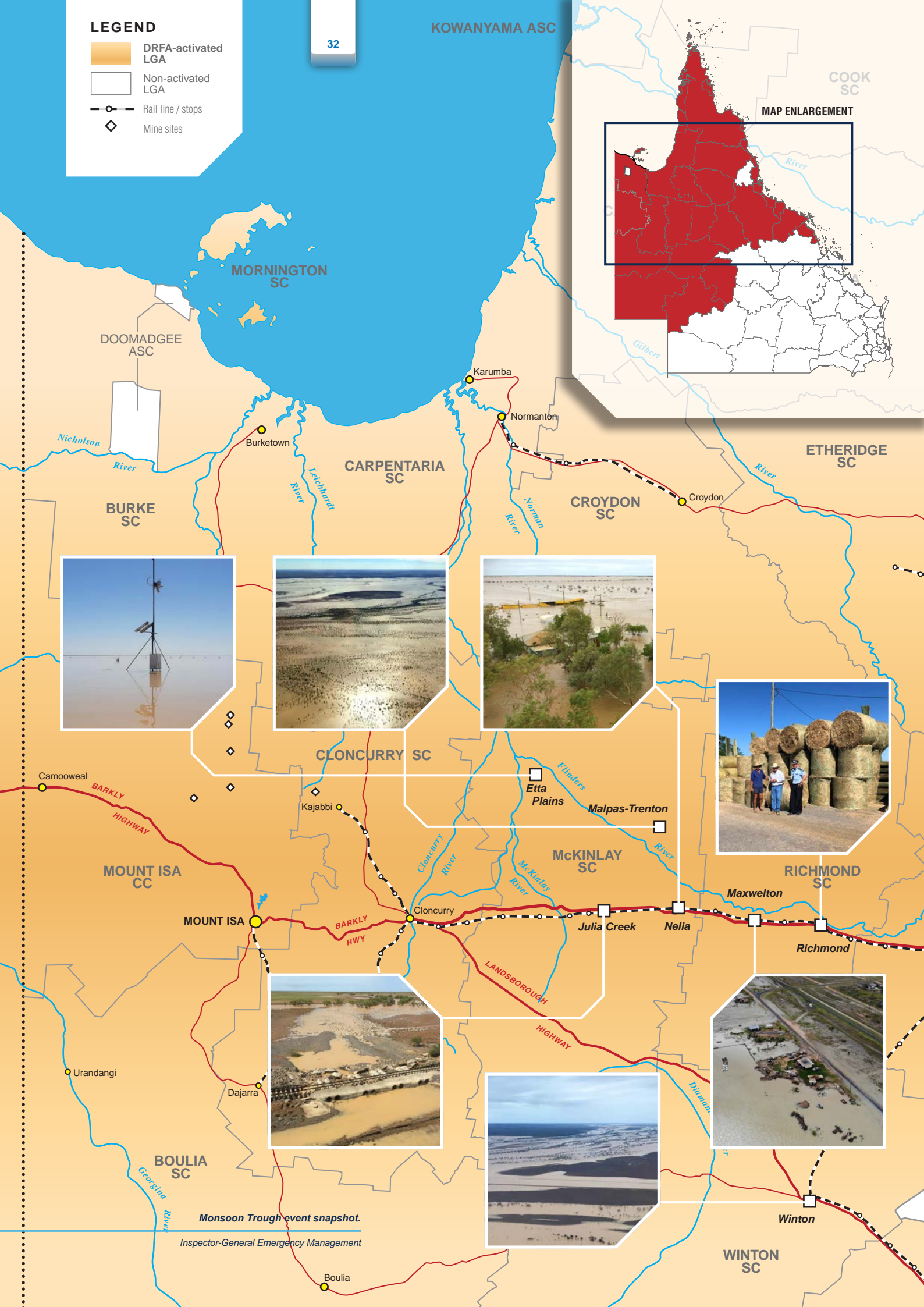
Monsoon Trough event snapshot.

Inspector-General Emergency Management

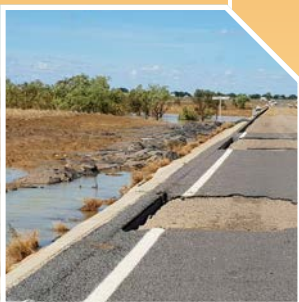
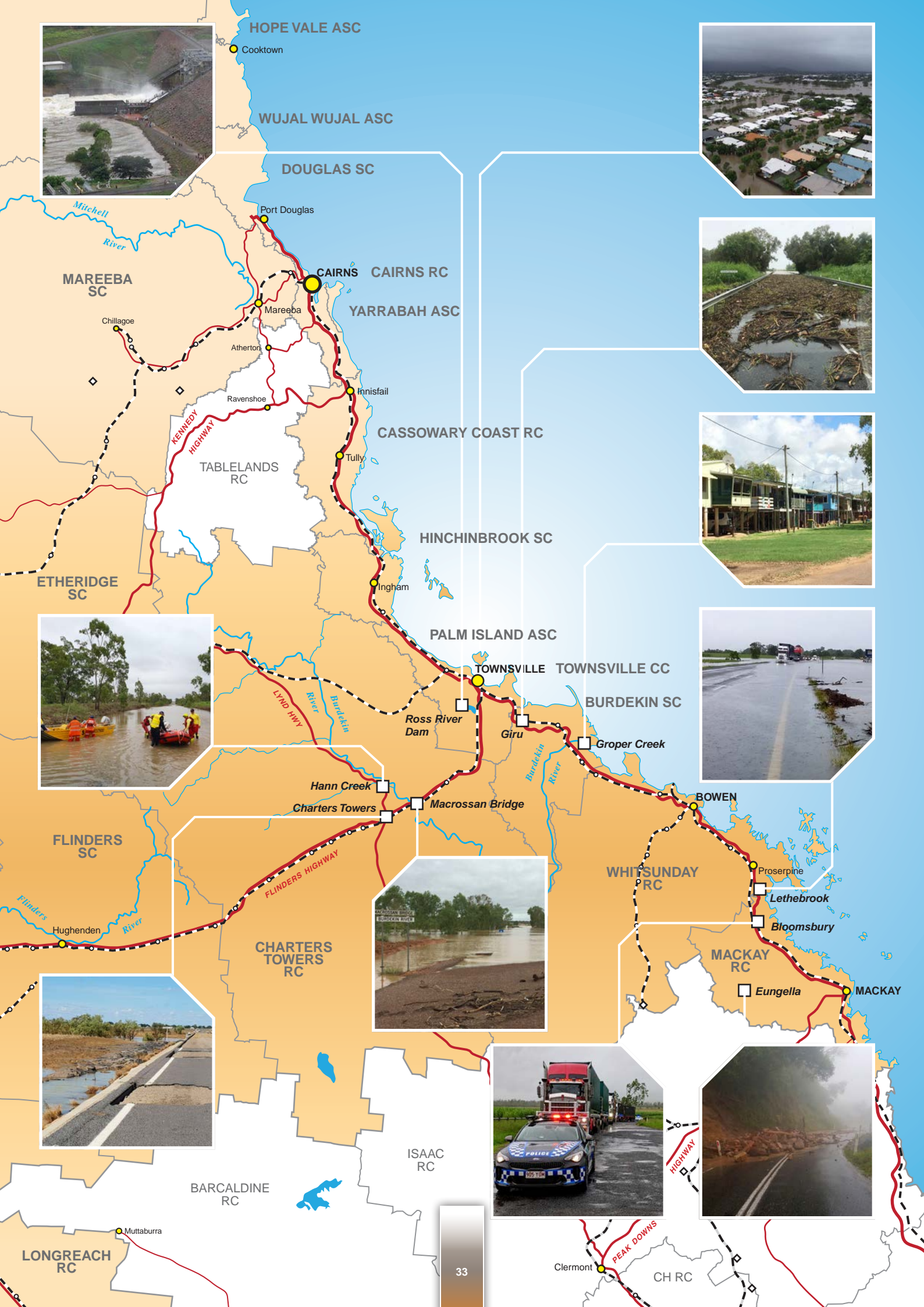
Boulia

Winton

WINTON SC











*Aerial view of Ergon Energy crews negotiating flooded Anderson Street in the Townsville suburb of Railway Estate, sandwiched between the headwaters of Ross Creek on its north side and the main waterway of Ross River to the south on 5 February 2019.*

Energy Queensland



## Context

Flooding is a key risk in Queensland and was at the heart of the devastation caused by the Monsoon Trough event.

In reviewing elements of flooding associated with the Monsoon trough, it is essential that there is a common understanding of Queensland's doctrinal and operational approach to flood disaster management, how flood risk management is defined and what strategies exist to manage floods, and mechanisms, policies and frameworks to help manage and reduce risks to the community.

This section of the report provides a contextual overview for:

- understanding flood risk
- floodplain and flood risk management
- Queensland's disaster management arrangements.



**‘Riverine flooding is equal to tropical cyclones as the most disruptive and damaging natural hazard within Queensland.’<sup>24</sup>**



Riverine flooding in Queensland occurs when there is excess rainfall over an extended period and the capacity of waterways are overwhelmed. Riverine flooding leads to inundation of areas which are not normally under water.

Queensland is the most flood-prone state in Australia.<sup>25</sup> Floods are inevitable, their impacts can be devastating and cannot be fully eliminated. When risks of flooding are not understood nor managed there will likely be greater impacts on the community.

Communities can be more resilient when they know their flood risk and this risk is effectively managed. The community cannot rely solely on government to manage these risks, all Queenslanders have a role to play.

**‘Although flooding in Queensland is inevitable, stakeholders can be proactive in understanding flood risk and engaging in activities that reduce exposure and minimise the impact of flooding.’<sup>26</sup>**

*Traffic on the Bruce Highway at Lethebrook, 30km south of Proserpine, was disrupted on 29 January 2019 when the O’Connell River burst its banks.*

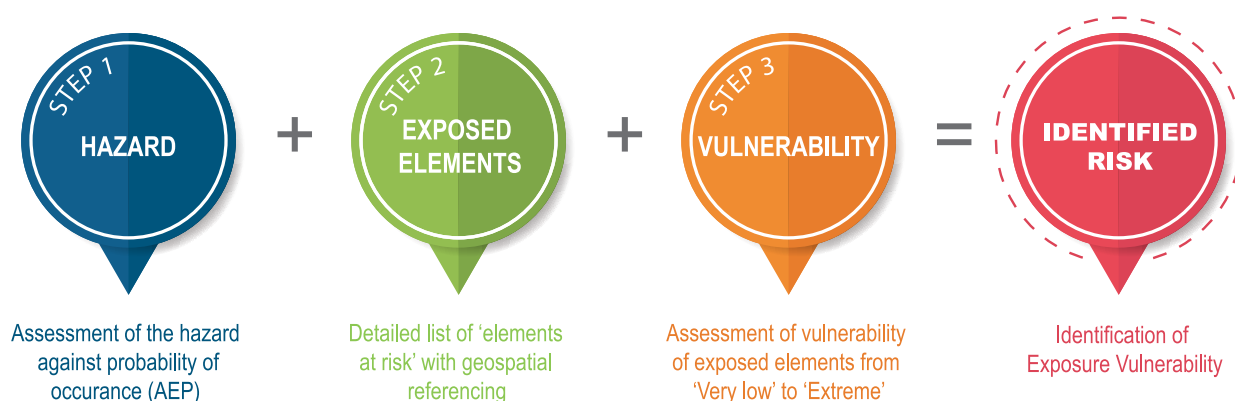
*Queensland Police Service*



## Understanding flood risk

Queensland communities have a long history of flooding. Most of the towns and cities in Queensland are located on or near floodplains. Floods can have negative impacts such as loss of life, damage to property, infrastructure and crops. However, flooding also provides benefits. It can deliver water to dependent ecosystems, increase soil moisture content for agriculture and replenish water supply to dams.

Queensland's approach to disaster risk management is outlined in the *Queensland Emergency Risk Management Framework* (QERMF).<sup>27</sup> The QERMF, developed by Queensland Fire and Emergency Services (QFES), applies a standardised and internationally recognised approach for prioritising, mitigating and managing risk.



Flood risk is often presented in maps. These maps are important as they support and inform decisions about land use planning controls, community education, building codes, and disaster management.

### Methodology for identifying risk.

Queensland Fire and Emergency Services

Many local governments have maps that identify flood risk to the community and these are often accessible through council websites. The Queensland Government has an online Flood Check map that allows members of the public to view the likely extent of floodplains, historic flood lines (where available), flood reports and studies. However, local government should always be the point of contact for the most current flood risk information for a property.

Knowledge and experience of previous flood events is a starting point for understanding flood risk.<sup>28</sup> However, managing flood risks relies on the understanding of the full range of flood events possible. Flood events are often compared to:

- a 'flood of record', which is the highest recorded flood for a location
- a previous flood
- a design flood event, which is a flood event with a given probability of exceedance in a year
- the 'probable maximum flood event' for a location, which is the largest flood that could conceivably occur for that location.

Floods of any magnitude can occur at any time. For example, a '1 in 100-year flood' has an annual exceedance probability (AEP) of one per cent. This means there is a one per cent chance of a flood of that size occurring in any given year. Consideration of flood magnitude and community perceptions are addressed later in the report.

**Queenslanders understand flood risk,  
adapt to changing circumstances and take action  
to mitigate and build resilience.<sup>29</sup>**

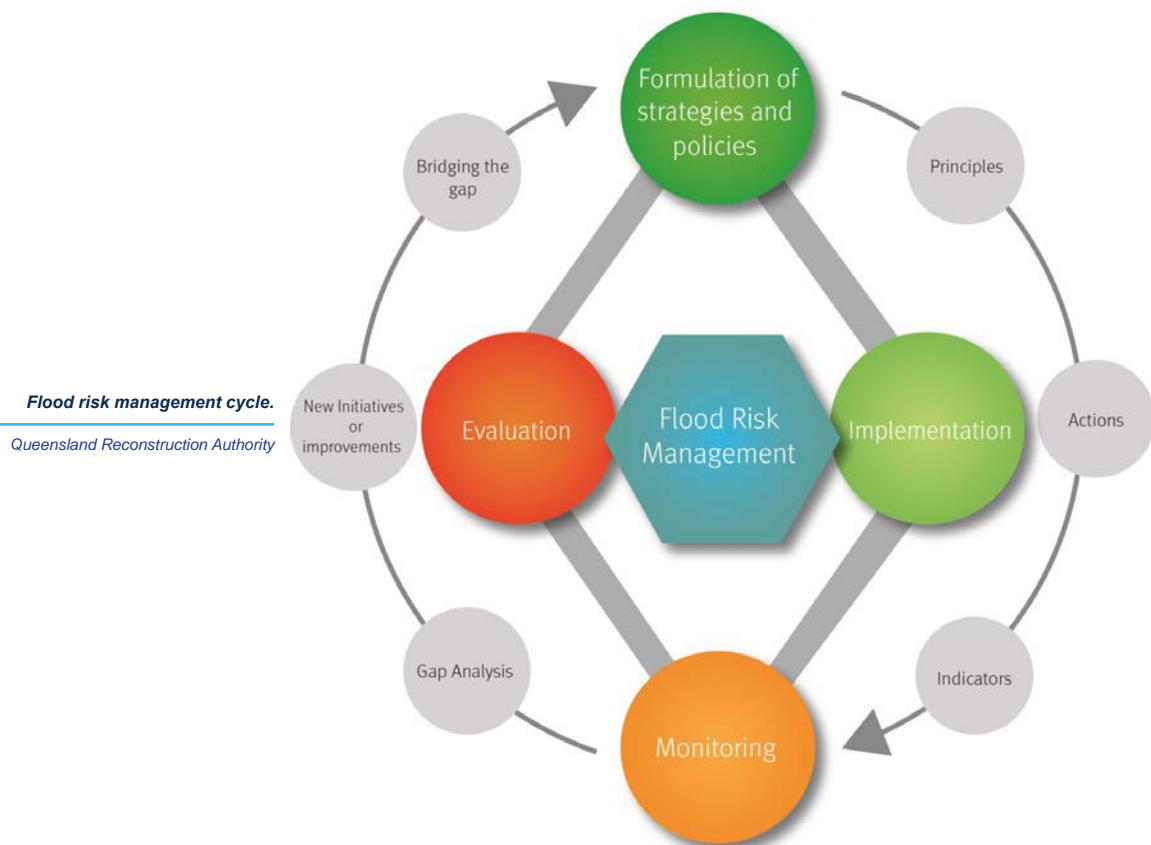
## Floodplain and flood risk management

Flood risk management has been defined as:

**‘The process of data and information gathering, risk analysis and evaluation, appraisal of options and making, implementing and reviewing decisions to reduce, control, accept or redistribute flood risk. It is a continuous process of analysis, adjustment and adaptation of policies and actions taken to reduce flood risk.’<sup>30</sup>**

**‘Management of flood risk is essential to limiting the impacts of flooding on the community in balance with maintaining the benefits of occupying the floodplain to society and the benefits of flooding to the environment.’<sup>31</sup>**

Management of flood risk needs to consider a whole-of-catchment approach (including the coast where applicable). Reducing risks from floods and promoting environmental, societal and economic opportunities, now and into the future, should be the focus.

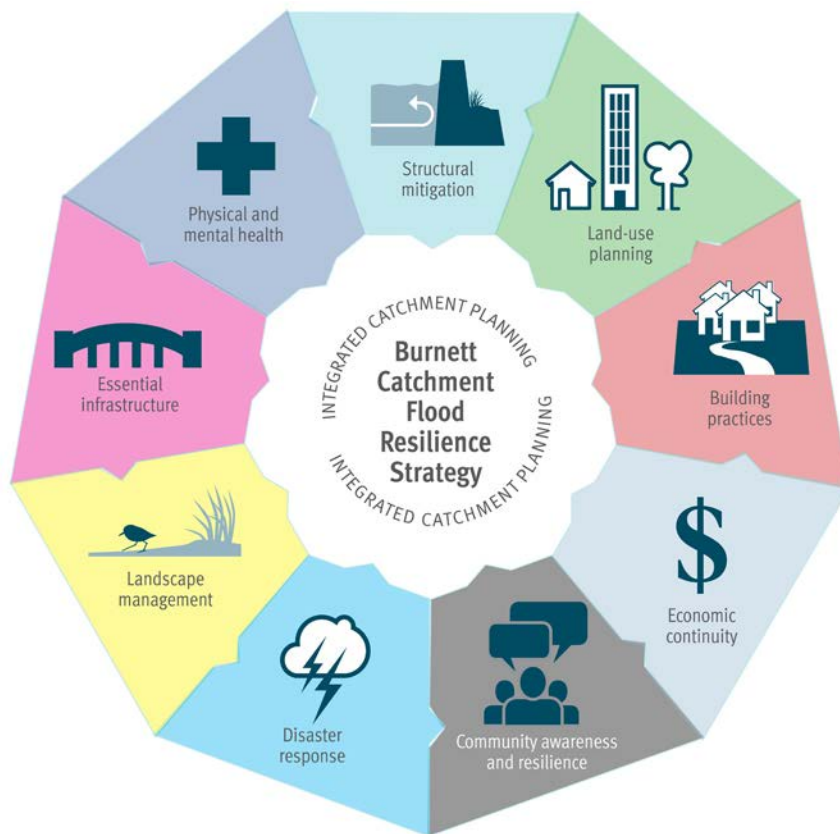


Strategies to manage flood risk may involve decisions to reduce, control, accept, or redistribute the risks. Some examples may include:

- land use planning and building controls
- community awareness and flood readiness
- improving flood prediction and warnings
- installation of permanent levees and associated works
- installation of spillway gates on dams and/or additional flood storage capacity on dams



Responsibility for flood risk management generally rests with local governments. They are the major service provider to communities and are responsible for managing local development. However, a floodplain will often cover land spanning more than one local government. Managing this risk requires coordination and collaborative action from many stakeholders.



#### Components of integrated catchment planning.

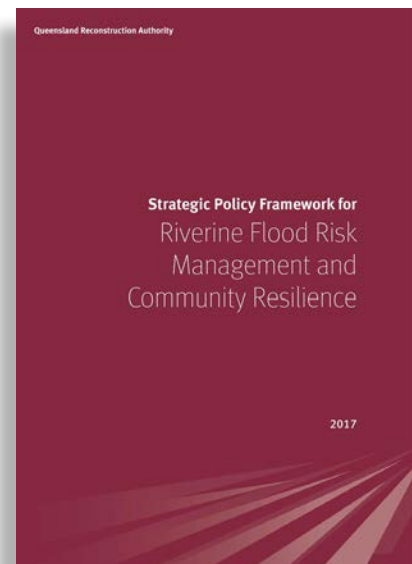
Queensland Reconstruction Authority

The QRA is responsible for the coordination of whole-of-government flood risk management planning and implementation.<sup>32</sup> The *Strategic Policy Framework for Riverine Flood Risk Management and Community Resilience 2017* provides the foundation for developing a comprehensive, multi-disciplinary flood risk management approach in Queensland.<sup>33</sup> The framework clarifies roles and responsibilities and provides a governance framework for implementing Queensland-specific flood risk management.

The framework aligns with the *Queensland Strategy for Disaster Resilience 2017*.<sup>34</sup> The strategy aimed to empower Queenslanders to factor in resilience measures and activities as they anticipate, respond and adapt to changing circumstances.

To implement the resilience strategy, the QRA works with state agencies, local governments and the Bureau to facilitate the delivery of local and regional resilience strategies across Queensland that consider a range of disaster risks such as flood. Regional coordination and collaboration are key aspects of this strategic planning process to ensure resilience initiatives that are locally led, regionally coordinated and state facilitated. For example:

- Brisbane River and regional floodplain management approaches.
- Flood warning infrastructure network.



## Brisbane River and regional floodplain management approaches

Following the floods across Queensland in 2010-11 and building on the work undertaken for the *Brisbane River Catchments Flood Study*, the QRA developed the *Brisbane River Strategic Floodplain Management Plan* (Strategic Plan). The Strategic Plan was developed in conjunction with state agencies and local councils to better understand current and future flood risks and identify regionally consistent approaches to strengthen flood resilience across the Brisbane River floodplain. The Strategic Plan sets a new national benchmark for floodplain management intended to have far-reaching benefits across the State through innovations in understanding current and future risk, disaster management, land use planning, resilient building guidance, community resilience and landscape management.<sup>35</sup>

## Flood warning infrastructure network

In 2015, the Queensland Government completed a statewide *Performance Review of the Queensland Flood Warning Gauge Network in Queensland* (Performance Review). The Performance Review identified that the Bureau uses data from more than 3,000 rainfall and river gauges that are owned and operated by 54 entities for flood warning. The review identified priority local governments requiring improvements to their early flood warning infrastructure.

As a result, in 2016 a series of flood warning network investment plans (Investment Plans) across 61 councils was developed. Developing the plans involved many stakeholders. The collaborative approach identified opportunities for 367 additional flood warning gauges that could further complement data used by the Bureau for its flood warnings and forecasts.

In July 2018, 17 local governments received \$2.9 million in funding through the Natural Disaster Resilience Program for new and upgraded flood warning infrastructure as identified in their Investment Plans. The QRA is working with these local governments to find ways to coordinate the installation and maintenance of new and existing flood warning infrastructure to deliver value for money outcomes for these regions.

Collaborative efforts are underway to improve how Queensland's flood warning infrastructure network is managed and coordinated now and in the future. The *Queensland Strategic Flood Warning Infrastructure Plan* was drafted in early 2019 for consultation and provides an overview of the context, issues and opportunities to improve flood warnings in Queensland. The QRA has identified future actions by to address current issues and to support ongoing improvements to Queensland's Flood Warning Infrastructure Network. The Office endorses ongoing improvements to the flood warning infrastructure network.

*Aerial view above Northshore Circuit in the Townsville suburb of Oonoonba, looking west across the overflowing Ross River towards Mount Louisa in the low cloud and rain.*

Queensland Fire and Emergency Services





## Queensland's disaster management arrangements

Queensland's arrangements for managing disasters are established under the DM Act. The arrangements provide a networked structure, with roles and responsibilities shared across local, district, and State levels. A key principle of the DM Act is that local governments should primarily be responsible for managing events in their local area. This is reflected across associated strategic policy, plans and guidelines. This approach recognises that communities are at the forefront of disaster impacts, and it focuses effort from across the system to work together in reducing disaster impacts and building community capacity to manage disaster risk.

Local leadership ensures that local knowledge and experience informs, guides and directs collective planning and effort before, during and after disaster events.

The DM Act requires local governments to form a LDMG where, typically, the mayor is the chair of the group. A Local Disaster Coordinator (LDC) must be an officer from council and other group members have specific roles and responsibilities reflecting the agency or organisation they represent.

LDMGs are supported by district and State level groups, as well as relevant state departments, statutory bodies, essential service providers and NGOs.<sup>36</sup>

LDMGs have a range of functions for disaster management, including preparing plans, community awareness and education, communications, information, reporting and assessing, that are shared with the next level of the system, the DDMG which is a regional grouping of state agencies.<sup>37</sup>

All local governments in Queensland have the same responsibilities to appoint members to LDMGs. Their practical ability to do so will vary, as local governments differ in many ways. Often, larger councils can almost replicate the DDMG for state agency membership, whereas smaller councils may struggle to reach beyond local emergency service representatives.<sup>38</sup> Consequently, the capability of LDMGs to manage disaster operations will vary and, therefore, the support provided to them must vary accordingly.

That support is delivered through strong regional arrangements, via 22 disaster districts. The chairperson for the DDMG, the District Disaster Coordinator (DDC), is a police officer, appointed by the Police Commissioner.

The DDMGs have similar disaster management functions to the LDMGs (such as preparing plans, community awareness, communications, information, reporting, reviewing and assessing).

They have two key functions defining their support for disaster operations: they must first identify useful resources within the district and, second, coordinate such resources and services to support LDMGs. The support for local disaster operations is provided via a District Disaster Coordination Centre.

### NATIONAL ARRANGEMENTS

### STATE ARRANGEMENTS

Local Government

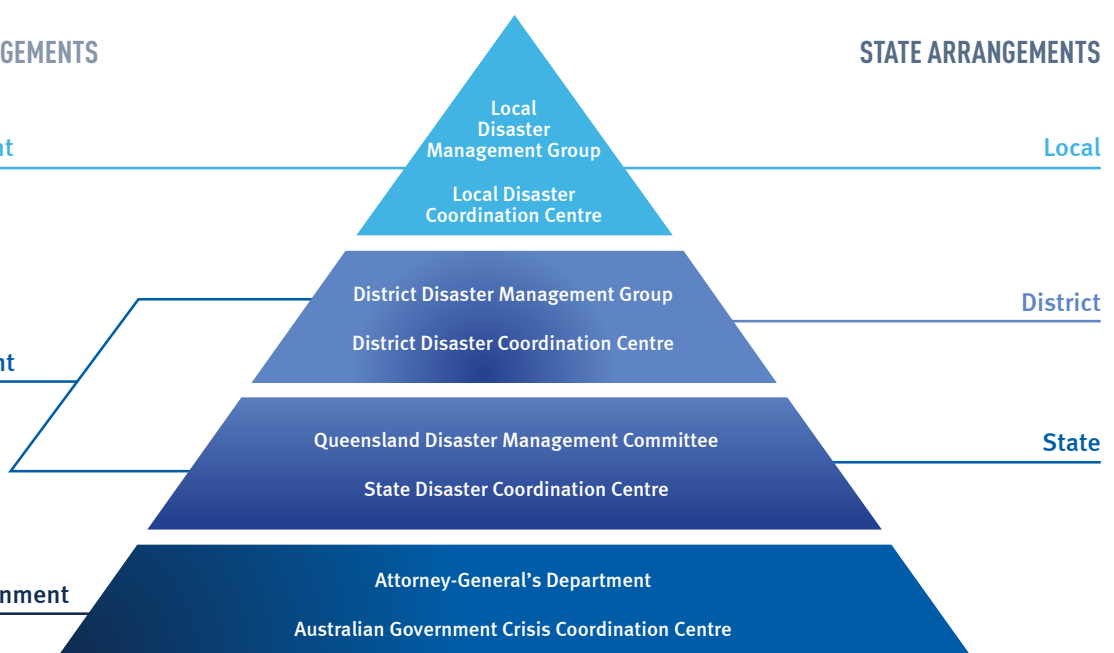
Local

State Government

District

Australian Government

State



At the state level, the Queensland Disaster Management Committee (QDMC) is chaired by the Premier. This Committee provides senior strategic leadership and facilitates communication between relevant Ministers and Directors-General before, during and following disasters.<sup>39</sup> The key role of the QDMC is to ensure effective disaster management is developed and implemented for the State and to provide clear and unambiguous senior strategic leadership in relation to the four phases of disaster management (prevention, preparedness, response and recovery).<sup>40</sup>

The QDMC is responsible for preparing *Queensland's Disaster Management Strategic Policy Statement* and the *State Disaster Management Plan*. Guided by the Standard, and together with the *Queensland Prevention, Preparedness, Response and Recovery Disaster Management Guideline* (DM Guideline), these documents outline Queensland's approach to keeping people safe, making communities more resilient to disaster risks and impacts, and detail primary responsibilities for all agencies.<sup>41</sup> When responding to a disaster, the main legislative functions of QDMC are establishing relations with the Commonwealth, identifying resources and coordination assistance for disaster operations.<sup>42</sup>

The State Disaster Coordinator (SDC) ensures that "accurate timely and relevant information is given to the QDMC during disaster response, and that the strategic decisions of QDMC about disaster response operations are implemented."<sup>43</sup>

The State Disaster Coordination Group (SDCG) provides support to the QDMC and the SDC. It is comprised of senior officers from all Queensland Government departments, the QRA, and the Public Safety Business Agency. NGOs and Commonwealth agencies are standing invitees. The State Disaster Coordination Centre (SDCC) supports the SDC and the SDCG and provides for a single point of truth about an event at a State level. The SDCC provides the State with a consistent '24-hour, seven-day-a-week' emergency management watch-desk capability throughout the year, along with the permanently situated Queensland Police Disaster Management Unit and a senior forecaster from the Bureau.<sup>44</sup>

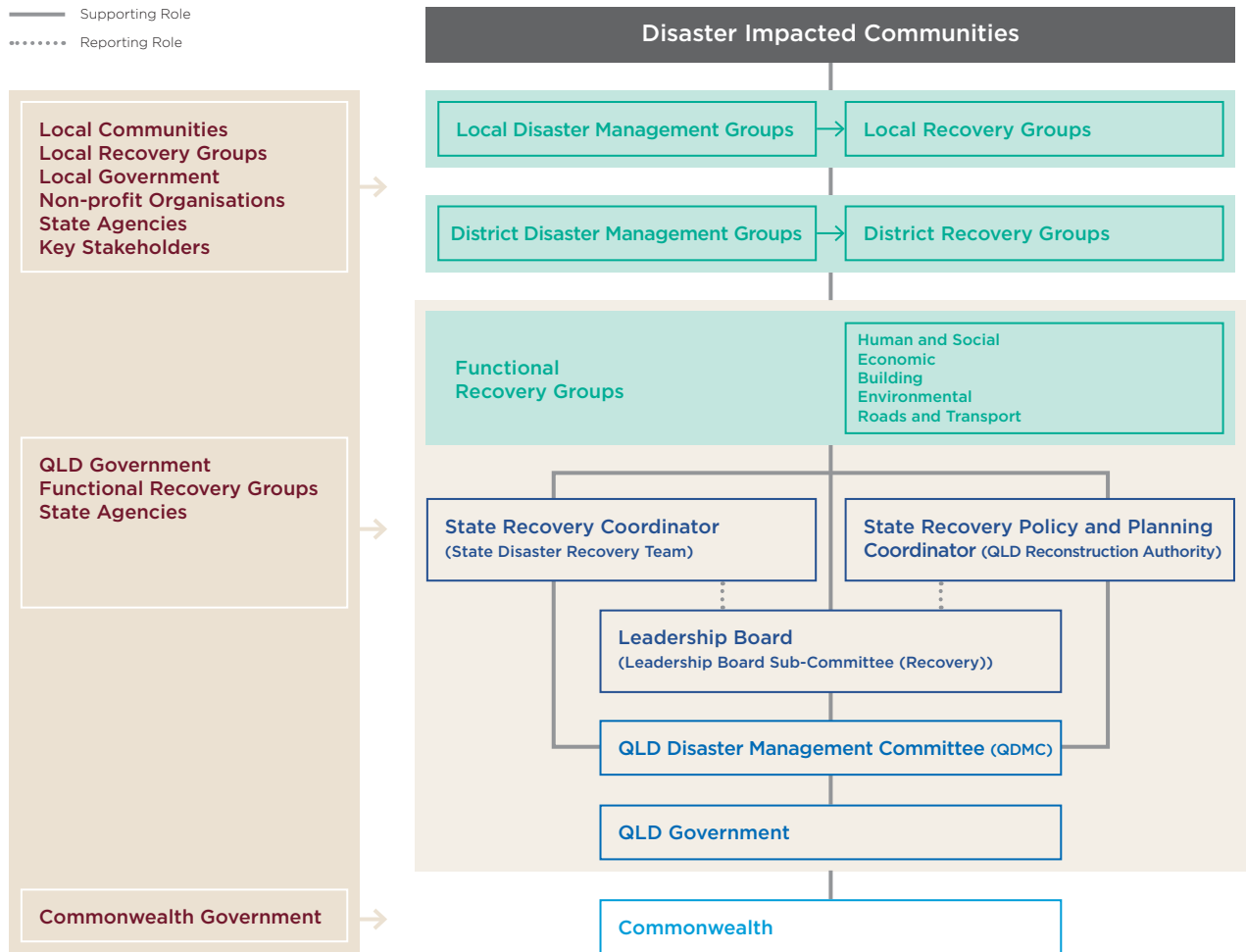
Preparation and readiness of the disaster management system is the remit of the QFES Commissioner.<sup>45</sup> The Commissioner is responsible for ensuring that:

- arrangements with the Commonwealth about disaster management are established
- disaster management and associated operations in the state are consistent with the Strategic Policy Statement, disaster management plans, standards and guidelines
- those performing disaster management operational functions are appropriately trained
- advice and support is given to QDMC, as well as local and DDMGs, about disaster management and disaster management operations.<sup>46</sup>

The QRA is the lead agency responsible for managing flood risk, disaster recovery and resilience policy and facilitation of mitigation activities.<sup>47</sup> The Chief Executive Officer (CEO) of QRA, permanently appointed as the State Recovery Policy and Planning Coordinator, sits on the QDMC. QRA is a member of the SDCG including as co-chair during the recovery phase. Together, they develop State strategic disaster recovery plans, oversee the effective delivery of relief and immediate recovery assistance measures. QRA also provide assistance in the development of local plans from a recovery perspective.

Recovery planning and operations in Queensland are further supported at the state level via Functional Recovery Groups. These groups work with Local and District Recovery Groups to develop and adapt recovery plans to meet emerging needs and priorities of impacted communities.<sup>48</sup>





**Structure of Queensland's Disaster Recovery Arrangements.**

Queensland Disaster Management Plan



*Aerial view to the south of the Ross River Dam gates releasing water during the monsoon event in February 2019.*

Queensland Police Service



## Preparation and planning

Preparation and planning are crucial phases in the effective management of disasters, including flooding.

In line with the terms of reference for this review, this section specifically considers preparation and planning in the context of the Ross River Dam, town and land use planning (in relation to areas affected by outflows of the Ross River Dam), and disaster management arrangements, more broadly.

### For the Ross River Dam, this section considers:

- the varying purposes of dams
- regulatory requirements for dams including owner/operator distinctions and responsibilities
- the history of the Ross River Dam and its specific purpose
- Emergency Actions Plans and what is expected from them
- observations of what occurred regarding some of these dam elements during the Monsoon Trough event during this phase.

### For town and land use planning, this section considers:

- the history of the Townsville planning scheme
- the Defined Flood Level in Townsville and the community's understanding of this
- publicly available information on land use planning
- observations regarding land use planning.

### For disaster management in the preparation and planning phase, this section examines:

- expectations regarding disaster management
- emergency warnings, communication and public education
- evacuation planning
- exercising and business continuity
- disaster coordination centres
- the application of lessons learnt.

## Background

### Dams in Queensland

Queensland's water dams are built to control and store water. They can fulfil many purposes including water storage for communities, industry and agriculture, hydroelectric power, recreation, and reducing flood impacts to downstream communities. The risk of failure of a dam is usually low and can be managed.

However, the failure of a dam can have major consequences — from injury and loss of life to economic, property and environmental damage. Dam safety regulation considers life safety risks. A dam is considered 'referable' or regulated if a failure impact assessment demonstrates there would be two or more people at risk if the dam was to fail.<sup>49</sup> A dam failure impact assessment is a formal process that determines the risk to public safety if a dam were to fail. Seqwater and SunWater own and operate close to half of Queensland's referable dams.<sup>50</sup> SunWater is a Queensland Government owned corporation established under the *Government Owned Corporations Act 1993*.

Under the *Water Supply (Safety and Reliability) Act 2008* (Water Supply Act) the Department of Natural Resources, Mines and Energy (DNRME) is responsible for regulating the safety of referable dams. Dam safety is the responsibility of the owner of the dam. The dam safety regulator (DNRME) ensures dam owners protect the structural integrity of referable dams through various mechanisms.

This includes the imposition of dam safety conditions and acceptable flood capacity requirements; ensuring dam owners perform appropriate inspections and reviews of performance; and regulating operational and communications procedures that dam owners follow during emergency events. DNRME undertakes audit programs to ensure compliance, regularly reviews dam safety risks against current standards and strives to identify, prioritise and manage risks accordingly.

In response to the *Queensland Flood Commission of Inquiry, Final Report* into the 2011 floods in south east Queensland, a recommendation was made to amend the *Water Supply Act*.

The recommendation required dam owners to have an emergency action plan (EAP) approved by DNRME. An EAP provides the procedures to enable dam owners to respond collaboratively with disaster management groups, local governments and emergency services agencies to manage the consequences of a dam hazard event and a dam emergency event and to minimise the risk of harm to persons or property.

DNRME may approve the EAP if satisfied it effectively deals with each dam hazard for the event. In addition, prior to approval, the EAP must be accompanied by a notice in relation to the EAP's consistency with the disaster management plan.<sup>51</sup> The notice is given by the local government and there may also be a notice from the DDMG.

An EAP must identify when and how the dam owner will notify persons who may be harmed or whose property may be harmed by the dam hazard event or emergency event.

The list of 2010-11 Queensland Flood Commission of Inquiry recommendations relevant to this review are available at Appendix D.

In 2015, the *Review of Seqwater and SunWater Warnings and Communications* was conducted in response to community concerns about flood release notification and communication, following flood releases from the Callide and Wivenhoe Dams.

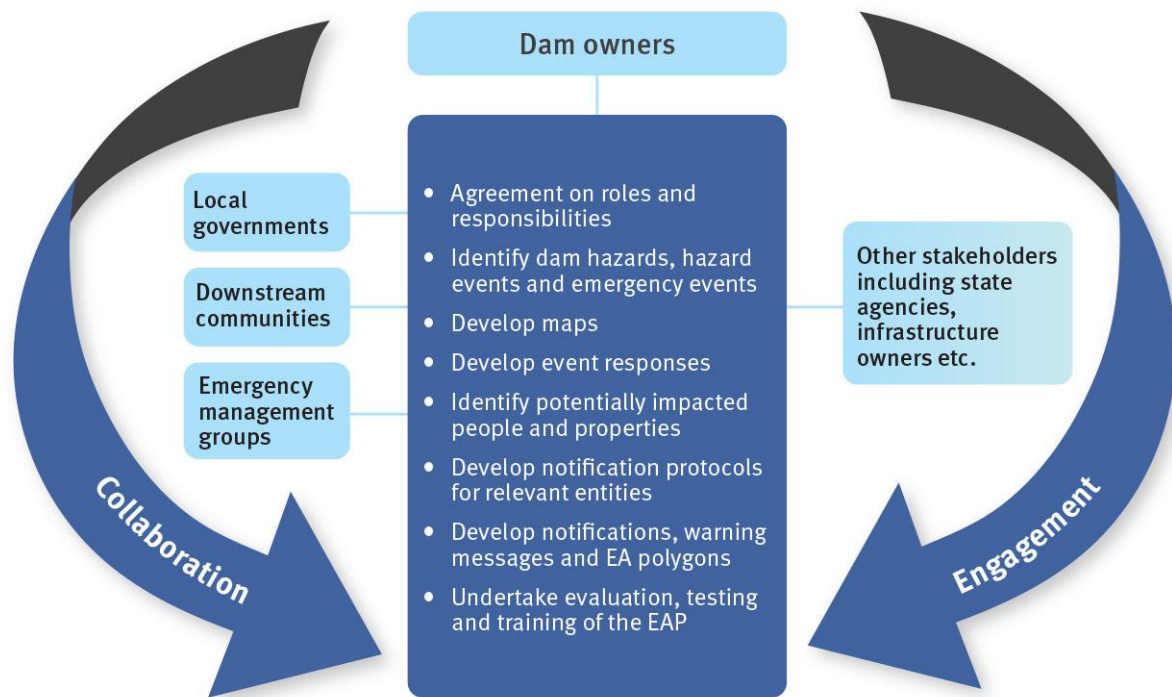
The Office made recommendations regarding improving warnings for the community, emergency planning for dams and enhancing integration of dam safety and disaster management.

Consequently, legislative amendments were progressed. These amendments:

- make it clear that dam owners are responsible for warning the community as soon as possible when issues start to emerge. This includes telling the community if and when they need to act to protect people or property.
- reinforced that an EAP exists to reduce risk to the community by planning for appropriate notification and warnings, which are integrated into the local disaster management framework.
- reinforced that the implementation of an EAP needs to be flexible to achieve the overarching objective (of reducing risk and improving safety) if unforeseen issues arise during an event.
- amended the approval process for an EAP to require local government consideration of the EAP, rather than simply allowing for consideration by the LDMG and also allows for review by the DDMG.
- explicitly linked the approval process to the disaster management standards issued by the IGEM under the DM Act so that plans are better integrated into all-hazards disaster management.



## › Dams in Queensland



Some referable dams are prescribed as a flood mitigation manual dam under the Water Supply Act.<sup>52</sup> The prescribed flood mitigation dams under the Water Supply Act are Wivenhoe, Somerset and North Pine dams.<sup>53</sup> Ross River Dam is not a flood mitigation manual dam.

A dam becomes a prescribed flood mitigation manual dam only if it has the capacity to significantly mitigate downstream flooding through management of release flows and control of flood volumes held in storage.

For these dams there are operational strategies, contained in a flood mitigation manual, that are sufficiently flexible to optimise releases to mitigate flooding downstream.

These operational strategies are designed to achieve an appropriate balance between dam safety, minimising risk to properties, infrastructure and life downstream, water security and environmental impacts.

The air space between full supply level and the top of the gates (less a freeboard) is available to the operator to temporarily store inflows. The objective is to use the storage volume to control outflows, considering early release of water while downstream consequences are more tolerable, or delayed release to avoid more severe downstream consequences and/or to allow extra time for more effective response.

**Stakeholder engagement in the EAP development process.**

*Department of Natural Resources, Mines and Energy*



Townsville has a long history with water supply dating back to the 1800s. As Townsville's urban development spread in the late 19<sup>th</sup> century, a reliable water supply was needed. Water demands were initially met through the construction of wells, however, ongoing water shortages resulted in the damming of the Ross River. A number of weirs were built from 1908 through to 1935 including Black Weir, Gleeson's Weir and Aplin's Weir.<sup>54</sup>

The dam was originally proposed in the 1950s for the dual purpose of flood mitigation and providing a reliable water source for Townsville.

***The frames of Black Weir under construction in 1933 in what would become the suburb of Thuringowa.***

*CityLibraries Townsville Local History Collection*

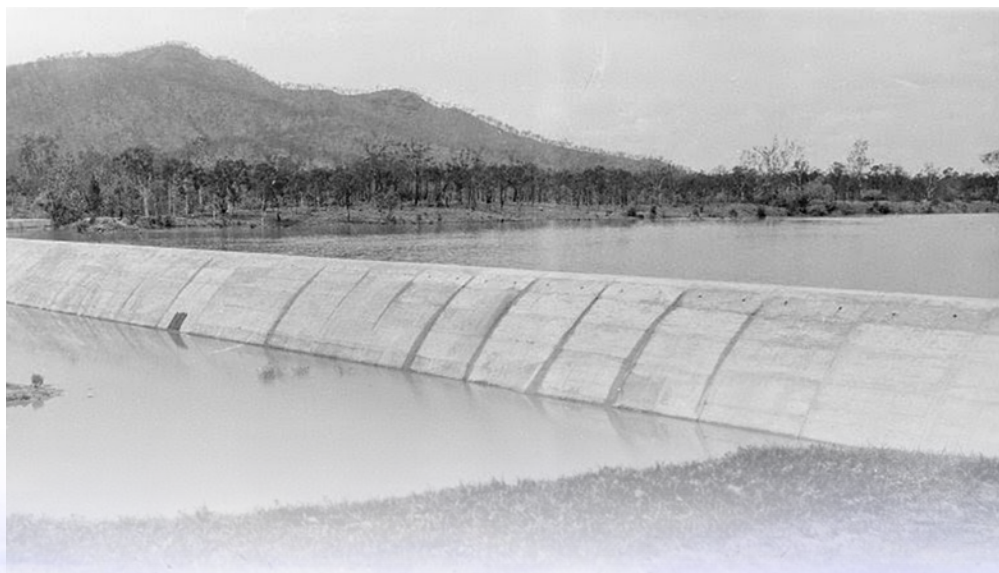


***This photo of the completed Black Weir in 1936 was annotated that its capacity was 830 million gallons.***

*W J Laurie photo, held by CityLibraries Townsville Local History Collection*

A 1968 report<sup>55</sup> contained the recommended dam design to provide effective flood mitigation and storage, with measures targeted to floods similar to those which occurred in March 1946.

The Ross River Dam is not currently a prescribed flood mitigation manual dam. It was built in 1974 to mitigate against flooding and improve water availability for the community.<sup>56</sup> The dam is the primary water source for the City of Townsville and is effective at mitigating floods. It is not a prescribed flood mitigation manual dam because the spillway gates are not designed to provide sufficient control of inflow storage and outflow release.





The Ross River Dam is owned by the Townsville City Council and located approximately 19 kilometres from the central business district of Townsville City. Townsville City Council has a facilities management agreement with SunWater for ongoing operations and management of the dam.<sup>57</sup> This agreement is in place until 30 June 2019 and extends to asset management including:

- condition monitoring, preventive and corrective maintenance
- long-term asset refurbishment planning
- dam safety risk assessments
- dam surveillance, monitoring and reporting
- development and maintenance of facility operations and maintenance manuals.

From 1 July 2019, the operation and management responsibilities of the dam will revert to the Townsville City Council.

SunWater provides emergency management services in line with the agreed EAP, at the direction of Townsville City Council.<sup>58</sup> However, downstream resident and community messaging in relation to the dam operations and outflows remains the responsibility of Townsville City Council. SunWater is authorised to work with the SDCC to issue warnings if Townsville City Council cannot be contacted, under specific emergent circumstances. SunWater is responsible for the day-to-day operations of the dam, and the way this is to be done is set by the Townsville City Council.



**Spillway gates on the Ross River Dam following the 2007 upgrade.**

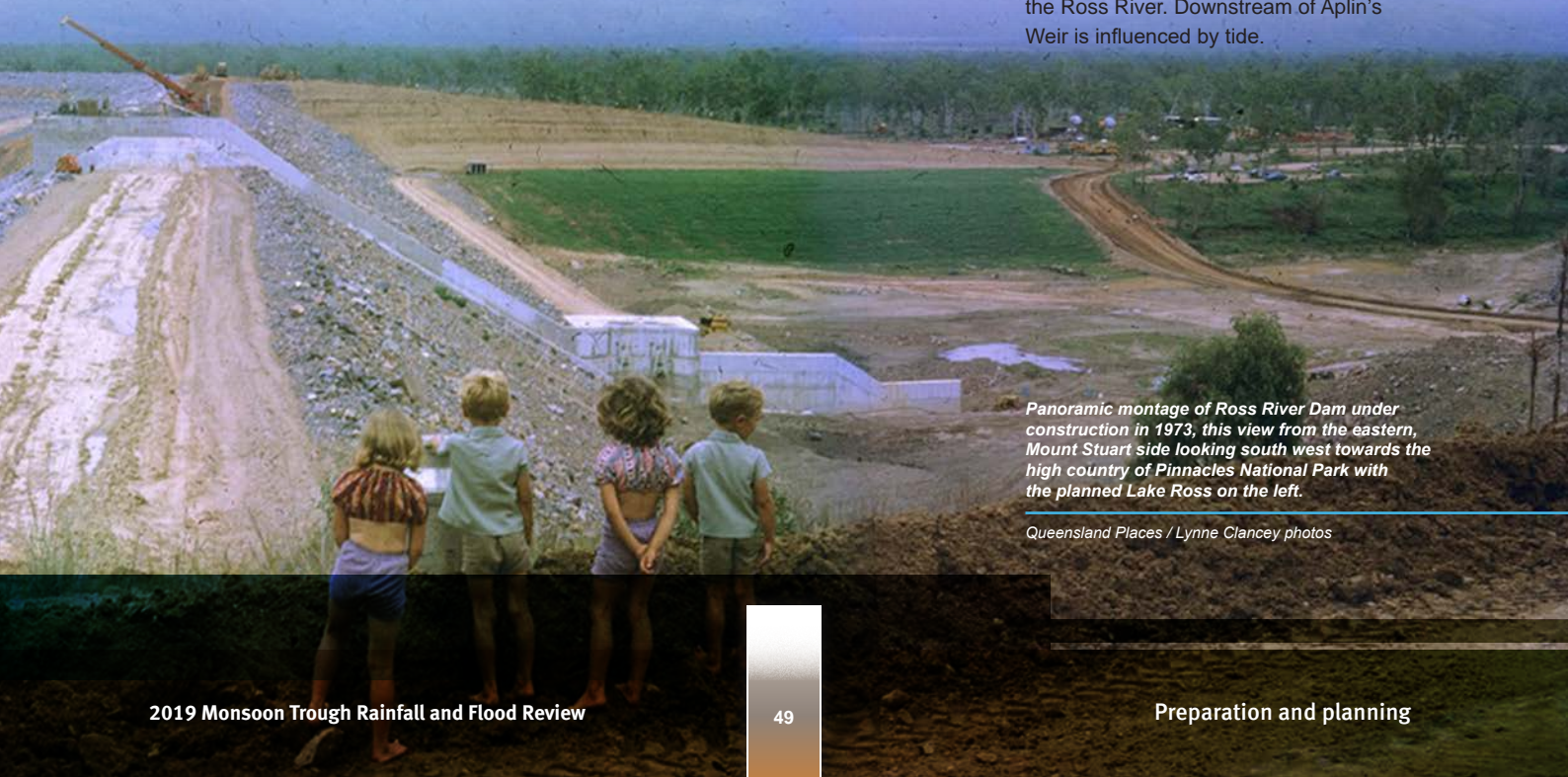
*PERI Australia*

As a result of a flood study undertaken by Townsville City Council in 2011, the automatic gate operating sequence was adjusted to better manage flooding downstream, balancing the need for critical water supply for Townsville.<sup>59</sup> This adjusted opening sequence is in the EAP.

The dam has an upstream catchment of approximately 761 square kilometres.<sup>60</sup> It consists of a 30m-high, 8.4km-long earth and rock-filled embankment wall with a storage capacity of 233,187 megalitres.<sup>61</sup> Spillway gates within the wall can reduce the effect of flooding within their designed capability. Downstream of the dam, Black Weir, Gleeson's Weir and Aplin's Weir create permanent water in the Ross River. Downstream of Aplin's Weir is influenced by tide.

Townsville City Council, as owner of the dam, is responsible for complying with dam safety obligations under the Water Supply Act. As such, SunWater is obliged to comply with the EAP for the Ross River Dam or as otherwise directed by the Townsville City Council, during a flood event.

The dam was constructed between 1971 and 1974, then upgraded in 1987 and 2007. As part of the 2007 upgrade, costing \$140 million, the embankment was raised by 0.8 metres, a 10 per cent increase in water storage capacity provided and three radial gates installed on the spillway. As part of the initial design of the gates the automatic gate opening sequence was developed to optimise water storage, flood mitigation and dam safety.



**Panoramic montage of Ross River Dam under construction in 1973, this view from the eastern, Mount Stuart side looking south west towards the high country of Pinnacles National Park with the planned Lake Ross on the left.**

*Queensland Places / Lynne Clancey photos*









*Black Weir during the 2019 monsoon event,  
viewed from the southern bank of the Ross River.*

Queensland Police Service









*Aplin's Weir, 10km downstream from Black Weir, just after 6pm on 6 February 2019 in this view from the west bank of the Ross River.*

Townsville City Council



0 km 5

TOWNSVILLE CBD

Ross Creek

Ross River

GARBUTT

HERMIT PARK

KIRWAN

ANNANDALE

THURINGOWA

RASMUSSEN

MOUNT  
STUARTROSS RIVER  
DAM

OAK VALLEY

PINNACLES

Lake Ross

Combined maps depict the Ross River catchment area (green outline, lower half) and Lake Ross, with an overlay (pale blue, upper half) visualising the extent of flooding in the event of a breach of the Ross River Dam (centre).

Townsville City Council

ROSS RIVER CATCHMENT  
BOUNDARY

MAJORS CREEK

CALCIUM



## Dams in Queensland ▷ What was expected

Referable dam owners must have an approved EAP for a referable dam.<sup>62</sup> It provides the procedures to enable dam owners to respond collaboratively with disaster management groups, local governments and emergency service agencies to manage the consequences of a dam hazard event and an emergency event and to minimise the risk of harm to persons or property. As the dam owner, Townsville City Council is required to have an approved EAP which must be reviewed before 1 October each year.<sup>63</sup>

### Dam hazard event

**A dam hazard becomes a dam hazard event when persons or property may be harmed due to the event, but the actions undertaken by the dam owner is unlikely to require a coordinated response involving two or more relevant entities.**<sup>64</sup>

### Emergency event

**A dam emergency event arises from a dam hazard where persons or property may be harmed and any of the following apply: a coordinated response to the event involving two or more relevant entities; the event is arising from a disaster situation declared under the *Disaster Management Act 2003*; or an entity performing functions under the *State Disaster Management Plan*, under that plan, require the owner of the dam to give the entity information about the event.**<sup>65</sup>

In line with this, the Office expected to find a documented and approved EAP for the Ross River Dam with clear roles and responsibilities. The preparation and implementation of an EAP must be the result of appropriate collaboration between the dam owner, local governments and disaster management groups. Under the Water Supply Act, the dam owner must provide the EAP to the chair of the relevant local and DDMGs to ensure consistency with group disaster management plans.<sup>66</sup> The local government must assess the EAP for consistency with its disaster management plan. The chairperson of the DDMG may review the EAP for consistency with the group's disaster management plan.

It is expected that consultation occurred during the development, testing and annual review of the EAP. The EAP would also be expected to be consistent with the disaster management plan.<sup>67</sup> The Office also expected to see dam operational staff and relevant disaster management groups participating in joint exercises, and that potential affected downstream residents received appropriate information on the EAP.<sup>68</sup>

The Office expected to find that the EAP for the Ross River Dam had been updated and approved as a result of the recent legislative changes for dam safety requirements, and the required consultation identified above in relation to the EAP had been undertaken.

## Dams in Queensland ► What was found

On investigation, the Office found that the EAP reflected the recent legislative changes designed to strengthen dam safety requirements, as detailed above. On 13 October 2017, the delegate of the Chief Executive of the Department of Energy and Water Supply approved an EAP for the Ross River Dam. Subsequently on 12 April 2018 minor amendments to the EAP were approved by the delegate of the Chief Executive of DNRME. The EAP is available on the DNRME website.<sup>69</sup>

The assessment of an EAP by the dam safety regulator includes an assessment of the hazards likely to be present for the dam and whether the EAP adequately deals with them. It includes ensuring that the EAP contains:

- the dam hazards, the dam hazard events or emergency events applicable
- what actions the owner must take to respond to these
- the area likely to be impacted downstream
- which entities (including residents) are to be contacted during such situations.<sup>70</sup>

SunWater has identified eight major risks to the Ross River Dam in the EAP, one of which is flood. The flood risk addresses a range of outflows from initial spillway releases through to flows that could overtop the dam and cause its failure. The EAP identifies how the dam owner will respond if a dam hazard event or emergency event happens.

The flood operations component of the EAP identifies a staged approach to managing the flood risk to the dam, ranging from preparing for a flood risk through to a stage five event where overtopping of the dam wall is likely. The triggers for each stage are clearly identified. The EAP also identifies contingency plans for gate failure.

*The Ross River Dam spillway gates open during the monsoon trough event.*

*Queensland Police Service*





The EAP contains a communication plan in relation to flood operations. Appendix A of the EAP contains the notification and communication list. Table A1 of the EAP contains preformatted emergency alert (EA) messaging in the event of Ross River Dam flood and dam failure. There is a staged approach to communication, with groups of people to be contacted related to the stage of the flood event and the relevant trigger level. People to be contacted include the LDMG, other disaster personnel, the dam owner and downstream residents.

During October and November 2018, SunWater led training and preparation activities for the Ross River Dam, including annual on-site EAP training and gate operation. Additionally, hydrology modelling training was conducted for dam staff in July 2018. In 2016, a simulated disaster management exercise for flooding and dam release scenarios was undertaken. This exercise was designed to simulate an extreme rain event involving significant outflows from the Ross River dam, including levels that triggered the EAP and associated support plans of the Townsville LDMG. The exercise objectives included the testing of the activation of LDMG subgroups, including evacuation, transport, warnings and alerts and evacuation centres and shelters. The exercise also evaluated the effectiveness of warning mechanisms used and the effectiveness of Incident Action Plans.

An official evaluator reported that:

**“the processes of coordination, information management (including media communications), the development of emergency alerts and the work of the evacuation planning group were successfully conducted.”**

DNRME has advised that the EAP for the Ross River Dam is considered best practice and is being considered at the national regulator's level as a guiding template for other jurisdictions. DNRME was also satisfied with the outcomes of the exercises conducted for the EAP and confirmed that the EAP for Ross River Dam has been updated to reflect recent legislative changes to strengthen dam safety for referable dams. The EAP, under the Water Supply Act, is required to be provided to the relevant local government and to the DDMG. SunWater provided a copy of the Ross River Dam EAP to Townsville City Council for its assessment and to the Townsville DDMG.<sup>71</sup>

|  |  |
|--|--|
| <b>Alert</b>                                   | • EL 38.45m and rising (0.1m below FSL)  |
| <b>Lean Forward</b>                            | • Storage EL 38.65m (gate opening trigger level)   |
| <b>Stand Up – greater than flood of record</b> | • Storage above EL 40.73m (flood of record 2012)   |
| <b>Stand Up – 2</b>                            | • Storage EL 41.00m and rising (accelerated gate opening sequence)   |
| <b>Stand Up – 3</b>                            | • Storage EL 42.50m PLL for no failure flow rate or 900m <sup>3</sup> /s (all gates fully open at EL 43.00m) |
| <b>Stand Up – 4</b>                            | • Storage EL 43.60m or flow rate 2100m <sup>3</sup> /s   |
| <b>Stand Up – 5</b>                            | • Dam failure extremely likely   |
| <b>Stand Down</b>                              | • Storage level FSL 38.55m and falling   |

*Activation trigger levels table for the Ross River Dam spillway gates.*

*SunWater*

## Finding 1

The Ross River Dam Emergency Action Plan complies with legislative requirements, and has undergone appropriate consultation, testing and review.

## Land use planning

As outlined in the DM Guideline, preventive measures can reduce the likelihood of a disaster event occurring or the severity of an event should it eventuate.<sup>72</sup> Appropriate land use planning is one approach a local government can take to reduce the impact of natural hazards and assist in minimising risk to life, property and environmental systems from natural hazards.<sup>73</sup>

**‘Promoting the avoidance or mitigation [of the risks associated with natural hazards] through plan making and development decisions of state and local government can significantly reduce the likelihood and severity of impacts of certain natural hazards including flood...’**

*After the deluge: receded floodwaters left their mark with debris entangled high on the fenceposts of this Townsville suburban property.*

*Townsville City Council*

## History of Townsville planning

Townsville City is located on the floodplain of the Ross River. Consequently, there is a need to continually refine responses to flood risks through the incorporation of improved flood risk management principles into land use planning. This inclusion has gradually increased over time based on local circumstances, as evidenced below.

Townsville City Council was formed in 2008 as a result of local government amalgamations. Prior to this the two local governments of Townsville City Council and Thuringowa City Council each had their own planning schemes.

Prior to the *Townsville City Plan 2014* being adopted, the Townsville Planning Scheme for Townsville City 1982 and the Town Planning Scheme for the Shire of Thuringowa 1977 had no specific reference to flooding considerations. However, their supporting by-laws included consideration of flooding issues in development application decisions.<sup>74</sup> Further details are provided in Appendix F.

Provisions, with respect to flood mitigation measures, were subsequently included in the *Townsville Planning Scheme 1994* and the *Thuringowa Town Planning Scheme 1996*. The *Townsville Planning Scheme 1994* included a requirement that premises shall have a minimum floor level of 3.25m Australian height datum (AHD).<sup>75</sup> AHD refers to the elevation from the ground of an object, relative to the sea level which is taken as 0m AHD. As well, subdivision of land for residential use, required the minimum level of surface of land for dwelling units, to be more than 0.5 metres above the highest recorded flood level or the designated flood or storm surge levels of Council.<sup>76</sup>

The Thuringowa Town Planning Scheme included more detailed provisions and referenced a minimum floor level of 3.9m AHD, provided the floor level was not less than 450mm above the 50-year average recurrence interval flood level (ARI flood level).<sup>77</sup> The ARI flood level is the average or expected value of the periods between exceedances of a given rainfall total accumulated over a given duration.

The Townsville City Plan 2005 introduced reference to a “one in 50-year flood” or to “Q50”, with the habitable floor level of any building to be 300mm above the Q50 level.<sup>78</sup> The Thuringowa Planning Scheme 2003 introduced a natural hazards overlay, which required floor levels of habitable areas of buildings to be at least 450mm above the 50-year ARI.<sup>79</sup>





## ► What was expected

In looking at the *Townsville City Council Planning Scheme*, the Office expected to find that it addressed the *State Planning Policy* requirements for natural hazards, risk and resilience for floods. The Office also expected to find that the *Townsville City Council Planning Scheme* addressed flood risks in the assessment process for development under the *Planning Act 2016*.

Further, that this development assessment process is informed by comprehensive flood risk maps for properties. This information would also need to be made available publicly, so that prospective purchasers could view it.

## ► What was found

The land use and building controls that currently apply to Townsville include State and local planning instruments through the *Planning Act 2016*. Further details of these are provided in Appendix G.

An amalgamated planning scheme, the *Townsville City Plan 2014*, covering the entire Townsville City Council area (Townsville City and City of Thuringowa amalgamation), was prepared under the *Sustainable Planning Act 2009* and was adopted in October 2014. The *Townsville City Plan 2014* includes a strategic framework which has adopted a 25-year planning horizon for the Townsville City Council local government area.

The *Townsville City Plan 2014* strategic framework includes planning for future land uses to ensure adequate supply for development, while considering broader outcomes sought by the local government area. This includes planning for a population set to grow from 190,000 in 2011 to between 270,000 and 300,000 by 2031. One theme the Townsville City Plan seeks to ensure is:

**“Exposure of communities to natural hazards, such as bushfire, landslide, flood and coastal risks such as storm surge and sea level rise, will be avoided wherever possible.”<sup>80</sup>**

For natural hazards (bushfire, landslide and flood) the specific outcomes of the *Townsville City Plan 2014* strategic framework include that:

- new development in areas subject to bushfire, landslide or flooding hazard is compatible with the nature of the hazard
- development does not materially increase the extent or the severity of natural hazards, and the safety of people is maintained and damage to property is minimised
- the settlement pattern avoids further expansion of urban and rural residential uses into hazard areas
- significant areas of Townsville are already established within the floodplains of the Ross and Bohle Rivers. Within these areas, the flood risk will be managed by avoiding intensification of development in high hazard areas and ensuring development is compatible with the hazard in other areas.

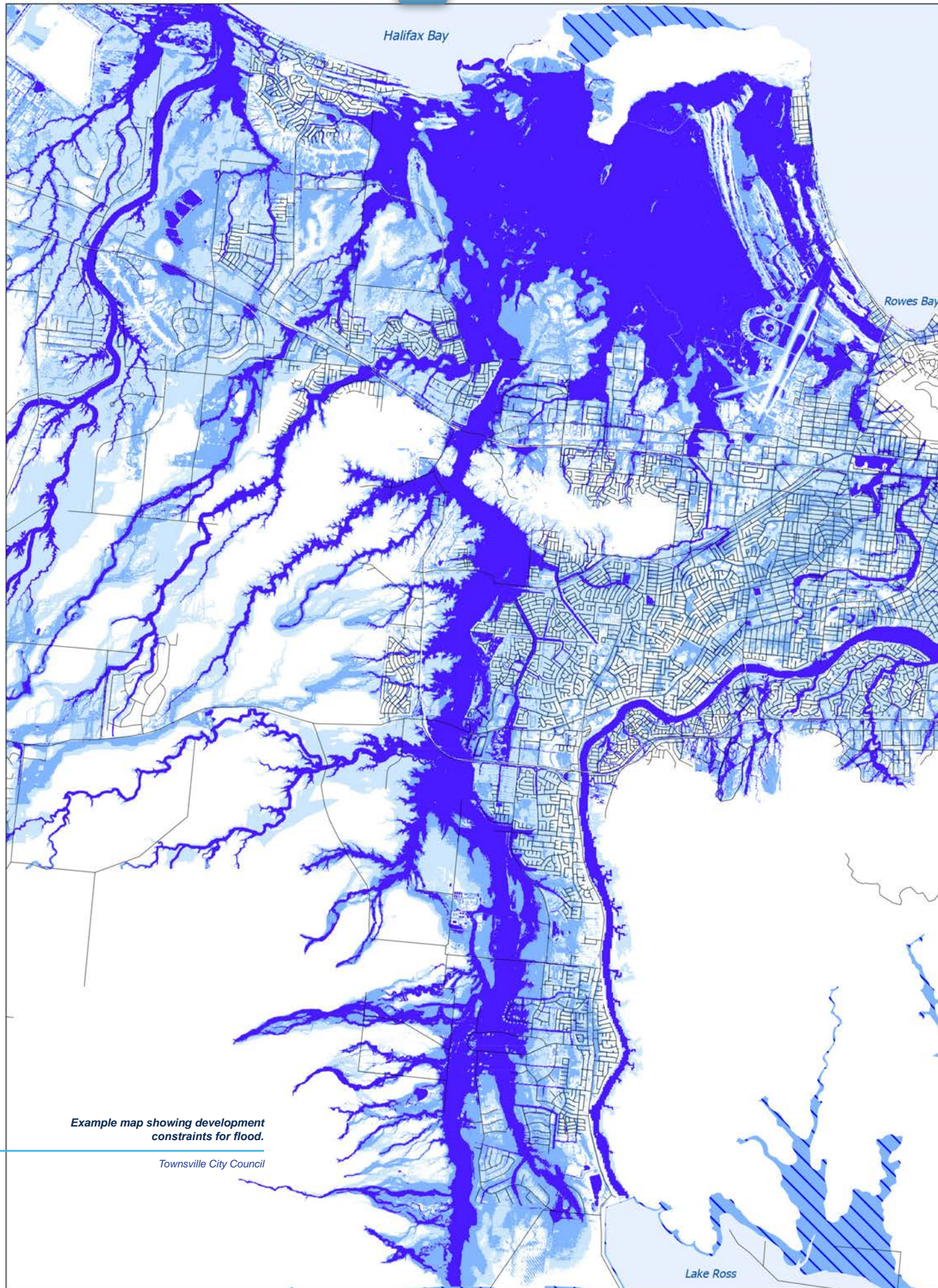
Land use zoning based on flood risk can reduce the community impact of flood.

WMA Water



The Office also found that, in approving the *Townsville City Plan* in 2014, the former Planning Minister considered that all State interests had been appropriately integrated in accordance with the July 2014 *State Planning Policy*. The State interest in natural hazards, risk and resilience in the *State Planning Policy 2014* seeks to ensure that natural hazards such as flooding are properly considered in planning systems and that hazards are avoided, or the risks are mitigated to an acceptable or tolerable level. Key to achieving these outcomes is an integrated, evidence-based process that empowers local government and the community to plan for their local circumstances and contributes to achieving a safer and more resilient Queensland. The *State Planning Policy 2014* and its various assessment benchmarks for flooding is similar to the *State Planning Policy 2017*. Where a planning scheme does not appropriately integrate the assessment benchmarks for development, the current *State Planning Policy* must be considered in the development assessment process.









# Townsville City Council Planning Scheme Development Constraints

## Flood hazard

- High hazard area
- Medium hazard area
- Low hazard area
- Medium hazard - further investigation area

## Cadastre

- Road network
- Waterway or waterbody

Cleveland Bay

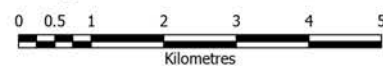
Queensland reconstruction authority data was supplied by © State of Queensland (Queensland Reconstruction Authority) 2012.  
Updated data available at <http://dds.information.qld.gov.au/dds/>.  
Flood hazard data was supplied by the planning and development division of the Townsville city council. This data is to be used as a guide only for planning purposes.

While every care is taken to ensure the accuracy of this product, Townsville City Council makes no representations or warranties about the accuracy, reliability, completeness or suitability for any particular purpose and disclaims all responsibility and all liability (including without limitation, liability in negligence) for all expenses, losses, damages (including indirect or consequential damage) and costs you may incur as a result of the product being inaccurate or incomplete in any way or for any reason.

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Gazettal Date: 27/04/2018  
Amendment Number: 2015  
Geocentric Datum of Australia 1994 (GDA94)



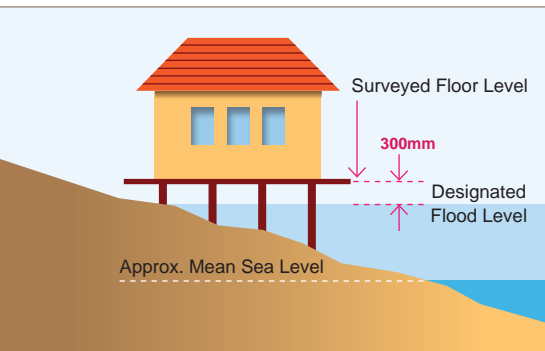
Approx Scale @ A3 1:100,000



**Overlay Map - OM-06.2**

## Defined flood level

A key element of development standards in Townsville involves 'Defined Flood Levels'. Townsville City Council requires that the habitable floor levels (or freeboard) accommodate a 1 in a 100-year ARI flood event plus a minimum 300mm for the lowest floor above the flood level.



**Townsville's City Plan habitable floor levels.**

*Image derived from City of Gold Coast*

In adopting these standards, a risk management decision, which balances the flood risk and the cost of living has been made. A 1% AEP plus a freeboard has often been used to define the standard up to which general development controls are applied to new standard residential developments. Compliance with the flood standard does not guarantee that a property will never experience flooding. Townsville City Council officers advised that this is made clear to the public when they undertake flood searches.

The *State Planning Policy 2017– State interest guidance material – Natural hazards, risks and resilience – Flood* provides guidance to local governments to support the implementation of the State Planning Policy 2017. It acknowledges that the frequency, extent or severity of the hazard may change over time and that this should be factored into a program of hazard mapping to ensure effective risk assessment. It also acknowledges that as populations grow and development pressures and land use patterns change, the results of flood hazard investigations should be revised. The 1% AEP in the guidance is considered base level flood modelling and local governments can refine this for their local circumstances.

An issue around the 1% AEP however is that there is limited public understanding of terms associated with this. Research undertaken by MCR found that less than 22 per cent of surveyed residents understood that the Q100 and Q500 terms relate to flood probability. When asked what the Q100 and Q500 terms meant to them, the vast majority of surveyed residents were unable to provide a meaning. When asked what the terms one-in-100-year and one-in-500-year flood meant, the most common meaning provided by survey residents was that they related to the frequency of flooding (e.g. a flood that occurs every 100 or 500 years).<sup>81</sup>

**Probability of experiencing a given-size flood once or more in a lifetime.**

*Department of Natural Resources, Mines and Energy*

| Chance of a flood of a particular size occurring or being exceeded in any one particular year | Chance of experiencing a flood in a 70-year period |                |
|---|--|----------------|
|   | At least once                                      | At least twice |
| 10% (1 in 10 odds)  | 99.9%  | 99.3%          |
| 5% (1 in 20 odds)   | 97.0%  | 86.4%          |
| 2% (1 in 50 odds)   | 75.3%  | 40.8%          |
| 1% (1 in 100 odds)  | 50.3%  | 15.6%          |
| 0.5% (1 in 200 odds)  | 29.5%  | 4.9%           |

The results of the MCR Community Survey demonstrate that a significant portion of the community either do not understand, or misunderstand, the terms currently used to communicate flood risk probability. A Q100 or a one-in-100-year flood is a flood event that has the probability of being equaled or exceeded once in every 100 years or, more appropriately, has a one percent chance of being equaled or exceeded in any year. Some people believe that a flood of this size can only happen once every 100 years. Rather, there is a 63 percent chance of this event happening over a 100 year period (noting that "happening" means "equalled or exceeded" in this description). However, the probability of a one-in-100-year flood event happening is one per cent in any year and this probability is the same every year.<sup>82</sup> Similarly, this is the case with a one-in-500-year flood event, where some people believe a flood of this size would only happen once every 500 years, however the probability of a one-in-500-year flood event occurring is consistently 0.2 per cent in any year. The Queensland Flood Commission of Inquiry noted that many members of the public did not understand the term Q100.<sup>83</sup>



Public confusion around the term one-in-100-year or one-in-500-year flood is not restricted to Australia. The same issue was raised on 8 May 2019 in an article in NPR News titled “When 1-in-100 Year Floods Happen Often, What Should I Call Them?” Considering significant regular flooding of cities and towns along the Mississippi and Missouri rivers, the article indicated the terms confused people to believe flooding would only happen every 100 years rather than considering that there was an annual one per cent chance that a home would flood each year. The article suggested that hydrologists at the US Geological Survey were transitioning away from communicating one-in-100-year flood and advocated communicating risk in terms of telling people what their risk of flooding is over time, rather than by year. “For example, if there is a 1% chance that a home will flood each year, that means there is a 26% chance it will flood over the course of a 30-year mortgage.”<sup>84</sup>

### Publicly-available information

It was found that property searches based on address or lot plan can be undertaken using the flood hazard maps in the Townsville City Plan. Townsville City Council has published a technical information sheet on its website that provides general information on the application of the flood hazard overlay to development.<sup>85</sup>

Property level flood reports are provided as part of a property search report which is commonly requested as part of the standard conveyancing searches for a property transfer. These reports provide detail on the modelled flood impact to a property during a 1% AEP and a 2% AEP flood event. The flood reports provide an indication as to whether regional flooding is likely to be a concern for an individual property.

However, the MCR Community Survey results indicate there is little understanding of the flood descriptors of Q100 or a one-in-100 flood event. In contrast, survey results indicate that 93% residents in the Townsville study area and 94% in the Western study area are confident about their understanding of flood risk to them and their property. This potentially demonstrates a level of over-confidence within the community in understanding their actual (as opposed to their perceived) flood risk. This could contribute to inadequate planning and preparedness measures at individual and household levels and put lives at risk.

In respect to increasing community awareness and understanding of flood risk, the *Brisbane River Strategic Floodplain Management Plan* provides a guide for delivering a coordinated approach to managing flood risk across the Brisbane River floodplain. It sets out a range of strategies and actions for State and local governments to consider to strengthen the flood resilience of the region consisting of Brisbane, Ipswich, Somerset and Lockyer Valley councils. The actions include community awareness campaigns such as developing regional material for delivering consistency in local provision of online flood awareness mapping, property scale information and community language and messaging.<sup>86</sup> This work may be a useful reference point for others to consider.

### Finding 2

**The definition of the flood descriptors Q100, Q500, one-in-100 flood event and one-in-500 flood event are not widely or consistently understood by the public.**

### Finding 3

**Residents had low levels of understanding of the terms used to describe actual flood risk, despite them expressing very high levels of confidence about their understanding of flood risk.**

### Recommendation 1

**Further work be undertaken to develop effective public flood risk messaging and community education materials that are easy to understand and tested with the community to ensure flood risk is understood.**

### Unintended Consequences of Terminology

Using terms such as 1-in-100-year flood or 500-year flood can be highly confusing as they are based on probabilities. This language was never intended to prepare people for flooding but was adopted in the 1970s to describe who would need to buy insurance.

Many people assume that if their area has experienced a 1-in-100-year flood, that means that for the next 99 years they need not worry about flooding. This is not the case.

A 1-in-100-year flood means:

- there is a 1% chance a flood of that magnitude will happen each year
- if it happens this year, there is still a 1% chance it will happen next year.

One way to interpret this further is with a flip of a coin. If you flip ‘heads’ twice in a row, that doesn’t mean that you’ll get ‘tails’ the next time. So, you could have three very significant floods in a row. All three floods may have had a low probability of happening, but sometimes low probability things happen. Floods of any magnitude can occur at any time.

There are further dangers from using these terms – the misunderstandings they can generate, can not only lead to people being underprepared, it can also impact public trust in flood science.

The average lay-person or elected official think ‘well, you scientists can’t get it right, because we had a 100-year flood two years ago, why are we having one now. You must have the numbers wrong’ – that is not the case.

(Rob Holmes – National Flood Hazard Coordinator, United States Geological Survey)

Using these terms in the public domain can lead people to perceive the science as wrong. This is important because:

- Flooding is getting more frequent and severe in many areas.
- Climate change is contributing – warmer air can hold more moisture which can fall as more extreme rain.
- New development can create more runoff, potentially putting people at risk, many of whom may not know they are risk.

Getting the language and messaging right will pay dividends for everyone – the public will be better able to understand their actual flood risk, the flood scientists and emergency managers will be better able to maintain public trust and better influence and support their communities in building resilience.

Adapted from When 1-in-100 Year Floods Happen Often, What Should We Call Them.<sup>87</sup>

### Land use planning enhancements

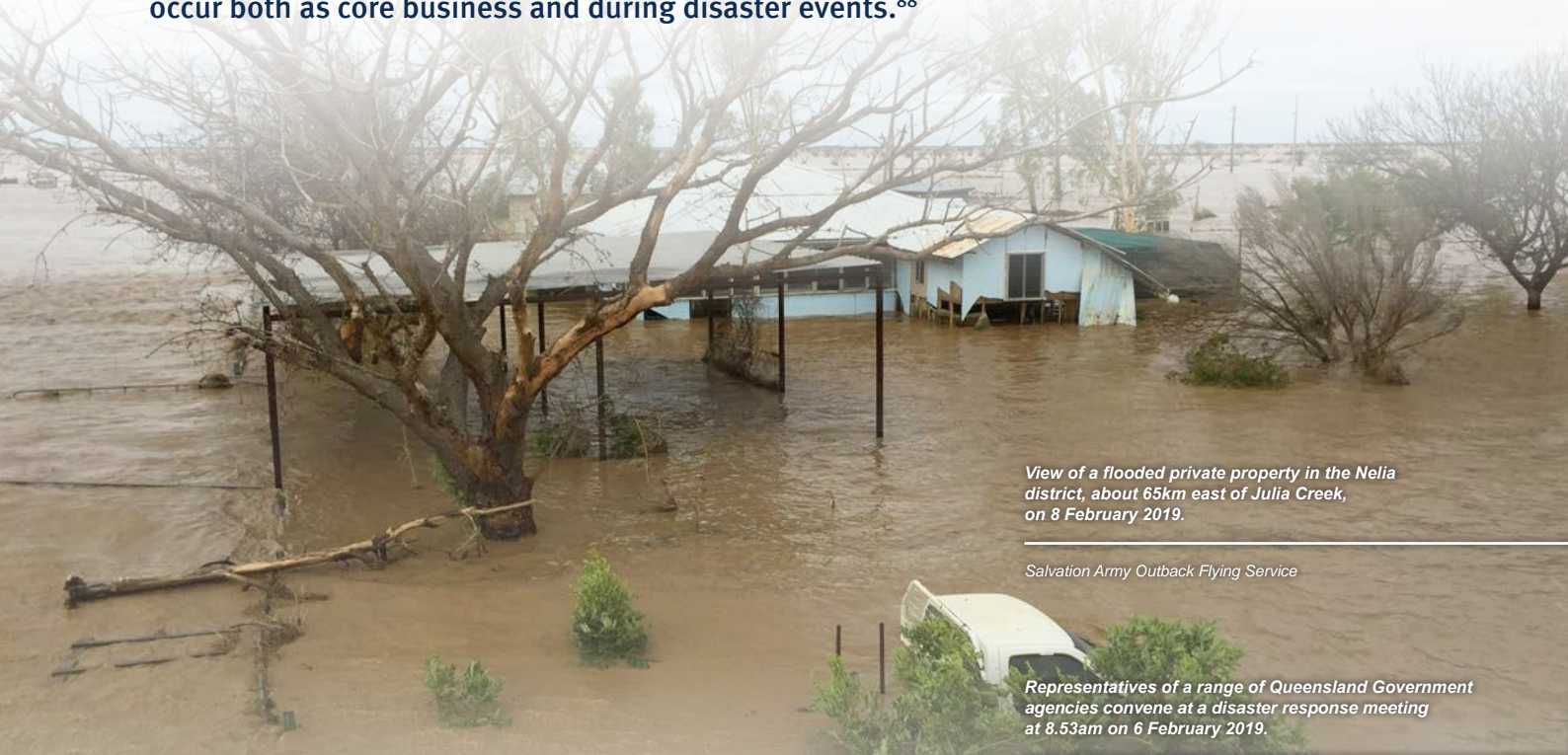
As a result of the Monsoon Trough event, the Department of State Development, Manufacturing, Infrastructure and Planning (DSDMIP) has identified an opportunity to further assist local governments by providing specialist advice and guidance on planning options and tools to facilitate development. The DSDMIP developed a fact sheet to assist local governments to identify opportunities through the planning framework that may aid in the recovery of local government areas affected by natural disasters. It includes matters such as demolition, exemption certificates and temporary local planning instruments.

The Northern Planners Directors Network was used subsequent to the Monsoon Trough event to encourage local governments to share their disaster recovery activities and identify any planning related issues. Matters raised by councils are informing ongoing discussions between the DSDMIP and affected councils.



## Disaster management planning

Local governments, disaster districts, state agencies and NGOs prepare for disasters through a continuous cycle of risk management, planning, coordinating, training, equipping, exercising, evaluating and correcting based on standards, guidelines, policies and good practice. This supports effective coordination and response during disasters. Planning must occur both as core business and during disaster events.<sup>88</sup>



*View of a flooded private property in the Nelia district, about 65km east of Julia Creek, on 8 February 2019.*

*Salvation Army Outback Flying Service*

*Representatives of a range of Queensland Government agencies convene at a disaster response meeting at 8.53am on 6 February 2019.*

*Townsville City Council*





## Disaster management planning ► What was expected

The Office expected to find plans align with legislation and disaster management guidelines, address all phases of disaster management, outline roles and responsibilities, and are developed in consultation with stakeholders.

It was expected that plans would be based on the phases of disaster management, including recovery, and include the management of known risks. Where identified, it was expected there would be a process to escalate residual risks for further consideration and management.<sup>89</sup>

The Office expected to find that plans are made accessible to all stakeholders, including the community, to enable greater understanding of local disaster management practices, and to act as an aid in the development of other's plans. Along with plans, an outline of associated risks and their assessment process are publicly available to stakeholders and the community.

The Office expected to find flood mapping is readily available to the public. Those communities with a high flood risk have an appropriate awareness of flood zones, a good understanding of flood risk probability and risk mitigation, and, are appropriately prepared.

The Office expected to find that pre-season disaster management groups across all levels and stakeholder agencies had reviewed and assessed plans, including sub-plans. Where appropriate, plans and sub-plans would have been assessed for integration across local, district and state levels.

For relevant stakeholder agencies it was expected that critical infrastructure plans and business continuity plans had been reviewed and assessed to ensure the protection and continuity of their service. This includes major transport routes, airports, marine ports, evacuation centres, cyclone shelters, emergency/disaster coordination centres, electricity, gas, water storage and supply, sewerage/waste and communications (i.e. telephone networks and the National Broadband Network).

It was expected that learnings from exercises and other assessment activities, such as training and events are captured, shared and importantly actioned to support continuous improvement. For Townsville disaster district, the Office expected to find progress on the implementation of a District Action Plan, as recommended in the *Review of Capability at a District and Local Level – Townsville Disaster District (Townsville District Capability Review)*.

It was expected to find that persons with disaster management roles and responsibilities have the skills and knowledge to perform their role; that formal training and exercises are coordinated, involve all entities, and address priority risks as identified in risk treatment plans.

The Office expected to find disaster coordination centres in a state-of-readiness with equipment, power supply, and communication systems tested and operational.<sup>90</sup> Skilled staff have been identified and are available for action, if required.

It was expected community engagement and education programs about risk and preparation for disasters is led by local government, supported by partner government and non-government organisations.

The Office expected to find plans that outline varying methods, important timings, and agency and individual responsibilities for information distribution and the development and implementation of community engagement and education initiatives. This would include methods for two-way engagement and the specific co-design of engagement programs for people with vulnerabilities in disasters (particularly where factors experienced by individuals could reduce an ability to prepare for, respond to, and adapt during disasters).<sup>91</sup>

It was expected that local disaster management plans would detail the use of community messaging and warnings and a range of communication channels, including EA, to inform the public on emergency situations. For efficiency purposes, these plans would be expected to also contain preformatted messages, alerts and warnings based on known risks, linked to mapped zones (i.e. location polygons).

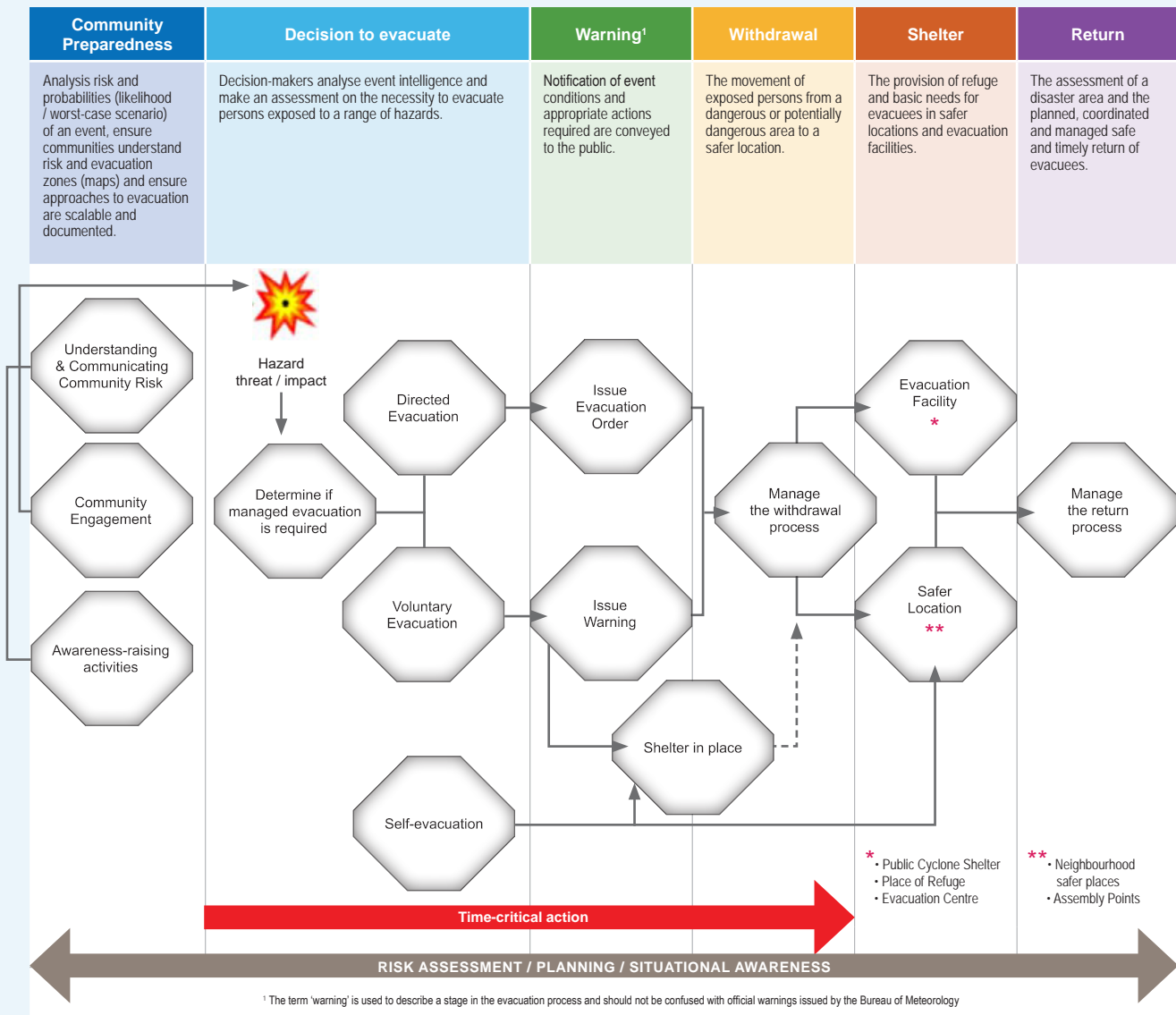
It was expected to find local plans developed in accordance with disaster management doctrine and practices. The Office expected these plans to be available and meaningful to respective communities and to guide all phases of disaster management. Similarly, it was expected to find district plans in place, developed in accordance with disaster management doctrine and practices. The Office expected these plans to be available and meaningful to respective stakeholders and to guide support to respective LDMG/s.

It was expected to find a State Disaster Management Plan in place, developed in accordance with disaster management doctrine and practices. The Office expected this plan to be available and meaningful to stakeholders and to guide support to DDMG/s.

For this event The Office expected to find strong relationships and support with Commonwealth Agencies including Emergency Management Australia (EMA) and the ADF. It is also expected that EMA operated to support the QDMC, in its role under Queensland's disaster management arrangements, including the provision and coordination of national resources and other State resources.

The Office expected to find that evacuation is planned for with plans reviewed regularly. Evacuations should be led by appropriately skilled people with the right authority. Additionally, those with a stake in evacuation are involved in, and committed to, planning and reviewing evacuation.





It would be expected that planning around persons with vulnerabilities in disasters (such as those with impaired mobility, diminished sensory awareness, multiple chronic health conditions, and/or social and economic limitations, specific cultural needs, tourists, and itinerant workers) has been undertaken by key stakeholders.<sup>92</sup>

This would include planning around vulnerable persons relevant to specific disaster events. It would also be expected that planning for people with vulnerabilities in disasters be aligned with the *People with vulnerabilities: A framework for an effective local response*.

Regarding current evacuation plans, the Office expected to see local government and district disaster management plans:

- reflected the DM Guideline and the sub-plan template
- went beyond the DM Guideline and reflected the Standard and issues raised by the literature and other jurisdictions
- were supported by arrangements that could adapt to circumstances
- had a component that helped prepare the community for the possibility of evacuation.

#### Five stages of evacuation and the evacuation process.

Queensland Fire and Emergency Services

It was expected that training on evacuation reflected the DM Guideline. The Office expected that those agencies with responsibilities for evacuation had committed to training their people, and that this training was sustained over time.

Finally, it was expected that people had retained their skills from training and could contribute to planning an evacuation.

## Disaster management planning ► What was found

### Disaster management plans

In assessing disaster management planning and preparation it was found that disaster management groups across all levels had plans in place associated with all phases of disaster management. Plans were developed in consultation with a range of expert stakeholders and were aligned with legislation and disaster management guidelines.

Previous assessments of disaster management plans for LDMGs and DDMGs in locations impacted by this event had identified that the shared responsibility of relief and recovery was an area that would benefit from further development.

The *Townsville District Capability Review* identified areas for improvement around disaster recovery planning and exercising for LDMGs in the north west, including Flinders. The report highlighted that these LDMGs were well placed for drought recovery, with significant expertise, networks and learnings that can be translated from drought recovery to broader disaster management. These LDMGs would benefit from applying these principles to their flood recovery plans.

The *Townsville District Capability Review* also found a number of other areas for improvement around relief and recovery planning and plans.

*'Across the Townsville Disaster District, most groups were assessed as moving from a development area towards well placed... There needs to be a stronger focus on governance, and recovery plans should be developed based on the five functional areas... Not all groups consider recovery across the five functional areas ... Working with QRA to develop sub plans that follow contemporary recovery models and planning could benefit the District. Community profiles can be better incorporated into recovery planning, and planning for vulnerable individuals and communities can be further developed with guidance from the Department of Communities, Disability Services and Seniors' vulnerability toolkit ...*

*'Key elements of relief; the use of evacuation centres and cyclone shelters, funding arrangements, roles and responsibilities, emergency supply and resupply, need to be more explicitly planned for and understood ... Clarity of roles and responsibilities and the development of formal agreements and contracts with civil agencies and support services could be better developed. External groups are aware of their obligations, are appropriately skilled and qualified to deliver as required within the arrangements and can work collaboratively with each group. We saw little application of the Queensland Policy for Offers of Assistance and supporting guidelines.'*<sup>93</sup>

The review of the Monsoon Trough event found that plans had been shared amongst stakeholders. The Office also found that collaboration and coordination amongst stakeholders was stronger where agency and group plans had been tested for integration, across local, district and state levels. The Office also found that the opposite occurred where agency and group plans had not been tested for integration.

For example, the plans and strategies of the Townsville LDMG and the Department of Housing and Public Works (DHPW), relating to the closure of evacuation centres were not as integrated as they could have been. Further detail relating to this example can be found in the Evacuation section of this report.



The Townsville DDMG conducted Exercise *Okapi* in 2018 that tested stakeholder plans in relation to a foot and mouth disease outbreak. It provided an opportunity for agencies, including LDMGs and the Department of Agriculture and Fisheries to test their strategies together. In the Monsoon Trough event, this proved very valuable for the mass carcass disposal in the north west.



## Finding 4

**Plans that are tested for integration with other stakeholders and across disaster management levels are more robust and provide for better outcomes.**

*DDMG Exercise Okapi in Richmond on 26 July 2018.*

*Inspector-General Emergency Management*

For larger councils, such as Townsville and Cairns, the capacity to employ a full-time disaster management officer to prepare, test and review local disaster management plans is far greater. For smaller local councils to overcome this capacity issue, the Office has previously noted some small rural based councils clustering together to employ and share a single disaster management officer (e.g. Longreach cluster). Local councils of a smaller capacity would benefit from adopting a similar practice.

Some local plans would benefit from further development around disaster recovery (i.e. five functional areas) to provide enhanced direction. This would include the development of operational plans, undertaken in greater consultation with the community and key stakeholders. LDMGs would further benefit from exercising these plans to test their functionality and integration with other stakeholder plans.

Planning is important and so are plans, but only up to a point. It is not until plans are tested to see if they work, be it during a developed exercise or in a real disaster event, that it is truly known how well the plans work. For the Monsoon Trough event it was found that, in most part, the plans worked adequately.

Disaster management plans were generally found to be easily accessible to all stakeholders and the community, with plans available online. These plans outlined associated risks and their assessment process. Flood maps were available to the communities in areas susceptible to flooding and storm surge.

## Finding 5

**Some local plans would benefit from further development to ensure appropriate and sufficient consideration is given to disaster recovery. Local Recovery plans established before an event should consider likely effort required across all functional recover groups.**

## Recommendation 2

**State Government agencies with key roles and responsibilities around disaster recovery provide increased support in the development of recovery at the local level (pre-event).**



## Disaster management planning ► What was found

### Disaster management plans *continued*

#### Finding 6

Whilst Townsville City Council's Tropical Cyclone community education program is commendable, an opportunity exists to enhance community preparedness regarding riverine flooding.

Townsville City experienced a riverine flood; a flooding event greater than anything experienced in the last 120 years. Many residents and responding agencies were caught by surprise due to the size and nature of this flood. Numerous accounts of Townsville residents disbelieving or ignoring flood warnings or messages and not evacuating their dwellings were relayed.

In the past, the Townsville LDMG and DDMG have focused on planning, community education and overall community preparedness and resilience around cyclone-related activities.<sup>94</sup> This is primarily due to the higher likelihood and consequence of cyclones for Townsville, compared with other natural hazards such as riverine flooding.

Drone view east along Seventh Street from above Railway Avenue in the flooded Townsville suburb of Railway Estate.

Queensland Fire and Emergency Services



In the adjacent suburb of Hermit Park, on the western side of Ross Creek, a Swift Water Rescue team sets off down a flooded street on 3 February 2019.

Queensland Fire and Emergency Services



As previously stated in this section, taking into consideration the size and nature of this event, the plans of affected local councils worked adequately. This includes those councils in north west Queensland that witnessed major floodwaters not seen in at least the last 50 years, or in recorded history, and the associated devastation to their primary producers.

This is largely due to these councils' greater levels of experience of dealing with, and planning for, seasonal floods. Given the uniqueness of this flood and the impact it had on primary producers in north west Queensland, there are opportunities to educate primary producers on disaster planning, preparation and resilience across the State, which is especially important when considering climate change.<sup>95</sup>

***Heli-mustering stock towards higher ground, west of Richmond.***

*Richmond Shire Council / Mayor John Wharton*

## Disaster management planning ► What was found

### Disaster management plans *continued*

Scientific modelling suggests climate change will likely exacerbate the frequency and severity of disaster events in Queensland, such as floods, droughts, heatwaves and bushfires. Increasing occurrence of disasters in Queensland will progressively place greater pressure on agencies and disaster management groups to support the management of and recovery from these disasters.<sup>96</sup>

The *Queensland Emergency Management Sector Adaptation Plan for Climate Change* (EM-SAP) identifies the issue of increased pressure from climate change and supports the disaster management sector 'to manage the risks associated with a changing climate, and to harness the opportunities provided by responding to the challenges'.<sup>97</sup> EM-SAP envisages 'an adaptive emergency management sector that is fully engaged with the risks and opportunities of a changing climate, building resilience together with the communities of Queensland'.<sup>98</sup>

EM-SAP outlines eight priority adaptation measures that were developed in consultation with stakeholders and through leading climate change measures. Three of these priority measures are particularly relevant at this time, namely: enhancing the sector's understanding of climate change risk and its ability to adapt; allocation of resources to support sector adaptation; and promoting and enabling community resilience building and self-reliance.<sup>99</sup>

Agencies and disaster management groups should regularly consider the effects of climate change and the consequence of events which exceed those previously encountered or currently planned for. Input from key stakeholders, including community leaders and subject-matter experts, will support this process and the development of future plans.

Some agencies and disaster management groups have already initiated measures to address increasing disaster management requirements. 'QFES has already commenced examining methods to incorporate climate projections into the QERMF, ensuring Queensland's disaster management arrangements will be supported by contemporary and forward-looking climate science'.<sup>100</sup>

Queensland Health (QH) has been progressively increasing its staffing capacity in the disaster management field, with measures underway to create permanent disaster management officers in regional and remote parts of Queensland. Disaster management training for staff has increased, with expanded training being planned. QH has invested in an IT system to improve communication and situational awareness capabilities within the State Health Emergency Coordination Centre (SHECC), with an intention to roll this out across the department.

### Finding 7

Climate change will exacerbate the frequency and severity of disaster events in Queensland.

### Recommendation 3

Entities with disaster management responsibilities need to integrate the eight priorities identified within the *Emergency Management Sector Adaptation Plan for Climate Change* into their disaster management planning cycle.



## Preparatory exercising

In 2016, the Townsville LDMG undertook an operation called *Dam You Huey*, which simulated an extreme rain event involving significant outflows from the Ross River Dam. It included levels that triggered the EAP and associated support plans of the Townsville Local Disaster Management Plan. From this exercise, several lessons were learned, with preformatted evacuation message scripts being developed in preparation for a future flood evacuation and sub-groups membership being revised.

In 2018, the Townsville DDMG, LDMGs and key stakeholders undertook Exercise Okapi to test plans in response to a foot and mouth disease breakout. This exercise ensured the DDMG and LDMGs were well-positioned for the mass disposal of thousands of dead cattle carcasses in north west Queensland as a result of the Monsoon Trough event. As one agency representative stated, 'It was opportunistic to have undertaken the exercise given the similarities with this event.' This demonstrates the value in event planning and testing, and also the value in exercising the collaboration of agencies and interoperability of their plans.

The Burke LDMG within the Mount Isa DDMG conducted an exercise in 2018 about the failure of critical infrastructure (e.g. water and communications) due to a flood event. This exercise focused on testing business continuity plans (BCPs) and the escalation to district level where local capacity was exhausted. This exercise enabled new senior council staff to understand their critical infrastructure, relevant BCPs and community impacts of flooding. This enhanced the ability of the Burke LDMG to better manage the Monsoon Trough event.

For the Monsoon Trough event, it is estimated about 500,000 cattle died in the north west area. Most of these cattle died not as a result of drowning, but from exposure (i.e. hypothermia). This created a challenge of carcass disposal, but it also enabled an opportunity for the ADF to provide logistical support in the disposal process. This support had not been formally planned but was implemented to meet the needs at the time.

*Members from the 1st Battalion, Royal Australian Regiment and the 3rd Combat Engineer Regiment fill sandbags and load them onto trucks for distribution around the Townsville area in preparation for rising flood waters on 2 February 2019.*

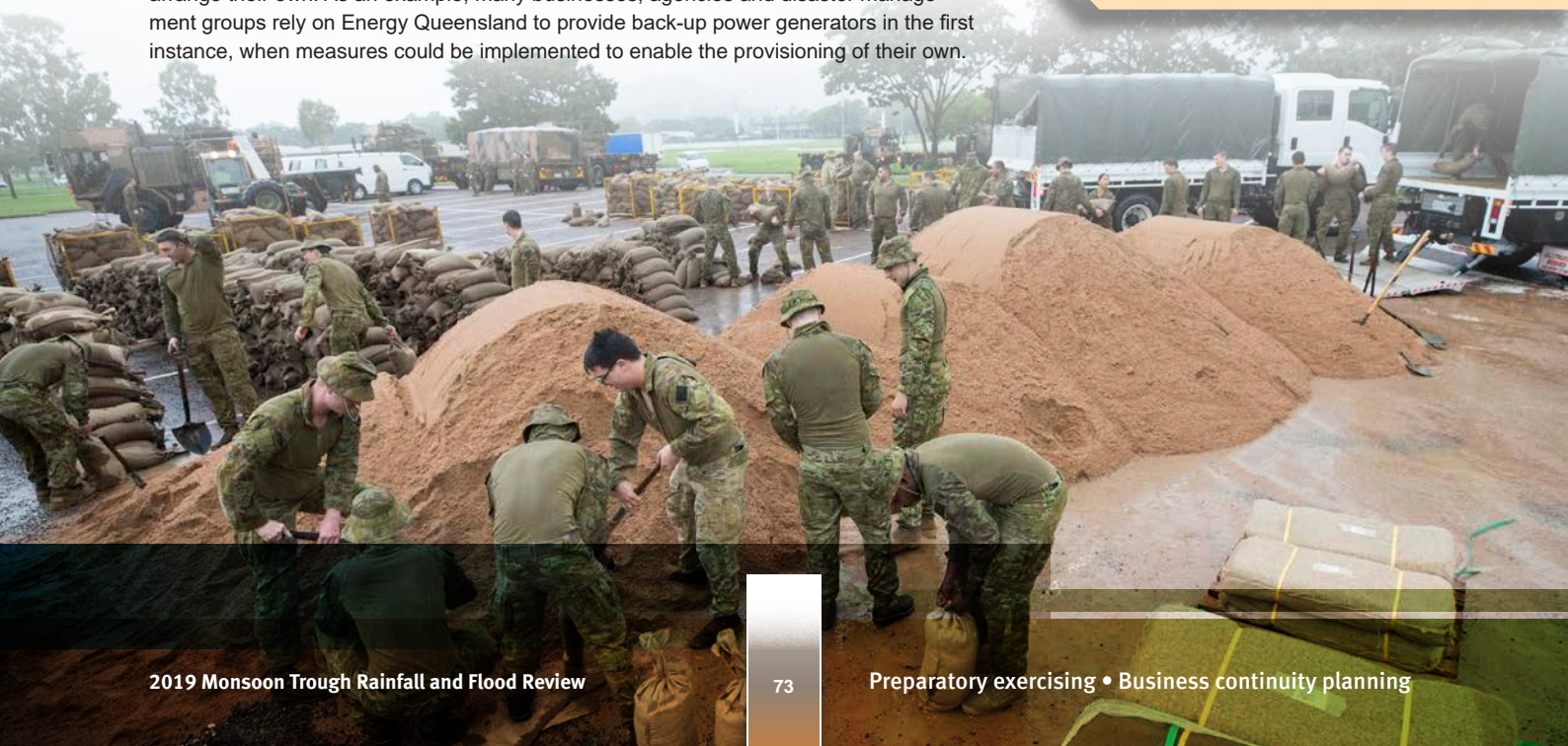
*Australian Defence Force*

## Business continuity planning

The Office found some agencies integrated their disaster management plans and BCPs to ensure protection and continuity of their services. Energy and telecommunication providers were found to have worked collaboratively to reduce the impact of telecommunication outages in Townsville City based on existing plans. Department of Transport and Main Roads (TMR) worked with the Department of Education plans to reduce the impact of flooding on school bus runs. However, it was also found that some businesses, agencies and groups inherently relied on others to support their business continuity when opportunities existed for these businesses, agencies and groups to arrange their own. As an example, many businesses, agencies and disaster management groups rely on Energy Queensland to provide back-up power generators in the first instance, when measures could be implemented to enable the provisioning of their own.

### Finding 8

**Stakeholders who look for opportunities to build resilience and reduce dependencies on partners typically have more robust business continuity plans.**



### Finding 9

State agencies and local governments that consider the *People with vulnerabilities: A framework for an effective local response and engage with stakeholders during the planning phase are better placed to meet the needs of the vulnerable*.<sup>101</sup>

### Finding 10

Benefits would be gained in developing information and education programs for vulnerable groups to reduce their disaster-related risks and to build individual preparedness and resilience.

## Application of lessons

Evidence was found of agencies and disaster management groups applying learnings from previous events and exercises. Agencies such as QH, DHPW, QFES, Queensland Police Service (QPS), the Queensland Ambulance Service (QAS), Department of Environment and Science, and TMR all applied learnings from previous events which occurred in Queensland over the past decade. Many agencies have learnt the benefits of staff and resource pre-deployment and the timely activation of emergency coordination centres. For example, as part of the planning process, DHPW identified a local recovery centre in Townsville and established contracts with service providers and identified staffing levels necessary for the management of activities. This placed DHPW in a more positive position for the Monsoon Trough event.

QH, the Townsville LDMG and DDMG identified learnings around the need for improved management of vulnerable aged persons living within specialist care facilities based on past disaster events. These learnings were applied during this event. Considerable attention and time were applied to improve relationships, coordination, collaboration, memorandums of understanding (MOUs), planning and preparedness amongst key stakeholders, including management from aged care facilities in Townsville.

The Local Aged Care Partner Group provided the nexus for the relationship building and the strengthening of cooperation and collaboration. Support from a locally-based Australian Government representative value-added to this process, along with the appointment of an advisor from the Local Aged Care Partner Group to the Townsville LDMG. This all led to noticeably improved outcomes during the Monsoon Trough event, with minimal support required from government agencies and disaster management groups.

### People with vulnerabilities in disasters

In response to Recommendation 3 in the 2014-15 IGEM Review of cyclone and storm-tide sheltering arrangements<sup>102</sup>, the Department of Communities, Disability Services and Seniors developed the *People with vulnerabilities in disasters framework* and accompanying toolkit.

The framework supports a consistent approach for local place-based planning addressing the specific needs of people with vulnerabilities.



Both of these planning resources are publicly available on the Queensland Government 'Supporting people with vulnerabilities in disasters' webpage:

[www.qld.gov.au/community/disasters-emergencies/supporting-people-with-vulnerabilities](http://www.qld.gov.au/community/disasters-emergencies/supporting-people-with-vulnerabilities)



Local governments in the Mount Isa and the Far North disaster districts, such as Carpentaria and Weipa, are regularly cut off by annual monsoon rainfalls. As a result, lessons have been learned over the years to manage the planned storage and resupply of groceries and other essential supplies.

The *Townsville District Capability Review* recommended the development of a district action plan. It was found that the development of this district action plan had been commenced but not yet completed. This was largely due to the significant updating of its District Disaster Management Plan. However, given the attention focused on implementing other recommendations from the *Townsville District Capability Review*, as well as responding to the Monsoon Trough event, the Office understands that with additional time this action plan will be developed. This will further enhance the response capability of the Townsville DDMG.

For State and local governments, investing in community education and messaging around disaster planning, preparedness and resilience is well supported. It was found that community education campaigns were designed and provided to suit local needs, depending on the size and characteristics of the community. For example, several small regional councils utilised local movie cinemas to play disaster preparedness messages in the lead-up to the cyclone season. Statewide marketing and television advertisement campaigns, such as the 'If it's flooded, forget it' and 'Get Ready Queensland' campaigns provide other opportunities to educate communities in a far wider capacity. It is recommended that State agencies and local governments continue to co-design and produce community education campaigns that meet the needs of the varying communities across Queensland.

The Office notes agencies, disaster management groups and local governments are accepting the importance of capturing and applying lessons learned. As recommended in *The Cyclone Debbie Review 2017-18* the Office has commenced the development of a system-wide lessons management program.

### Emergency warnings and communication

The Office found evidence to indicate that councils had planned to provide effective emergency warnings, alerts and messages as a means for informing the public of emergency situations.

Preformatted messages and alerts existed, were based on locally known risks, with arrangements in place to have these messages delivered quickly and effectively utilising a range of communication channels during times of emergencies.



**This Facebook post showing the Clarke River at 3.4m at the Gregory Highway bridge, 60km south east of Greenvale, which prompted 296 comments and 1400 'shares', was typical of many real time alerts reinforcing existing messaging.**

*Charters Towers Regional Council*

#### Good practice by Townsville local group

In response to recommendations made in the *2015–16 IGEM Review of Seqwater and SunWater Warnings Communications*, the Townsville LDMG revised the community information and warnings sub-plan to include preformatted emergency alert messaging and warning area maps for Ross River flooding and dam failure.<sup>103</sup>

This sub-plan is an example of good practice, in that it provides further operational guidance across the following areas:

- agreed processes across communication phases and all communication channels, including specific processes for previously identified vulnerable communities
- pre-developed key messages for use on radio, television and media releases across the following communication phases (pre-season, seasonal preparedness, imminent event, operational, during and immediate post-event).<sup>104</sup>





# 3.4m

**The Gregory Highway bridge over the Clarke River, a tributary of the Burdekin River system 60km south east of Greenvale, provided a stark reinforcement of the ‘if it’s flooded, forget it’ community messaging.**

*Queensland Police Service*



# 0.7m



0.5m

0m



## Disaster management planning

## Disaster Coordination Centres

For the Townsville LDMG, the recent investment in a modern designated Local Disaster Coordination Centre proved highly beneficial for coordinating response activities for the Monsoon Trough event.

The Office was told of issues with the Townsville District Coordination Centre due to the impact of the Monsoon Trough event (surrounding flooding, power supply, access etc) which were overcome as required. However, the presence of a QPS search and rescue coordination capacity within the centre enhanced its capability to better manage the safety and wellbeing of evacuees.

It is understood that Townsville City Council will explore the use of their new building by the DDMG during events not requiring Townsville LDMG activation. LDMGs and DDMGs are encouraged to continue this maturing approach and continually look to apply further developments and preparedness of their disaster coordination centres.

Due to the size and nature of this event, the Department of Agriculture and Fisheries (DAF) established a Strategic Command Centre which assisted with information gathering and sharing with internal and external stakeholders. Although this centre did not take on a command role for the Department, it did meet the agency's needs.

**Telecommunications agencies of the Townsville  
Local Disaster Coordination Centre  
on 6 February 2019.**

*Townsville City Council*





## Evacuation

LDMGs are the lead for evacuation management in Queensland, including the planning for both voluntary and directed evacuations.<sup>105</sup> They are supported in this role by the Australian Red Cross through the use of its national database system 'Register: Find: Reunite' which assists in locating individuals and responding to inquiries regarding people in disaster areas.

In general, evacuation plans were found across the local level, with support from district level plans, to provide guidance on the management of evacuations, including integration with other plans (e.g. transport routes and evacuation centres/shelters management). They also address known risks and provide context around evacuations and scale of events. The provisioning of local flood and storm surge mapping into plans was also found. Guidance around evacuation messaging was evident, with appropriate communication systems for public evacuation messaging in place.

At a local level, planning for the managed closure of evacuation centres and the temporary relocation/rehousing of evacuees would benefit from further development. Additional information relating to the process and consideration points for closing evacuation centres would also be advantageous. This issue is addressed in more detail later in the Evacuation component of the Response section of this report.

There are instances where the placement of vulnerable persons in evacuation centres cannot be avoided. Vulnerability can include physical impairments, health problems, alcohol/drug dependencies and social-interaction issues. With respect to vulnerable persons, including aged and disadvantaged persons, evacuation plans were found to consider these persons in the evacuation processes. The Office found that the safe storage of medications in evacuation centres can be problematic where sufficient measures do not exist. It also found that improved care of vulnerable persons could occur where specialised evacuation centres are established to effectively accommodate vulnerable persons (e.g. aged persons).

There are benefits in agencies which contribute to the support of persons with vulnerabilities being involved in planning of evacuation centres. This includes planning of the storage and management of medications within evacuation centres.

For agencies which manage evacuation centres (e.g. Australian Red Cross) there may be instances where the capabilities and the provision of resources exceeds their capacity and support from LDMGs and other agencies is required. In preparation for these instances, benefits would be gained in evacuation centre plans outlining this process, including the identification of those agencies capable of providing any foreseeable support required. Further benefits would be gained from developing MOUs along this line with individual agencies.

Some communities are more susceptible to disaster events and the need to evacuate is very common place. Out of necessity these communities can be well-prepared, with plans in place to safely manage such events. The Groper Creek community in the Burdekin Shire is one of these. This small fishing community is located on the banks of Groper Creek and frequently subjected to riverine flooding. Burdekin Shire Council advocates disaster resilience and supports individual planning and preparedness. In response the residents of Groper Creek have constructed their houses on high stumps to be less susceptible to flooding. Residents have planned to self-evacuate early to negate the risks associated with flooding.

It was found that for this Monsoon Trough event residents self-evacuated early as planned and safely returned after flood waters receded. Little to no support was required from the local council. However, the Burdekin Shire Council understands the needs of this community and is ready to support, if required.

### Finding 11

**Effective evacuation plans consider additional instructions and specific measures to accommodate vulnerable persons in evacuation centres, including measures to safely store medications and separate evacuees with additional needs from others (e.g. evacuation centre for aged persons).**

### Recommendation 4

**Evacuation centre plans be revised to better manage vulnerable persons, including the safe storage of medications and providing alternate arrangements for evacuees with additional needs. (e.g. evacuation centre for aged persons).**



*The small riverfront community of Groper Creek, situated on the southern shores of the Burdekin River estuary, 42km south east of Ayr, is well prepared for riverine flooding events.*

*Department of Housing and Public Works*





*A small armada of fixed- and rotary-wing aircraft – including many examples of the ubiquitous Robinson R22 and R44 helicopter, widely used for stock mustering and general station work – was mobilised in the response efforts, seen here returning to Richmond Airport just after 7.10pm on 12 February 2019 at the conclusion of the day's flying.*

Queensland Police Service



## Response

The response phase formed the largest component of activities and arrangements considered for the review of the Monsoon Trough event.

Accordingly, this section is the largest in the report and addresses three key streams of inquiry: the Ross River Dam operations; information infrastructure; and more general matters captured under the response phase of disaster management arrangements.

### For dam operations this section looks at:

- the operation of the Ross River Dam, including spillway gates
- communication flow between Sunwater and Townsville City Council
- a summary of modelling and analysis from commissioned hydrology and water management specialist firm BMT Eastern Australia
- activation of other EAPs and event management reporting.

### For information infrastructure, this section looks at:

- weather radar systems
- flood warning infrastructure
- telecommunications.

### Consideration of disaster management arrangements in the response phase in this section includes:

- operational expectations of what should occur against the Standard and other doctrine
- roles at local, district and State levels
- LDMG and DDMG activations
- disaster coordination centres
- public warnings and communication
- information sharing (including Requests for Assistance)
- resourcing, coordination, collaboration and deployment
- ADF and Defence Assistance to the Civil Community (DACC)
- evacuation
- education.



## Dam operations and flood warning infrastructure

The successful operation of Ross River Dam was at the heart of the response phase during the Monsoon Trough event.

Efficient operations and adherence to the EAP had the potential for significant implications for many thousands of residents downstream of the dam wall.

*Aerial view to the east of the Ross River  
Dam spillway gates.*

*Queensland Police Service*



## ► What was expected

In reviewing the expectations for the operation of the Ross River Dam during the response phase of the Monsoon Trough event, the Office expected to find the EAP for the Ross River Dam had been activated appropriately and operations complied with the requirements of the EAP. It was also expected that a number of other EAPs for affected dams were activated.

The Office also expected to find that the dam owner adopted a flexible approach to compliance with the EAP to support community safety outcomes and property protection. The main purpose of an EAP is to minimise the risk of harm to persons or property if a dam hazard event or dam emergency event occurs. This implies flexibility in the implementation of the EAP to ensure that these outcomes are achieved.<sup>106</sup> Efficient and effective communication between SunWater, Townsville City Council and the LDMG was also expected.

Following an emergency event involving a referable dam, the dam owner must prepare an Emergency Event Report and provide it to the Chief Executive of DNRME, as the dam safety regulator. The report must describe the event, the implementation of the EAP, including communications made and actions taken in response to the emergency event, an assessment of the effectiveness of the EAP and make any recommendations for improvements for the future.<sup>107</sup> The Office expected to see an Emergency Event Report completed in accordance with these requirements.

## ► What was found

### EAP activation

The EAP was activated at 11:40am on 30 January 2019, when the activation trigger for ALERT status was reached. A chronology of the actions for the EAP is detailed below.

SunWater acted in compliance with the EAP during the flood event and in particular:

- operated the dam in accordance with the EAP
- undertook modelling for the purpose of predicting the level of the dam and likely outflows from the dam
- regularly and effectively communicated with the Townsville City Council and the LDMG as to the level of water in the dam and likely operation of the spillway gates
- acted on instruction from Townsville City Council as the dam owner.

| Date      | Time  | Trigger               | Action   |
|-----------|-------|-----------------------|--|
| 25/1/2019 | 09:00 | –                     | 24-hour watch was commenced with the Sunwater operations in limited stand-up   |
| 30/1/2019 | 11:40 | EL 38.45m             | EAP activated to ALERT. Anticipated gate operations to occur and lake level close to activation trigger for ALERT and lake level rising. |
| 30/1/2019 | 13:33 | EL 38.65m             | EAP activated to LEAN FORWARD and gate operations commenced  |
| 01/2/2019 | 05:30 | EL 40.73m             | EAP activated to STAND UP – GREATER THAN FLOOD OF RECORD   |
| 01/2/2019 | 08:32 | EL 41.00m             | EAP activated to STAND UP – 2  |
| 03/2/2019 | 12:00 | EL 42.50m             | EAP activated to STAND UP – 3  |
| 16/2/2019 | 10:31 | EL 38.55m and falling | EAP STOOD DOWN   |

*Activation level and triggers for Ross River Dam.*

*Townsville City Council.*

## ► What was found

### Operation of the spillway gates

The automatic operation of the spillway gates of the Ross River Dam were revised following flood studies by Townsville City Council in 2012 and 2013, to optimise flood attenuation and dam safety.<sup>108</sup> The 2012 *Review of Ross River Dam Gate Operations to Improve Downstream Flood Immunity* demonstrated that, by maintaining gate control of the dam outflows to a higher water level in the dam, a reduction of downstream flooding could be achieved with minimal adverse impacts and without significantly increasing risks to water supply security and dam safety.<sup>109</sup>

The change in operations meant that up to 90 per cent of properties previously identified as flood impacted by the 100-year ARI flood would no longer be impacted. Subsequently the EAP was updated to include new gate operations.

The automatic operation of the spillway gates during the flood event occurred in accordance with the EAP. Additionally, SunWater operated the spillway gates manually on four occasions during the flood event, at the direction of the Townsville City Council. Council gave these directions in an endeavour to reduce the anticipated peak of the downstream flooding. The main purpose of an EAP is to minimise the risk of harm to persons or property if a dam hazard event or emergency event for the dam happens and this implies flexibility in the implementation of the EAP to ensure that these outcomes are achieved. Any operation outside the EAP would be in exceptional circumstances, unforeseen in the EAP and only after very careful consideration by expert engineers.

The above manual operation of the spillway gates is a clear demonstration of implementation of this flexible approach. It should not be used as a precedent for other gated structures across Queensland, as the specific circumstances present in the Ross River Dam situation are unlikely to be replicated. Each case would need to be assessed and decisions made based on the individual circumstances of each matter.

The public survey undertaken by MCR and commissioned by the Office found that 24 per cent of those surveyed in the Townsville study area believed an early release of water from the Ross River Dam leading up to the flooding event would have made a difference to them or their property, with 30 per cent of those surveyed of the view that the flood waters would not have been so high had the water been released earlier.<sup>110</sup>

The BMT Eastern Australia modelling and analysis, to be outlined, found that there would have been no appreciable difference in impact, had water been released earlier.

Following the Monsoon Trough event, questions were raised about the extent to which releases from the Ross River Dam impacted downstream communities. SunWater undertook preliminary modelling which showed that:

- (a) had the spillway gates been automatically operated during the whole of the event, the peak for the gates to fully open would have been reached on 3 February 2019 and there would have been no measurable difference to the spillway outflow
- (b) had the spillway gates been operated manually from midday on 29 January 2019, using a pre-release strategy, the peak for the gates to fully open would likely be reached on 4 February 2019 for almost the same peak outflow and with the risk of earlier minor flooding impacts occurring.



## BMT report on the level of the event, dam operation and impacts on the community

BMT Eastern Australia Pty Ltd (BMT) was commissioned to undertake an independent hydrology report examining the possible impacts on communities downstream from the Ross River Dam. This included considering various scenarios and contrasting the results with how the dam was operated during the flood event.

The BMT assessment found the event to be extreme and placed it somewhere between a 1-in-500 and 1-in-1,000-year event. In arriving at its finding, BMT found rain gauges reporting up to a 1-in-2,000-year event. At the Ross River Dam, BMT found release rates were close to a 1-in-1,000-year event. This translated in the lower reaches of Ross River to an event which was 'at least a 1-in-500' year event. BMT also found that previous Townsville City Council flood studies 'appeared to be robust.'

### Operation of dam

BMT considered the following scenarios for the operation of the dam:

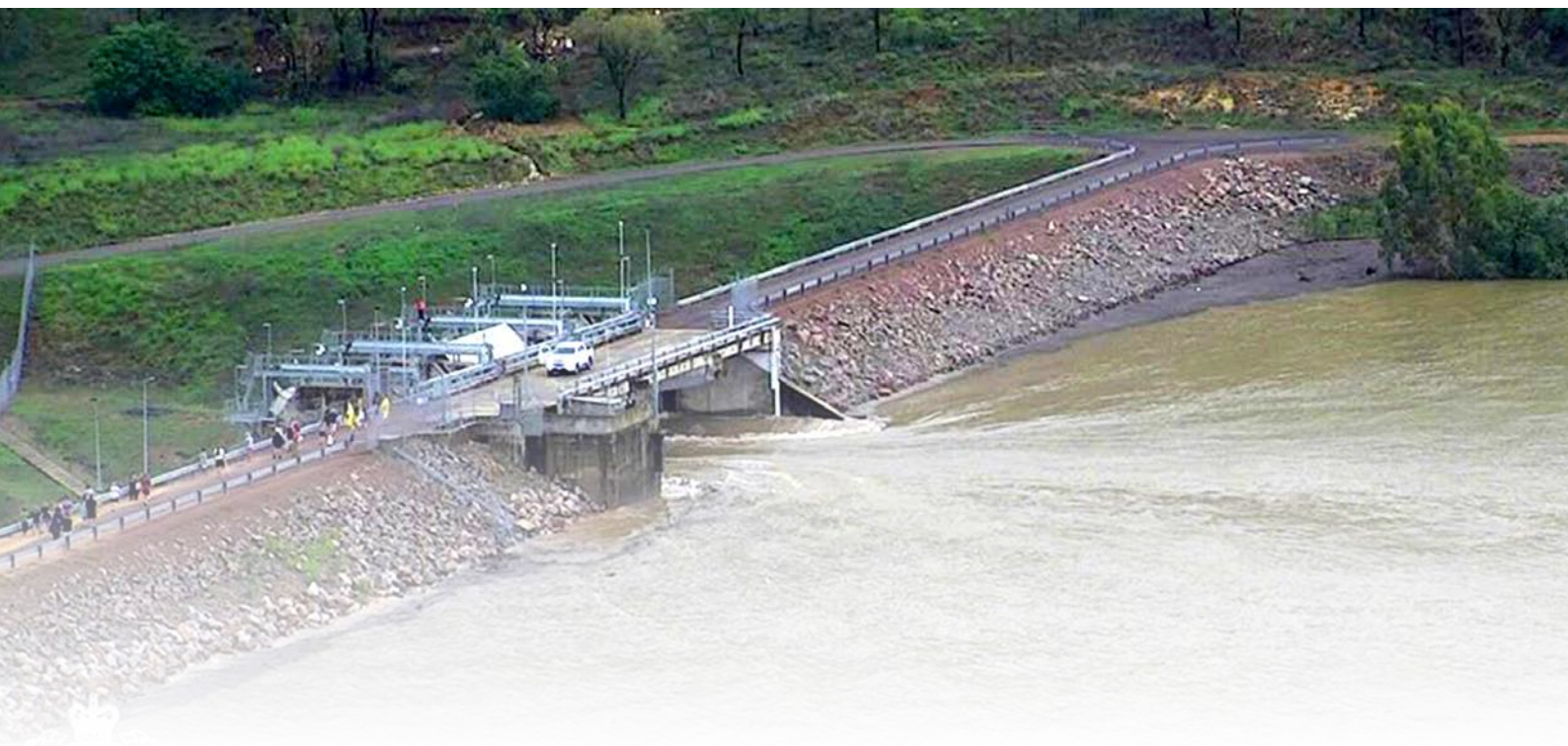
- Scenario One:  
If the dam was not in existence.
- Scenario Two:  
If the dam was operated in accordance with standard operating procedures and EAP.
- Scenario Three:  
If the dam release had occurred earlier.<sup>111</sup>

Each scenario is compared to the actual event to determine impacts in terms of: discharge, peak flood level and flood extents and time of peak flood levels.

A summary of the key points for each of these scenarios follows on the next page.

*This drone view of Ross River Dam conveys an impression of the enormous force of the head of water behind the spillway gates.*

*Queensland Fire and Emergency Services*



## BMT report: modelling scenarios

### Dam operated as it was during the flood event

Simulated peak flood levels are presented in the upper left frames on each of the following pages. Notably, key points shown are:

- Flows in the Ross River are mostly contained within the river channel until the river reaches the Nathan Street (Bruce Highway) bridge. Beyond the Nathan Street Bridge to Aplin's Weir and beyond, low lying suburbs along the river experience inundation.
- Upstream from Aplin's Weir, there appears to be a small breakout of flow on the left (northern) bank, allowing water to flow into the Mindham Park Drain and on to Ross Creek.
- From upstream of the Bowen Road Bridge to the golf course upstream from Rooney's Bridge, there was breakout from the left bank, with high velocities observed across Bowen Road. In the vicinity of Rooney's Bridge, breakout flows across the left bank, flowed into Ross Creek.
- On the right (southern) bank, there was breakout of flow upstream from Bowen Road Bridge, with water entering the Gordon Creek catchment. Between Bowen Road Bridge and Rooney's Bridge, there was significant inundation of the low lying suburbs.

#### Scenario One:

##### If the dam was not in existence

The peak discharge for the no dam scenario is presented in the upper-right map frames on the following pages.

Notably, key points shown are:

- The areas which experienced flooding in the event would have had an additional 0.5m depth of inundation if the dam did not exist.
- A large area (shown in magenta in the following maps) would have also experienced flooding in this scenario.

#### Scenario Two:

##### If the dam was operated in accordance with standard operating procedures and the EAP

The peak discharge scenario is presented in the lower-left frames on the following pages. It should be noted that the development of a model that is perfectly calibrated to the event has not been possible, since the sensitivity of water levels to gate operations results in large differences in discharge from the dam.

Therefore, some assumptions have been made in the calculation of scenario discharge and these are detailed in the BMT Report on page 70. Given the variables involved in calculating minor changes to dam discharges and associated flooding impacts, the assumptions made are considered acceptable for assessing the potential impacts.

Notably, key points shown are:

- From the Ross River Dam to the Nathan Street (Bruce Highway) Bridge, there would have been no difference in peak flood levels.
- A large part of the Gordon Creek catchment could have experienced higher flood levels by up to 50mm.
- Along the Mindham Park Drain, peak flood levels could have been up to 100mm higher.
- In the Woolcock Street area around National Creek, peak flood levels could have been up to 50mm higher.

#### Scenario Three:

##### If the dam release had occurred earlier

The potential for increased dam releases was assessed. The *Ross River Flood Study Base-line Flooding Assessment* (Townsville City Council, 2013) identifies that the Ross River has a capacity of approximately 500 cubic metres before water exceeds the banks and inundates properties.

The flood model developed for this review was used to test the capacity and provided an independent verification of the findings from the flood study. In this hypothetical scenario, it was assumed that dam releases would not have occurred until the dam has reached full supply level. At this point, 350 metres cubed/s would have been released for a period of 21 hours until the water level in the dam would have led to higher releases under the current operational rules.

Analysis indicates water levels in the dam would not have been affected by this release scenario, and that the peak discharge (rate and timing) and flood impacts would not have differed appreciably from the actual event.

#### Note on all Scenarios

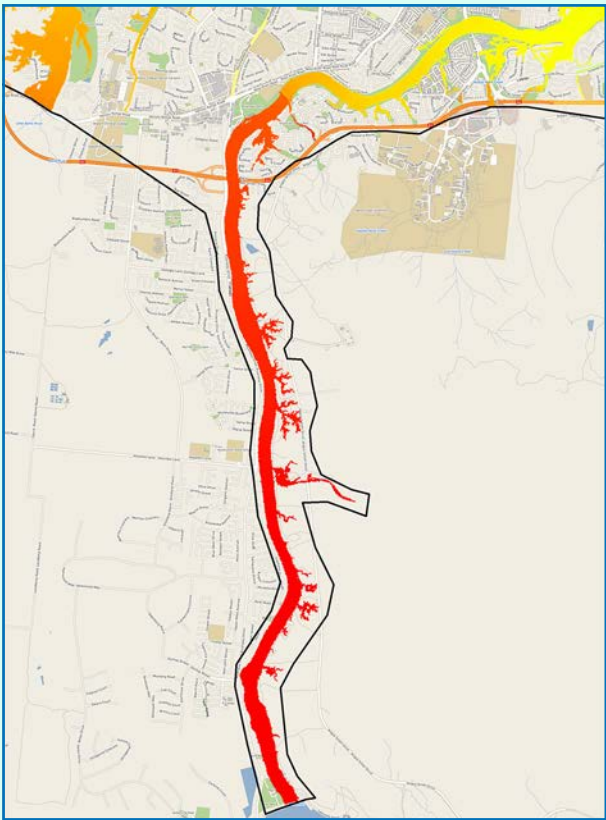
The flood mapping presented here is the best estimate of flood behaviour based on limited data available for calibration and verification of the model at the time of the review. These scenario assessments are relative: therefore, inaccuracies associated with modelling will be present, but this will have no influence on the impacts that are presented. Impacts should be assessed on a regional scale and the mapping should not be used to assess changes in flood behaviour on an individual scale.<sup>112</sup>

#### Note on Findings

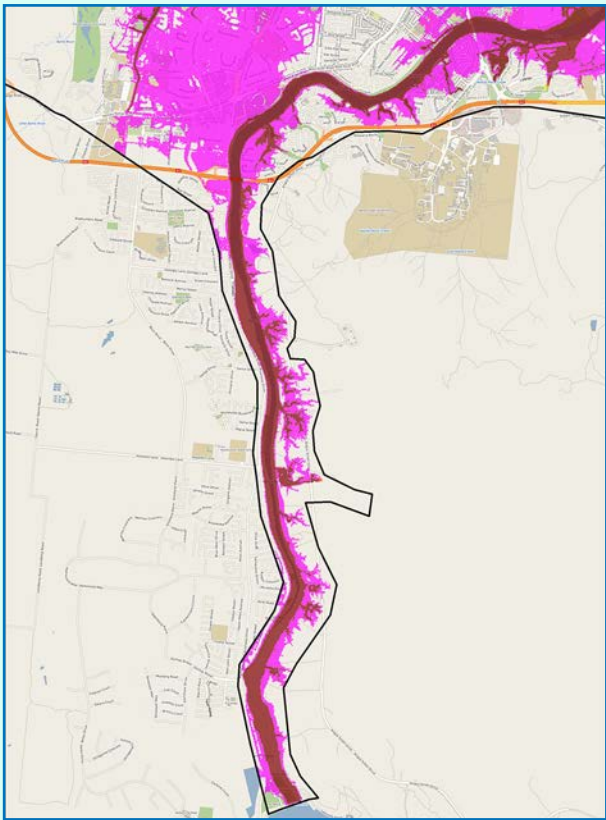
See Findings 12, 13 and 14 on page 90.



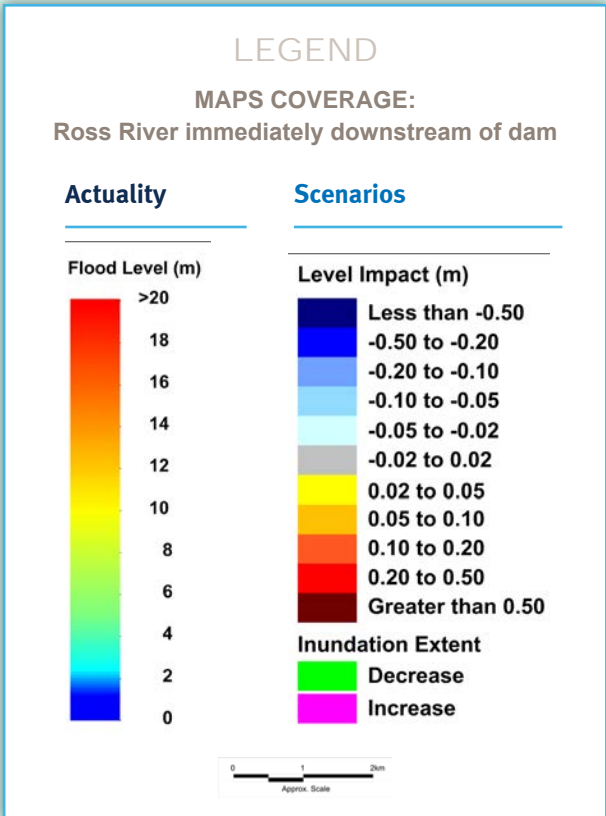
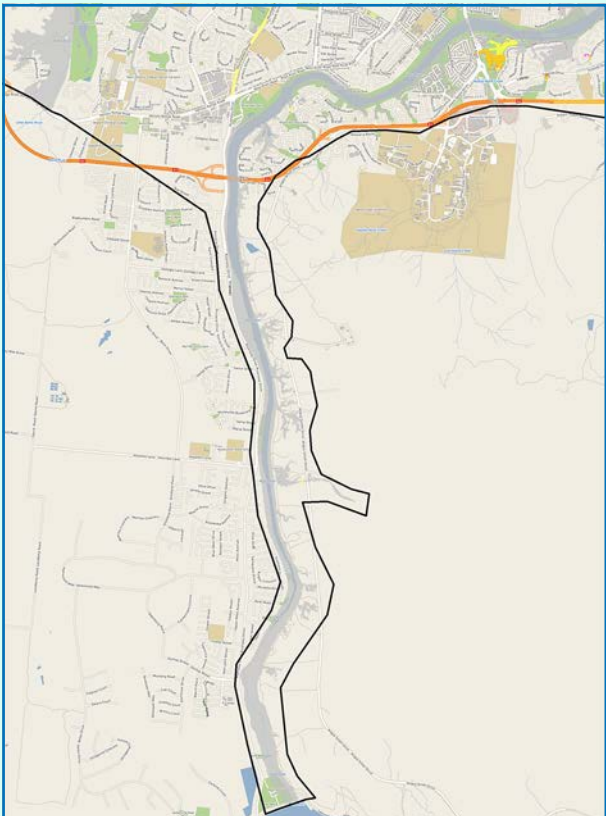
Dam operated as it was during the flood event



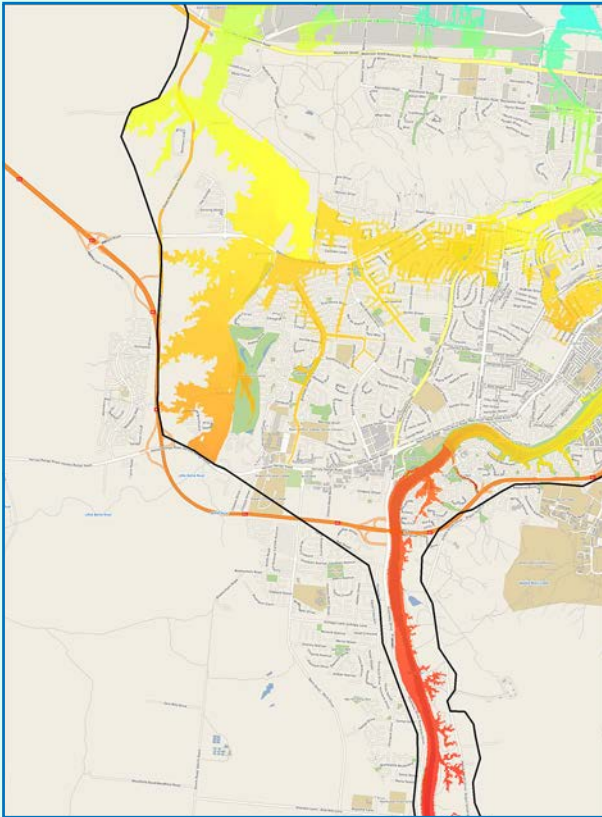
Scenario One: If dam was not in existence



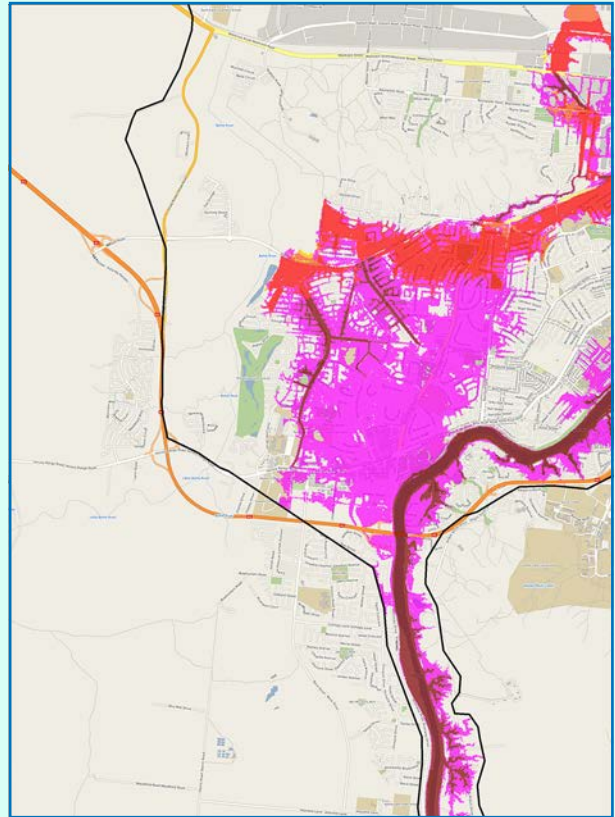
Scenario Two: If dam in accord with procedures / EAP



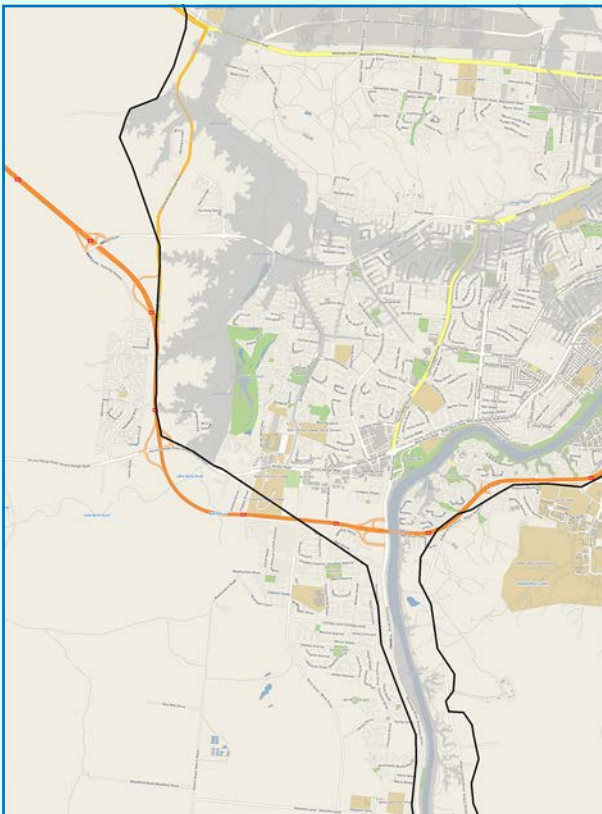
### Dam operated as it was during the flood event



### Scenario One: If dam was not in existence



### Scenario Two: If dam in accord with procedures / EAP

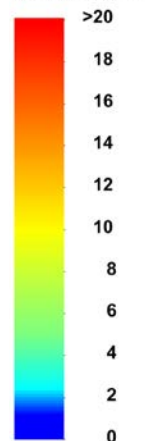


#### LEGEND

MAPS COVERAGE:  
Ross River • Townsville south west suburbs

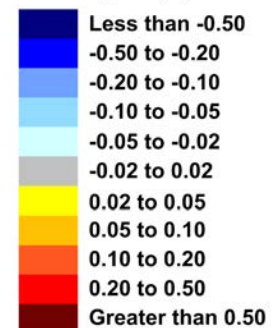
##### Actuality

##### Flood Level (m)



##### Scenarios

##### Level Impact (m)

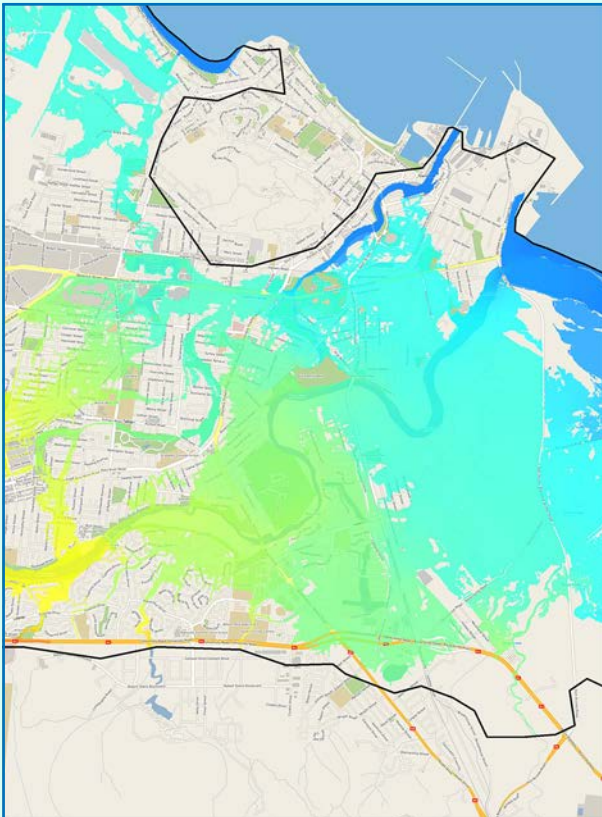


##### Inundation Extent

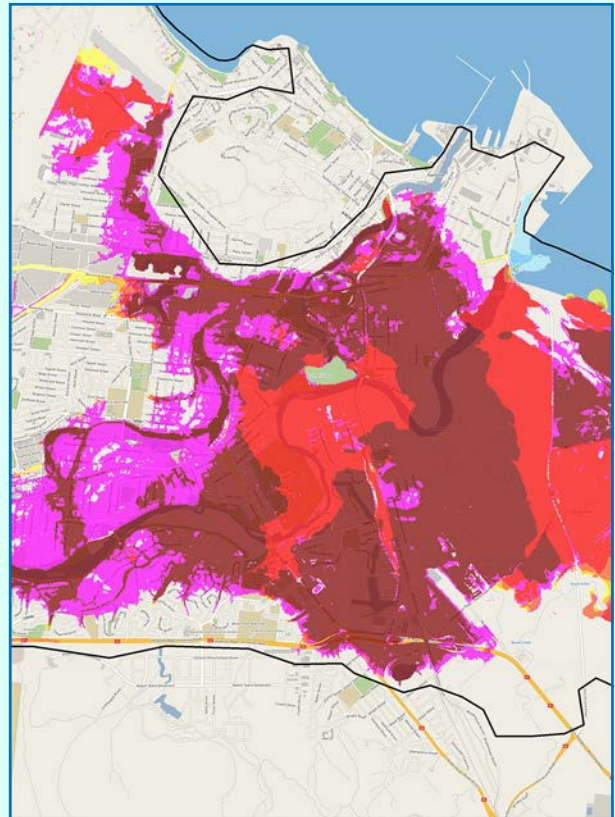




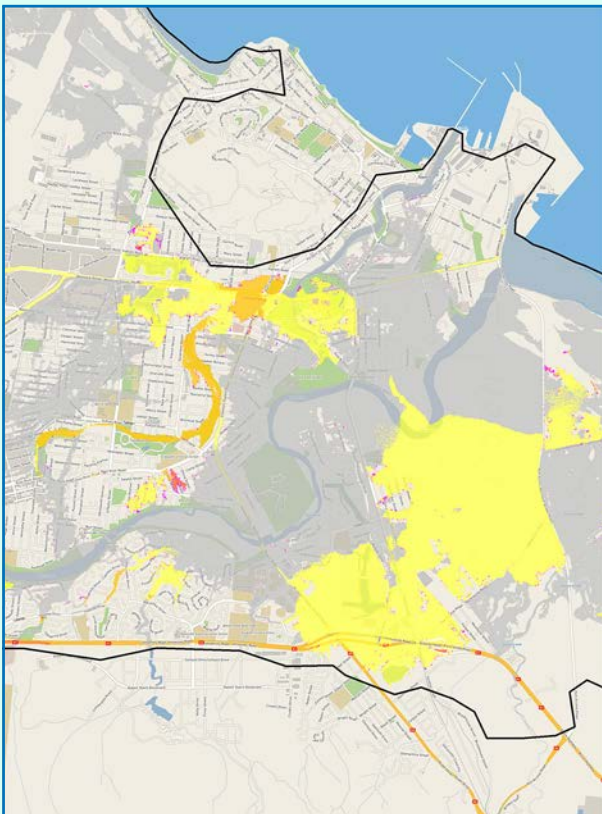
**Dam operated as it was during the flood event**



**Scenario One: If dam was not in existence**



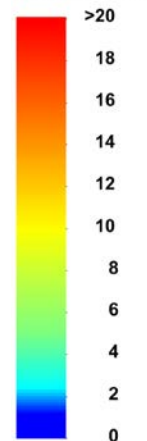
**Scenario Two: If dam in accord with procedures / EAP**



**LEGEND**  
**MAPS COVERAGE:**  
Ross River / Creek • Townsville inner suburbs

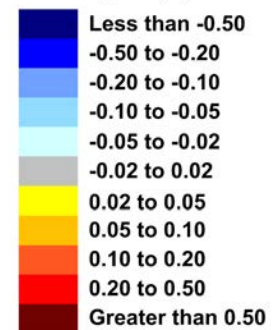
**Actuality**

**Flood Level (m)**



**Scenarios**

**Level Impact (m)**



**Inundation Extent**





## Communication between SunWater and Townsville City Council

SunWater provided early warning to Townsville City Council and disaster management agencies as to when agreed flood emergency activation triggers may be reached. This assisted these agencies in performing their role to issue timely warnings and messaging to the community.

Communication during the flood event included the principles as defined in the EAP as follows:

- SunWater will aim to inform and support the LDMG in the Townsville area

- The LDMG will be the principal voice on all communications to the community during an emergency situation where practical
- The LDMG will take the lead role in notifying all relevant persons. SunWater will support the LDMG by:
  - providing timely advice to the LDMG
  - contacting the SDCC Watch Desk to send emergency notification to the Ross River Dam Emergency polygon if Townsville City Council cannot be contacted
  - informing and supporting the DDMG for Townsville.<sup>113</sup>

Communications between SunWater and Townsville City Council were regularly maintained during the event in accordance with the EAP. Regular communication between each of the key personnel with emergency action roles including the Dam Duty Officer, Local Event Coordinator, Incident Controller, Dam Safety Technical Decision Maker and Flood Operations Decision Maker was documented during the event.

Appropriate communications occurred between Townsville City Council and external agencies such as QPS and members of the public. Details of the communications were recorded.

### Finding 12

Significantly more flooding would have occurred if there was no Ross River Dam.

### Finding 13

Arguably, there would have been increased flooding if the standard operating procedures were followed and there was no manual gate operation of the Ross River Dam.

### Finding 14

If there had been increased water releases earlier from the Ross River Dam, there would have been no appreciable difference to flooding impacts.

Flood modelling based on 2000 metres cubed/s.

Townsville City Council

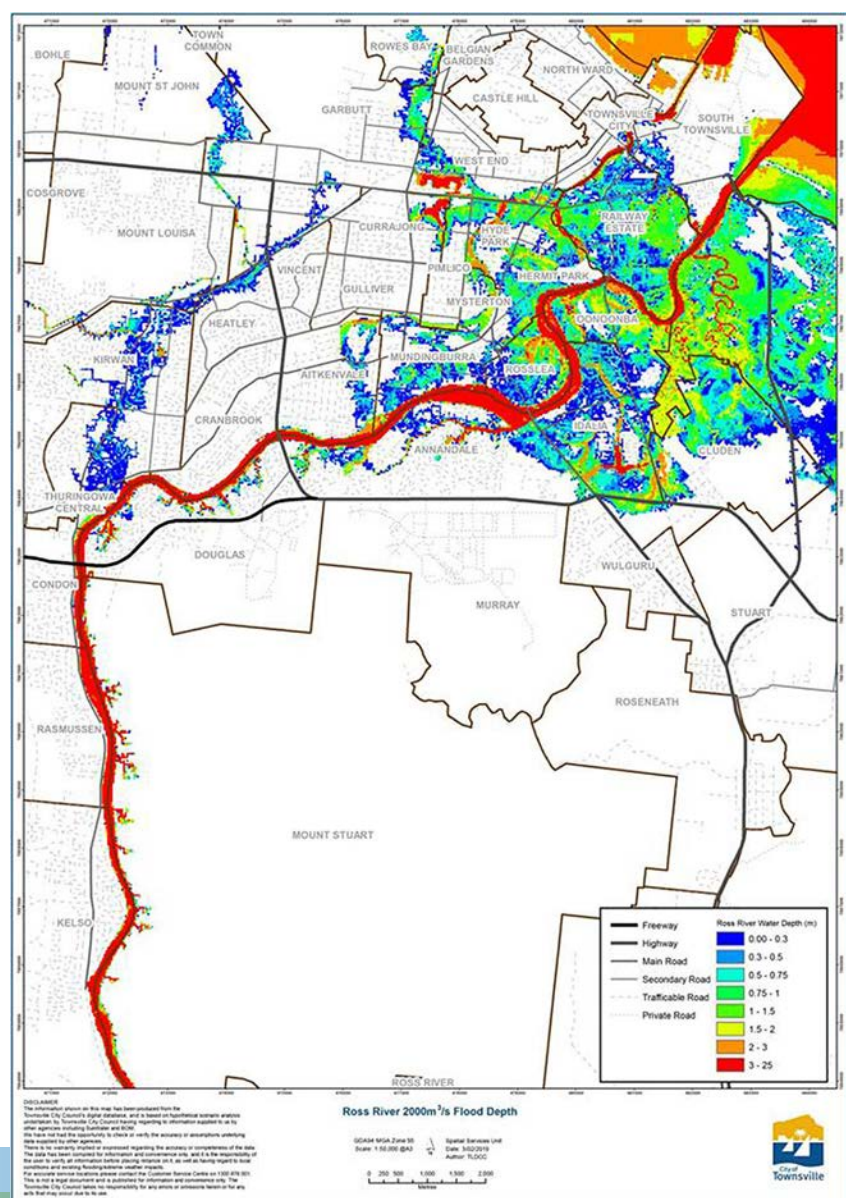
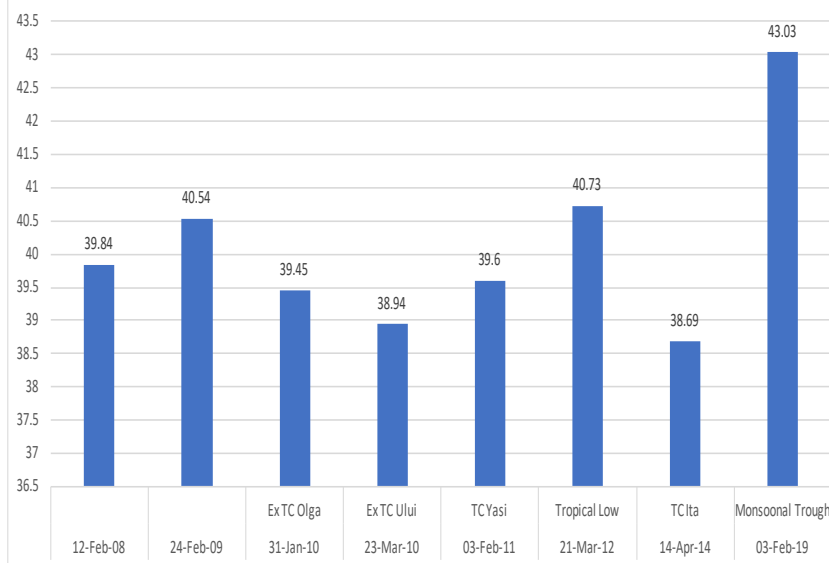




Table 9: Flood operations—LEC and IC communication plan

| Activation level                      | Trigger for communications   | Group to contact          | Method  | Message code   | Message text   |
|---------------------------------------|--|---------------------------|---------|--|--|
| Alert                                 | • EL 38.45m and rising (preparedness)  | • LDMG<br>• TCC<br>• DDMG | • Phone |  | Describe current situation with dam—What is the event?<br>What is the status?<br>Advise of current storage level   |
|                                       |  |                           |         | Send SunWater Incident and Near Miss alert                 | EAP Alert Notification—Ross River Dam  |
| Lean Forward                          | • Storage EL 38.65m (gate opening trigger level)   | • LDMG<br>• TCC<br>• DDMG | • Phone |  | Describe current situation with dam—What is the event?<br>What is the status?<br>Advise of current storage level   |
| Stand Up—greater than flood of record | • Storage above EL 40.73m (greater than flood of record)   | • LDMG<br>• TCC<br>• DDMG | • Phone |  | Describe current situation with dam—What is the event?<br>What is the status? (storage is greater than flood of record)<br>Advise of current storage level<br>Advise of any forecasts you are aware of         |
| Stand Up—2                            | • Storage EL 41.00m and rising (accelerated gate opening sequence)   | • LDMG<br>• TCC<br>• DDMG | • Phone |  | Describe current situation with dam—What is the event?<br>What is the status? (storage is greater than flood of record)<br>Advise of current storage level<br>Advise of any forecasts you are aware of         |
| Stand Up—3                            | • Storage EL 42.50m PLL for no failure flow rate, OR<br>• Flow rate 900m <sup>3</sup> /s, AND<br>• Loss of communications with TCC LDMG or TCC LDMG has authorised SW to issue Emergency Alert on their behalf<br><b>NOTE: Gates fully open at EL 43.00m</b> | • LDMG<br>• TCC<br>• DDMG | • Phone |  | Describe current situation with dam—What is the event?<br>What is the status? (storage is greater than flood of record)<br>Advise of current storage level<br>Advise of any forecasts you are aware of         |
|                                       |  |                           |         | • SDCC Watch Desk –if TCC not available<br>• Email & Phone | Refer to Table A1 – Emergency Alert messaging  |
| Stand Up—4                            | • Storage EL 43.60m, OR<br>• Flow rate 2100 m <sup>3</sup> /s, AND<br>• Loss of communications with TCC LDMG or TCC LDMG has authorised SW to issue Emergency Alert on their behalf  | • LDMG<br>• TCC<br>• DDMG | • Phone |  | Describe current situation with dam—What is the event?<br>What is the status? (storage is greater than flood of record)<br>Advise of current storage level<br>Advise of any forecasts you are aware of         |
|                                       |  |                           |         | • SDCC Watch Desk –if TCC not available<br>• Email & Phone | Refer to Table A1 – Emergency Alert messaging  |
| Stand Up—5                            | • Dam failure extremely likely, AND<br>• Loss of communications with TCC LDMG or TCC LDMG has authorised SW to issue Emergency Alert on their behalf   | • LDMG<br>• TCC<br>• DDMG | • Phone |  | Describe current situation with dam—What is the event?<br>What is the status? (storage is greater than flood of record)<br>Advise of current storage level<br>Advise of any forecasts you are aware of         |
|                                       |  |                           |         | • SDCC Watch Desk –if TCC not available<br>• Email & Phone | Refer to Table A1 – Emergency Alert messaging  |
| Stand Down                            | • Storage FSL 38.55m and falling   | • LDMG<br>• TCC<br>• DDMG | • Phone |  | Describe current situation with dam—What is the event?<br>What is the status? (storage is greater than minor flood level, as set by BOM)<br>Advise of current storage level<br>Advise EAP has been deactivated |

Ross River Dam  
Peak Levels

*Extract from the Ross River Dam EAP of the flood operations – Local Event Coordinator and Incident Coordinator Communication Plan.*

*SunWater*

*Historical peak levels of the Ross River Dam.*

*SunWater*

### Finding 15

The Ross River Dam was operated in accordance with the Emergency Action Plan (EAP) and a flexible approach to implementation of the EAP was undertaken. The EAP's implementation provided improved outcomes, particularly in terms of communication and notification and in the flexible operation of the dam which resulted in reduced flooding.

# LEGEND

- DRFA-activated LGA
- Non-activated LGA
- Rail line / stops
- Mine sites

## Referable Dam EAP

- ▼ YES
- ▼ NO
- ▽ Unknown

## KOWANYAMA ASC



EAP activations of other referable dams.

IGEM / data supplied by DNRME



### Activation of other EAPs

Depending on the specific dam and the activation trigger, the dam safety regulator will often only be notified of an event at a dam at the 'LEAN FORWARD' or 'STAND UP' point in the EAP. Notifications are clearly written into the EAPs for each identified dam hazard event and each trigger, with pre-prepared and pre-considered justifications for them. In many instances EAP activation is not an emergency. The table in **Appendix H** lists dams that were in the vicinity of the monsoon event. However, not all these dams experienced intense rainfall and flooding, and not all were required to notify the regulator.

In addition to activation and implementation of the EAP for the Ross River Dam, EAPs were activated during the Monsoon Trough event for other dams. These included: the Paluma Dam (Townsville), the Burdekin Falls Dam (Townsville); the Copperlode Falls Dam (Cairns), the Tinaroo Falls Dam (Mareeba); Copperfield River Gorge Dam (Mareeba); Julius Dam (Mount Isa); Corella Dam (Mount Isa); Eungella Dam (Mackay); Teemburra Dam (Mackay) and Kinchart Dam (Mackay).

These dams are fixed spillway dams and are designed to fill then spill. For fixed spillway dams the owner provides adequate and accurate warnings (forecasts) and public information. The owner of the dam also maintains or increases the frequency of observations and monitoring to safeguard and warn of potential dam failure hazard.



### Emergency event report

Townsville City Council submitted to the Chief Executive of the DNRME an emergency event report for the Ross River Dam. The report complies with the requirements for emergency event reports in the *Water Supply Act*. It indicates that the Ross River Dam was operated in accordance with the EAP requirements. In relation to communication, the report indicates that the communication protocols required during an emergency event as defined in the EAP were followed.

Further, the deviations from automatic gate operation outlined in the EAP were undertaken to mitigate the impacts of downstream flooding. The report recommends that the EAP should be reviewed in consideration of the potential impacts of operating the gates outside automatic mode and that this should occur prior to the 2019/20 wet season. This may provide an opportunity to further improve the EAP as a result of any learnings from the manual gate operations.

Finally, the report indicates the dam performed satisfactorily during the flood event. No major defects were observed that threatened the safety of the dam. However, significant erosion did occur downstream of the spillway and adjacent to the spillway training walls as a result of the flood event and should be repaired as required. Based on the structural performance of the dam, the report indicates that the EAP effectively dealt with the flood event for the primary purpose of maintaining structural safety of the dam.

### Recommendation 5

As part of the annual EAP review for the Ross River Dam, consideration should be given to the potential impacts of operating the gate outside automatic mode and whether this event has provided any new information and learnings which can be incorporated into the EAP. This should occur prior to the 2019/20 wet season.

*The LED sign below the Ross River Dam wall at 6.50pm on 2 February 2019.*

*Queensland Police Service • A/Sgt Ben Wilson*





## Information infrastructure

To assist in informing stakeholders and the community about the onset of an event, adequate infrastructure needs to be in place and operating efficiently. This should be supported by appropriate redundancies where gaps exist, or failures occur.

### Weather radar services

The Office was told challenges with planning for the Monsoon Trough event due to a lack of weather radar services in some locations limited the ability to predict rainfall, impact and response activities.

The floodwaters in north west Queensland did not inundate its small townships but resulted in road and rail closures which caused isolation and created access issues.

Much of the flooding in the north west region of Queensland directly impacted primary producers and mining companies.

The Office was told the establishment of permanent weather radar stations in the north west between Mount Isa and Townsville could provide some benefit in forecasting future events. This issue was previously raised by both Flinders and Richmond LDMGs and conveyed in the *Townsville District Capability Review*.<sup>114</sup>

Since the Monsoon Trough event, the Australian Government has committed to improved weather monitoring facilities, which will include new radars at Maxwellton (near Julia Creek) and Charters Towers.<sup>115</sup>

### Flood warning infrastructure

The Office was told by a number of councils that they experienced issues with flood warning infrastructure. The issues included:

- river gauges being damaged due to the flooding
- lack of infrastructure to provide adequate warnings
- inaccurate readings or loss of communications
- reliance of manual river height gauges.

One example was in the Douglas Shire Council. Daintree Village experienced its highest flood on record and a lack of upstream river height information of the Daintree River made it difficult for local government to provide timely warnings to the community.

Timelier upstream river height information would have enabled the LDMG to gauge the likely impact of rising river levels and inform the community earlier of what was to unfold.

The Office also heard of significant loss of gauges due to record water levels, noting that not all water monitoring assets are installed for floodplain warning purposes.

There were also issues arising from the reliance on reading manual gauges. For example, local councils noted concern with having to deploy staff in adverse weather conditions and potentially exposing them to danger. This resulted in reporting delays and hampered situational awareness in some areas.

The Office recognises the state-wide review of the Queensland flood warning gauge network in 2015 and the ongoing improvement initiatives.

As a result of impacts of this event, joint Commonwealth and State funding assistance has been activated through the Australian Government's Disaster Recovery Funding Arrangements.

Three key floodplain management initiatives are being funded under special Disaster Resilience Funding Arrangements for:

- repair and reinstatement of damaged flood warning infrastructure, and installation of new infrastructure across 17 impacted local governments
- development of a flood resilience strategy for the Burdekin Catchment, including the adjacent smaller Haughton River catchment that impacted the town of Giru
- Townsville City Council to update and recalibrate flood modelling and mapping, including the Ross River following the record floods.

The QRA will facilitate and support the delivery of new and upgraded flood warning infrastructure for impacted communities, and the Burdekin Catchment flood resilience strategy. These projects will be delivered using integrated catchment planning approaches successfully piloted with local governments in recent years.

This work in addition of other initiatives resulting from the *Strategic Policy Framework for Riverine Flood Risk Management and Community Resilience 2017* are expected to make considerable improvements to flood warnings in the coming years.

## Telecommunications

The provision of telecommunication services during the Monsoon Trough event in urban, rural and remote centres appears to have been generally well delivered and managed, as was representation by service providers on DDMGs.

Overall, the Office found little commentary or evidence regarding opportunities for improvement for telecommunication service providers and infrastructure matters. There appeared to be general acceptance the flooding would disrupt infrastructure and services and all reasonable steps had been taken to restore services. In one instance, a satellite vehicle was stationed at the Heatley evacuation centre to provide connectivity for the community.

The one exception submitted to the Office related to Daintree Village, in Douglas Shire, north of Cairns. Power was lost during the Monsoon Trough event on January 26 as flood waters rose above powerline height in the Upper Daintree and Lower Daintree at Barratts Creek.

The Office was told battery backup at Daintree's Telstra exchange provided ongoing service only for 3.5 to 4 hours. Consequently landline, email, internet, and mobile services to the area were unavailable. At the request of the LDMG, a generator to repower the exchange was flown to Daintree Village however this could not occur until 28 January 2019.

This created significant issues and concern for both residents and the LDMG as it impacted on the ability of agencies to gather information, contact residents, and report issues during this period.

Douglas Shire Council arranged for a satellite phone to be transported to the village and has subsequently sought funding to have a generator installed at the exchange. The Office was told council would consider other redundancy measures in the future.

Daintree Village had been isolated and subject to power failure on four occasions between December 2018 and March 2019 and Douglas Shire Council suggested Telstra should ensure remote sites, particularly those frequently isolated and subject to power failure, have an adequate backup power supply.

Telstra confirmed backup power facilities were provided at key sites to maintain services for short time frames following periods of local mains power failures. In the case of Daintree Village, this was in the form of batteries. As well as the battery reserves, Telstra advised it had mechanisms in place to deploy service staff with portable generators when reserves may not support the site for the duration of the outage.

Telstra confirmed that due to the location of Daintree Village, and the potential delays in gaining access due to flooding events, generator support was sometimes not possible within the battery reserve timeframe and therefore outages unfortunately could occur.

Telstra noted it had initiated attendance at Daintree Village on each and every occasion, day and night, also attending via helicopter during the period of flooding in support of restoring communications to the community. Telstra has committed to continuing to address concerns in real time for all future service interruptions.

*Fibre-jointing repairs at one of the Williams River wash-out sites, 100 kilometres east of Cloncurry.*

*Partially-submerged communications tower at Etta Plains, about 100 kilometres north west of Julia Creek.*

*Telstra*

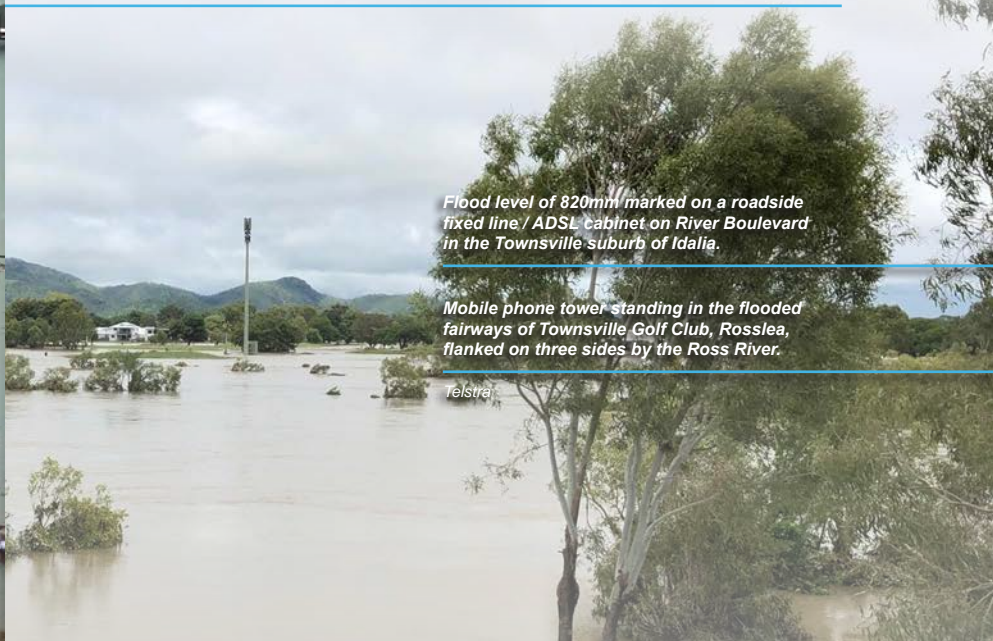




## Telecommunications

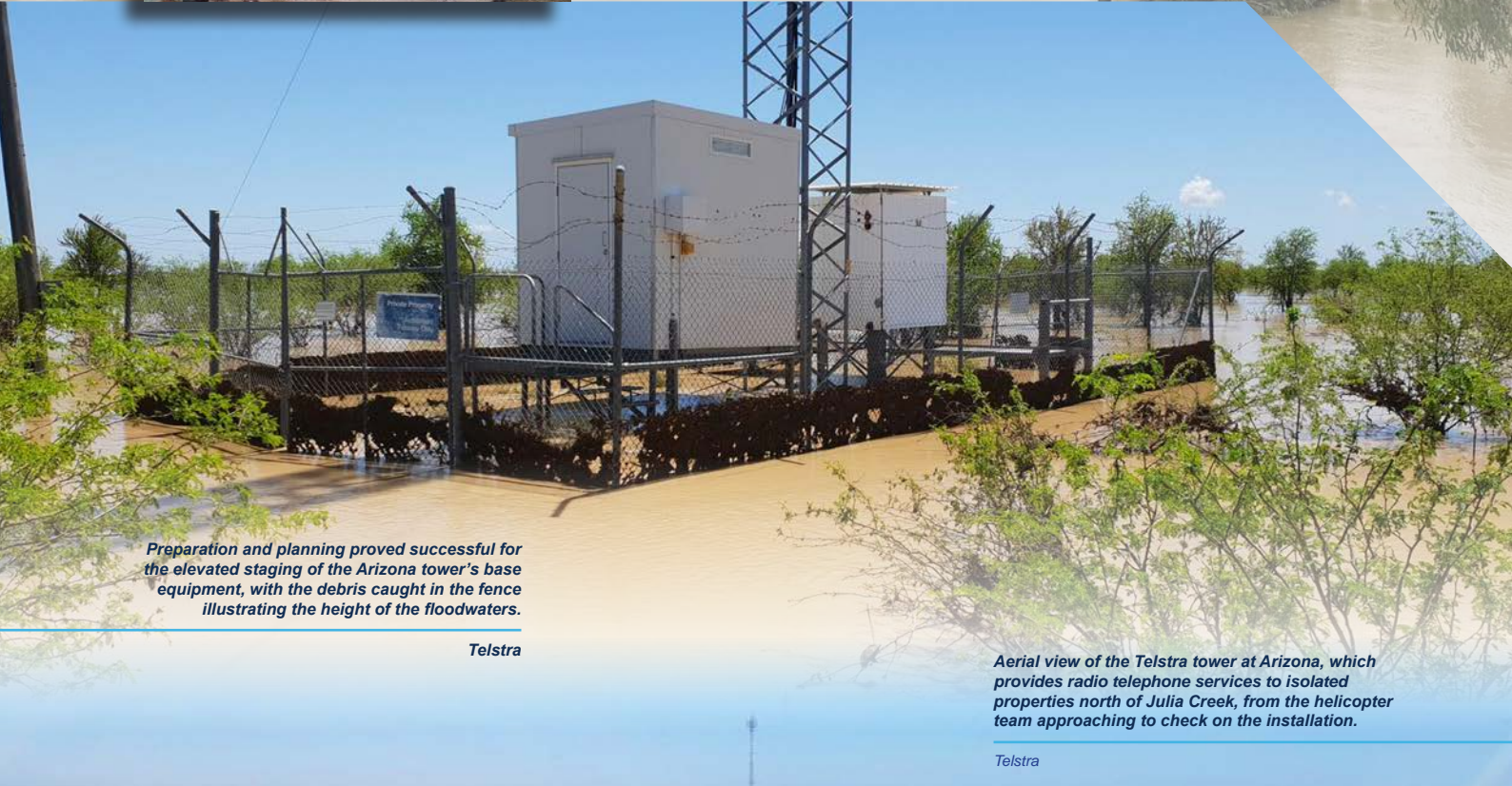


*Flood level of 820mm marked on a roadside fixed line / ADSL cabinet on River Boulevard in the Townsville suburb of Idalia.*



*Mobile phone tower standing in the flooded fairways of Townsville Golf Club, Rosslea, flanked on three sides by the Ross River.*

Telstra

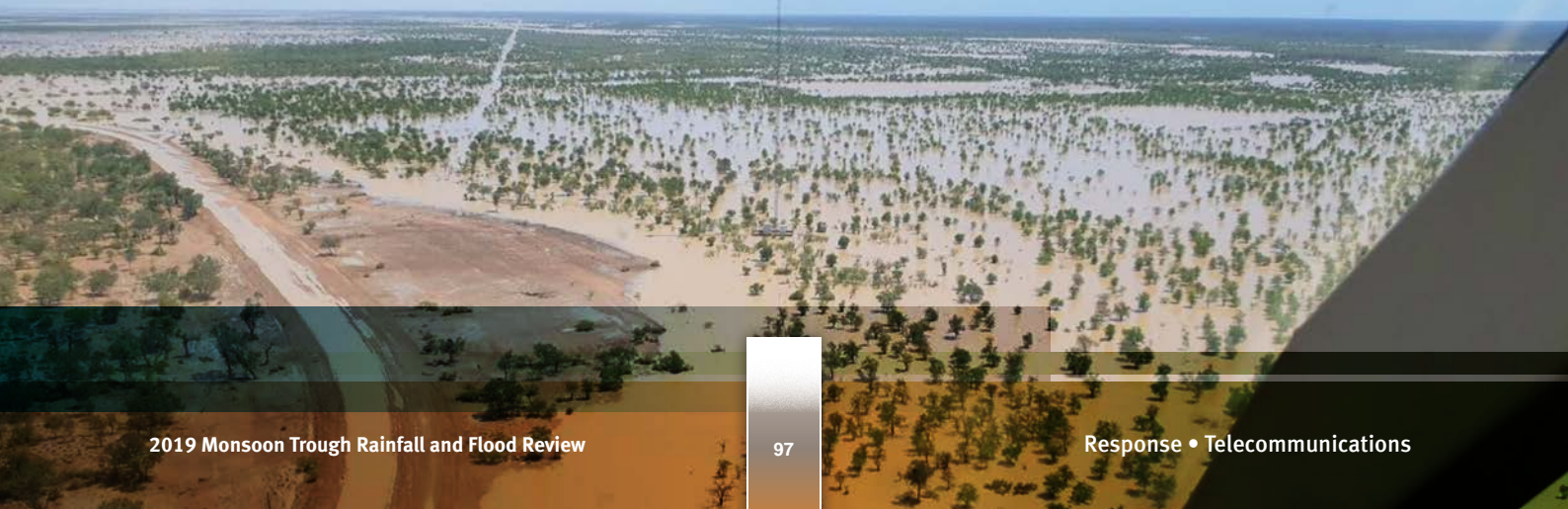


*Preparation and planning proved successful for the elevated staging of the Arizona tower's base equipment, with the debris caught in the fence illustrating the height of the floodwaters.*

Telstra

*Aerial view of the Telstra tower at Arizona, which provides radio telephone services to isolated properties north of Julia Creek, from the helicopter team approaching to check on the installation.*

Telstra





## Disaster management arrangements

### ► What was expected

Disaster response is *'the taking of appropriate measures to respond to an event, including action taken and measures planned in anticipation of, during, and immediately after an event to ensure that its effects are minimised and that persons affected by the event are given immediate relief and support'*.<sup>116</sup> The response phase of disaster management involves the conduct of activities and appropriate measures necessary to respond to an event.<sup>117</sup>

In establishing expectations for the response phase for the Monsoon Trough event, the Office expected to see disaster coordination centres at the local, district and State levels activated as the need arose, to coordinate resources, collect and share information and provide support.

The Office expected coordination to operate across organisations and agencies, both vertically and horizontally. It expected to find agreed control responsibilities occurring, with disaster operations being supported across multiple agencies and groups.

From a command perspective, it expected to find an ability to make decisions and task personnel to support disaster operations and the community.

It was expected that a range of technical information and intelligence products would be provided across all levels, as required, to support effective decision-making. This technical information is expected to be provided by those agencies and personnel with the necessary knowledge and skills.

Event reporting provides real-time situational awareness for disaster coordinators at all levels. It enables operational decision-making to be based on comprehensive and timely information.

The Office expected to find regular event reporting, including situational reports (SitReps) to be generated. That information systems were operating which enabled the effective sharing of this information across all levels.<sup>118</sup>

While local governments are primarily responsible for managing events in their areas, the activation of support and resources from district and state levels will ensure an effective response to disaster affected communities. This is particularly relevant for hazard-specific arrangements and large-scale disasters which may overwhelm local resources.<sup>119</sup>

Timely activation across all levels is critical for an effective response. It would be expected that LDMGs demonstrate an understanding of the indicators of disasters and to monitor and provide situational awareness of events. It would be expected a timely activation is achieved by LDMGs and escalation procedures are followed that include trigger points and required actions during alert, lean forward and stand up arrangements.<sup>120</sup>





## Disaster management arrangements ► What was expected

It was expected that LDMGs had previously identified local resources for use during disaster operations and could coordinate these resources.<sup>121</sup> Where capability limits are reached, or shared responsibility is needed, it is expected that there is evidence of the LDMGs advising their DDMGs about any support services required to facilitate disaster operations and disaster management.<sup>122</sup>

DDMGs were expected to have identified and planned for the allocation and coordination of resources within their disaster district as well.<sup>123</sup>

As outlined in more detail earlier in this report, the QDMC provides senior strategic leadership in relation to disaster management across all four phases in Queensland. It facilitates communication between the Premier, relevant Ministers and Directors-General before, during and after disasters. Its functions include the identification of resources, in and outside the State, that may be used for disaster operations, and the coordination of State and Commonwealth assistance for disaster management and disaster operations.

It was expected that the QDMC provided strategic direction for this event, including the identification and coordination of State and Commonwealth resources for disaster response operations. It was also expected that the QDMC provided strategic direction to the SDCG, which it would implement, with the SDCG supporting the SDC.<sup>124</sup>

Resourcing, collaboration, coordination and deployment are all essential elements of the response phase and for the Monsoon Trough event. The Office expected to find the delivery of disaster-related services, through all phases of the Monsoon Trough event, integrated across the sector and responsive to community needs.

Effective resource management supports all phases of disaster management. It ensures the best use of scarce resources and value for money across the arrangements. It also supports local economies and mitigates risk.<sup>125</sup>

The Office expected to find resources being prioritised, coordinated and allocated based on community needs and operational priorities by agencies. Resources are to be managed across all steps (i.e. start to finish) and across all levels of the arrangements. It is also expected that stakeholders are aware of resourcing capability and capacity across the levels, including human resources.

With communication systems and information sharing, the Office expected that sharing of information and intelligence using communication systems between state group and agencies, DDMGs, LDMGs and local governments would occur seamlessly and in line with established plans during the event.

In doing so, there would be a common situational awareness across stakeholders to support effective planning and decision-making.

***Aerial view to the north west on 6 February 2019, shows Richmond flanked by the floodwaters of O'Connell Creek to the west and the Richmond River in the foreground to the east.***

*Richmond Shire Council / Mayor John Wharton*



## Disaster management arrangements ► What was found

The Office found that, overall, and taking into consideration the nature and size of the Monsoon Trough event and associated flooding, disaster management arrangements in the response phase to this event were generally of a high standard. This was particularly so at the local level, where the management of response activities was led.

It was found that agencies and disaster management groups worked well together to manage the Monsoon Trough event, providing a high level of safety to the community. There were many examples where agencies and disaster management groups applied lessons learned from past events to achieve better outcomes.

There were also many examples found where agencies, groups and individuals were adaptive and explored opportunities to solve problems and achieve positive results, in response to unique and challenging situations.

There were 37 LDMGs and six DDMGs at various levels of activation throughout this event, with 13 LDMGs, one DDMG and the QDMC stood-up in response to this event. These stood-up groups were supported by the activation of their respective coordination centres. Information and intelligence (e.g. Bureau weather forecasts, flood modelling, dam levels, river heights, health warnings, evacuation centre locations and road closures) was gathered and shared with stakeholders and the community.

Agencies combined and shared resources (e.g. resources were shared amongst councils, ADF, QPS, QAS and QFES to affect rescues).

Prioritised activities were coordinated, providing support to agencies and communities across a large area. For example, to effectively execute the evacuation plan for flood-affected Townsville residents, the members of the LDMG's Evacuation Sub-Group had to prioritise and coordinate their activities.

This involved using flood maps to determine the areas for evacuation and dividing them into quadrants, establishing evacuation messages and timings, selecting and resourcing evacuation management teams, and overseeing activities including physical door knocks. All of these activities were commanded and managed through the local disaster coordination centre.

Experts within State agencies and others (e.g. Telstra and SunWater) were deployed to disaster coordination centres and, where required, provided advice and technical information to enable informed and timely decision-making. This was undertaken in line with their roles and responsibilities as outlined in the disaster management guidelines.

To enable greater knowledge capacity and aid informed decision-making, liaison officers (or agency representatives) from different government and non-government agencies were allocated to operate from within disaster coordination centres.





## Disaster management arrangements ► What was found

These liaison officers were able to apply their expert knowledge and experience to support the objectives of the centre commanders. For example, the TMR liaison officer provided expert advice around flooded roads/bridges and their re-opening. Similarly, the disaster management group representatives for Energy Queensland provided advice about timings and areas cut off from electricity supply.

It was found that situational reporting was provided by disaster management groups, councils, emergency services agencies, state government agencies (e.g. Department of Transport and Main Roads, Queensland Health, Department of Housing and Public Works, Department of Communities, Disability Services and Seniors, Department of Agriculture and Fisheries), and NGOs (e.g. Australian Red Cross) and regularly shared across agencies and groups at local, district and State levels.

It was found for this event that across the affected area the quality of agency and group reporting was at such a strong standard that they negated the frequency of meetings required. This was found at local, district and state levels.

For example, the number of State Disaster Coordination Group meetings was significantly reduced due to the quality and frequency of reports being provided by state group members, and also provided by LDMGs and DDMGs through the arrangements to the State Disaster Coordination Centre.

The disaster response capacity and capability across agencies and disaster management groups in Queensland has matured, particularly for responding to floods, severe storms and cyclones. Queensland is becoming well versed in these events.

Annual disaster management plan assessments have identified progressive improvements in LDMG and DDMG plans, supporting improved disaster response actions.

A commitment to apply past learnings and a willingness to undergo continual improvement, is enabling disaster management groups and agencies to further develop their response ability across local, district and State levels.

This has also contributed towards building better disaster resilience across the State.

**Townsville Local Disaster Management Group meeting at 8:53am on 6 February 2019.**

*Townsville City Council*

**Many Queensland communities have embraced opportunities for reducing disaster risk and building resilience before, during and after a disaster event. They have engaged with disaster risk reduction experts and have made significant, measurable progress'.<sup>126</sup>**



## Roles at local, district and State levels

Councils are primarily responsible for managing disaster events in their local government areas. Local councils are ideally placed to manage disasters at the community level given their knowledge and understanding of social, environmental and economic issues.<sup>127</sup>

It was found that, given the nature of this event and the varying capacities of the affected communities, LDMGs in general responded effectively.

The leadership of LDMGs in managing the response phase was evident. LDMGs had plans in place that they enacted to direct and coordinate their response activities within their capability and capacity. There was adherence to the protocol of districts and the State level providing support to groups upon their request.

This practice aligns with Queensland's disaster management arrangements and demonstrates an increasing awareness, preparedness and capability of local councils to perform their leadership roles.

Overall, the Office found that LDMGs provided regular situational reports and elevated requests for assistance to district level where required. District and State groups supplemented the role of the groups as requested.

For this event, the SDCG was activated but met on just the one occasion during the response phase. This was largely due to the strong capability of LDMGs to manage the response phase for this event, with any support requests managed mostly through DDMGs.

Although the SDCG met formally only once, its members provided regular agency briefings, and were briefed about the Monsoon Trough event by liaison officers located within the SDCC.

Flexibility and adaptation were applied with SDCG members managing response requirements through existing relationships and direct contact between its members.

This was also supported by the State Disaster Coordinator directly engaging with SDCG members.

## Disaster group activations

During this event DDMGs activated to an appropriate level and provided support to LDMGs during the response phase of this event.

Although Mount Isa and Far North DDMGs did not elevate to the 'stand up' activation level, there was sufficient support being provided to their LDMGs that stood up or required it.

The Townsville DDMG stood up in a timely manner and in accordance with the DM Act. The District Disaster Coordinator (DDC) for the DDMG declared a disaster situation for the entire district. The need for the disaster declaration was found to comply with the DM Act and supported the magnitude of the Monsoon Trough event.

The directions of the Townsville DDMG were well supported by its disaster coordination centre, which was situated in a Townsville police station.

The Office sought to examine the various timings and levels of activations of various disaster management groups. This was

undertaken to more closely understand the cumulative impact of the Monsoon Trough event on resourcing and overall coordination. Accurately capturing the activation data for this review was challenging. The Office found wide-ranging inconsistencies between the systems used by QFES and QPS in the SDCC, finding the only accurate method required an analysis of individual disaster management group records.

The Office found there was differing levels of understanding and use by stakeholders in relation to the terms 'stand up' and 'activated'. This led to some stakeholders being unclear of the timing and activation levels of local, district and state disaster management groups, disaster coordination centres and emergency operation centres.

As an example, for the Townsville DDMG, one stakeholder perceived the DDMG had stood down based on advice that the DDMG was no longer meeting for the event. As a result, this member felt the DDMG had stood down too early as their agency was still undertaking response

activities and was unclear as to why the DDCC was also still activated at that time. The Office understands the DDMG had not stood down; rather, it had stopped holding formal meetings for the event. The DDMG continued to support ongoing response activities across the district as the event unfolded. After the DDMG finally did stand down the DDCC remained activated to provide support to members as needed for some time longer.

As another example, the Mount Isa DDMG identified itself as being activated for this event. However, the group did not elevate to the 'stand up' activation level. This caused confusion and misunderstanding, amongst some, of this DDMG's activation level.

The current State Plan provides the Activation Response Model for disaster management groups, including the levels of activation and their respective definitions. It refers to disaster coordination centres not being activated in the Lean Forward level, whilst in the Stand Up level personnel and coordination centres are activated.



## ACTIVATION RESPONSE MODEL

| Level of activation | Definition  |
|---------------------|---|
| <b>Alert</b>        | A heightened level of vigilance and preparedness due to the possibility of an event in the area of responsibility. Some action may be required and the situation should be monitored by staff capable of assessing and preparing for the potential hazard.                |
| <b>Lean Forward</b> | An operational state prior to 'Stand Up', characterised by a heightened level of situational awareness of a disaster event (either current or impending) and a state of operational readiness. Disaster coordination centres are on standby – prepared but not activated. |
| <b>Stand Up</b>     | The operational state following 'Lean Forward' where resources are mobilised, personnel are activated and operational activities commenced. Disaster coordination centres are activated.  |
| <b>Stand Down</b>   | Transition from responding to an event back to normal core business and/or recovery operations. The event no longer requires a coordinated response.  |

The DM Guideline provides further context for the activation of disaster management groups and disaster coordination centres and the convening of meetings. *'Activation does not necessarily mean disaster management groups must be convened but may entail providing information to members of those groups about the risks associated with a pending hazard impact.'*<sup>128</sup>

The decision to activate disaster management arrangements, including the disaster management groups and/or disaster coordination centres, depends on multiple factors including the perceived level of impact to the community.

**Activation response model.**

*Disaster Management Guideline*

The DDC should determine when, and to what extent, the DDMG should activate and may bypass initial levels of activation where appropriate to the event.<sup>129</sup>

The *Queensland Disaster Management Lexicon* (the lexicon) was created to reduce confusion about disaster management-related terminology used in Queensland.<sup>130</sup> The lexicon provides a platform to highlight and explain terms from a number of sources specific to Queensland's disaster management environment.

**Finding 16**

**District Disaster Management Groups activated to an appropriate level and provided support to Local Disaster Management Groups during the response phase of this event.**

**Finding 17**

**Information regarding activation levels is not collected and recorded consistently through the various systems in use.**

**Finding 18**

**Some inconsistency of the use of the terms 'stand up', 'activation' and 'activated' contributed to confusion and misunderstanding between stakeholders.**

**Recommendation 6**

**A single point of truth be established for accurately capturing and reporting on disaster management group activation levels for any given timeframe.**

## Disaster coordination centres

For the Townsville LDMG, the recent investment in a modern, designated Local Disaster Coordination Centre proved highly beneficial for coordinating response activities for this event. The local coordination centre became the focal point for many agency representatives across the Townsville LDMG and Townsville DDMG. This coordination centre was able to accommodate a large number of staff and held close to 150 people at the Monsoon Trough event's peak. It provided expert local council staff and agency representatives with an environment which supported collaboration and co-production of intelligence products. The centre also provided a room for LDMG meetings.

Some agencies such as the Department of Agriculture and Fisheries established a Strategic Command Centre which assisted with information gathering and sharing with internal and external stakeholders. Although this Centre did not take on a command role for the department, it did meet the agency's needs.

The Office was told of issues with the Townsville District Coordination Centre due to the impact of the Monsoon Trough event (surrounding flooding, power supply, access, etc.). However, the presence of a QPS search-and-rescue coordination capacity within the Centre enhanced the capability to better manage the safety and wellbeing of evacuees.

The Office was told the effectiveness of the Townsville DDMG was at times impacted by their members and advisors being drawn to attend meetings at the Townsville LDMG as events in other local council areas were unfolding.

Teleconferencing was used by the Townsville DDMG to reduce the impact of meetings (including conflicts) and other commitments on members and advisors. The DDMG also alleviated the administrative burden by convening meetings only when required. Members communicated with each other outside of meetings to support information-sharing and situational awareness. This was found to be especially beneficial at the Monsoon Trough event's peak.

It is understood that Townsville City Council will explore the use of its new building for use by the DDMG during events not requiring LDMG activation.

The Mount Isa District Disaster Coordination Centre has been developed to a level where it can operate at a minimal capacity to support yearly monsoon resupply activities for LDMGs.

LDMGs and DDMGs are encouraged to continue this maturing approach and continually look to apply further developments and preparedness of their disaster coordination centres. This could include emergency services looking to share existing or new facilities as district disaster coordination centres.



*Two views of different operational areas in the Townsville response effort: the multi-agency desks in the DDCC (below) and in the LDCC (right) on 6 February 2019.*

Townsville City Council / Queensland Police Service

## Finding 19

Consideration of location and facilities of coordination centres and how they will be operated during an event are valuable planning exercises. This helps identify both strengths and opportunities of issues such as co-location or administrative requirements.





*Local QPS members brave the fierce downwash from the Robinson R44's rotor blades at Richmond Airport on 10 February 2019 as the helicopter undertakes a 'hot re-stocking' of fodder bales, slung for delivery to starving stock on flood-bound properties in north west Queensland.*

Queensland Police Service





## Response • Public warnings and communication



**Evacuees and their essential belongings board a truck provided by Townsville City Council.**

Queensland Police Service

**This Facebook post advising the expected opening of the Ross River Dam spillway gates was one of thousands of social media community messages promulgated during the Monsoon Trough event.**

Townsville City Council

For this event the unpredictable nature of the monsoon trough created a dynamic and challenging environment for many agencies and disaster management groups to operate within.

The Office was told that developing accurate forecasts and associated preparations in the lead up to the Monsoon Trough event were extremely challenging. Rainfall and flooding levels were dynamic, changing many times over an extended timeframe. It was common for flood waters to rise and fall numerous times - something that was locally termed the 'yo-yo effect' (e.g. Bluewater and Burdekin).

Against this challenging environment, it was found that many agencies and disaster management groups had limited time to provide effective community messages and warnings in the lead-up to the impacts of this weather event.

The Office found commendable efforts in public warning and information for this event, particularly of smaller and less well-resourced councils.

Many LDMGs, led by councils, provided regular and updated community messages via their dashboards, social media, commercial media, live local radio and television, community noticeboards, electronic billboards, emails, phone calls, and text messaging.

This process was supplemented by agencies using their own messaging mediums, such as commercial radio and ABC radio, Facebook, QPS social media, QFES social media, DTMR's [QLDTraffic](#) website, and the Bureau's online Queensland Weather and Warnings webpage.

Notably, it is understood that agencies and councils linked and referenced each other's respective messages (e.g. QPS, DTMR, QH, QFES, Department of Education and Australian Red Cross). This provided the community with a consistent understanding of the Monsoon Trough event.

Councils from Mount Isa to Weipa and through to Winton were found to have strongly, and effectively, embraced social media channels for messaging to residents.

Some councils also utilised methods such as direct messaging (e.g. phone calls and door-knocking).

**MEDIA RELEASE >> Spillway gates on dam expected to be fully open between 8pm and 8.30pm, 3 February at 7:24PM**

Heavy rainfall into the Ross River Dam catchment is expected to push the water level to a height which will automatically open the spillway gates to full between 8pm and 8.30pm.

Residents in the following suburbs should get to higher ground immediately:

This includes Rosslea, Hermit Park, Railway Estate, Townsville City, Oonoonba, Idalia, Cluden, West End, Rowes Bay, Garbutt, Aitkenvale, Cranbrook, Currajong, Mysterton, Pimlico, Mundingburra, Douglas, Annandale, Kirwan and Thuringowa Central and South Townsville areas.

If you require evacuation assistance, contact SES on 132 500. For life-threatening emergencies call 000.

For more information listen to local radio, phone 1800 738 541 or visit Council's Emergency Management Dashboard [disaster.townsville.qld.gov.au](https://disaster.townsville.qld.gov.au)

👍🐶🐱 201

340 Comments 528 Shares



## » Public warnings and communication

For Townsville, the following warning and information messaging was demonstrated:

- 50 emergency alerts
- more than 200 traditional communications (i.e. media releases and radio and television interviews)
- more than 3,600 social media communications
- approximately 40 radio recorded messages per day across local radio stations
- approximately 15 radio live readers per day across local radio stations
- the establishment of the 'Townsville Disaster Information' Facebook page which provided the community with 'real-time' updates and a channel for two-way communication
- the establishment of the emergency management dashboard, providing the community with a central location for real-time updates.

Many councils promoted their emergency dashboards as the online community messaging platform for this event. These dashboards were regularly promoted as the 'point of truth' for these council areas and the Office saw evidence of this.

This was reflected by both large and small councils. Townsville City Council cited around 3.75 million hits on its dashboard for this event.

The MCR Community Survey revealed that 52 per cent of people used their local council and LDMG as an information source in the lead up to the Monsoon Trough event, and 42 per cent during the event. This would indicate local council is a trusted and important source for disaster related information. Flinders Shire Council used its [dashboard](#) for the first time during the event and anecdotally noted strong take-up and acceptance of the tool, particularly for flood warning and gauge monitoring.

There is significant opportunity to better leverage and promote local council emergency dashboards in the future.

The MCR survey also revealed that, in the lead-up to and during the flood event, around 50 per cent of survey respondents reported using sources provided by local councils or LDMGs to gather information on the event. Of the local councils or LDMG sources that were accessed, 15 to 20 per cent of Townsville survey respondents reported using the Townsville City Council website or dashboard. This reduced marginally to 15 to 17 per cent of respondents using local websites and dashboards in the Western Queensland study area.



*Centred on Hughenden, the inaugural Flinders SC dashboard provided 16 easily-navigated information modules as well as an interactive map and cameras.*

Flinders Shire Council



It was also found that the dashboard was supported as the 'point of truth' by agencies who linked with them on a regular basis.

The Office was also told dashboards were useful in the Recovery Phase. Townsville City Council demonstrated good practice in this regard and was easily able to transition seamlessly between Response and Recovery on its dashboard.

### Finding 20

**Local disaster dashboards provided on Council websites proved valuable in informing the community and were recognised as the 'point of truth' by much of the public in this event.**

### Recommendation 7

**Councils, with the support of stakeholders, continue to develop and promote local disaster dashboards as the 'point of truth' for community information and messaging during disaster events. Greater use during recovery should be considered.**

### Information sources used by the community

As similarly found in other IGEM reviews, surveyed residents used both official and unofficial information channels in the days before and during this monsoon event.

A community survey undertaken at the request of the Office for this review found that:

1. Townsville study area residents mostly used the Bureau of Meteorology (the Bureau) website in the days before the Monsoon Trough event (67%), shifting to using information from the following three sources during the event:

- telephone warnings (53%),
- the Bureau website (53%), and
- family / friends / neighbours (53%)

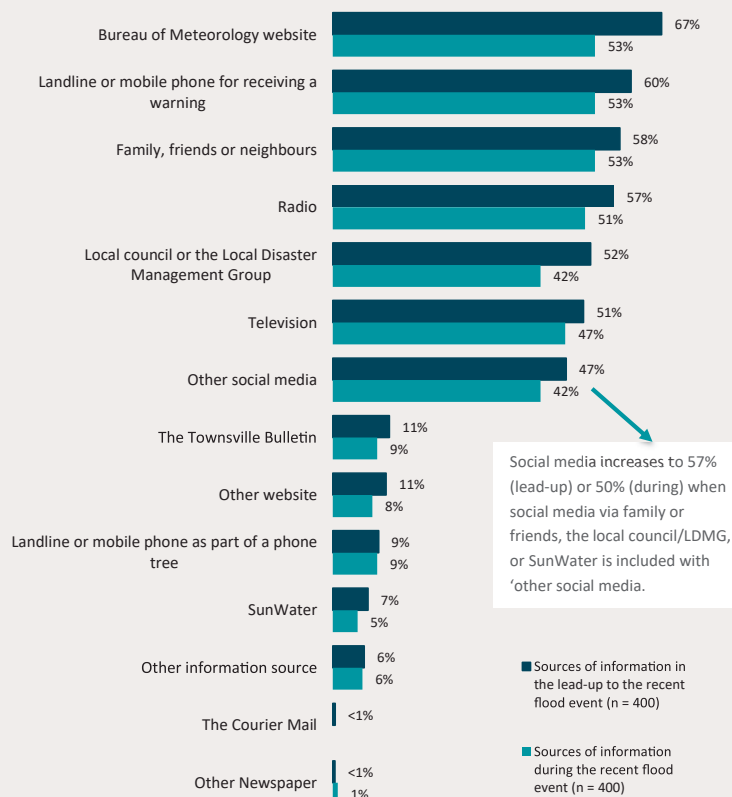
2. Residents from the western Queensland study area mostly sought information from both family/friends/neighbours (68%) and the Bureau website (62%) in the days before the event.

During the flood event, this shifted significantly, where the majority of residents (78%) were seeking information from family/friends/neighbours.

The survey also found that social media featured strongly as a well-used source of information across all study areas surveyed and that text messages (including Emergency Alerts) were very well regarded with the vast majority of Emergency Alerts considered easy to understand.

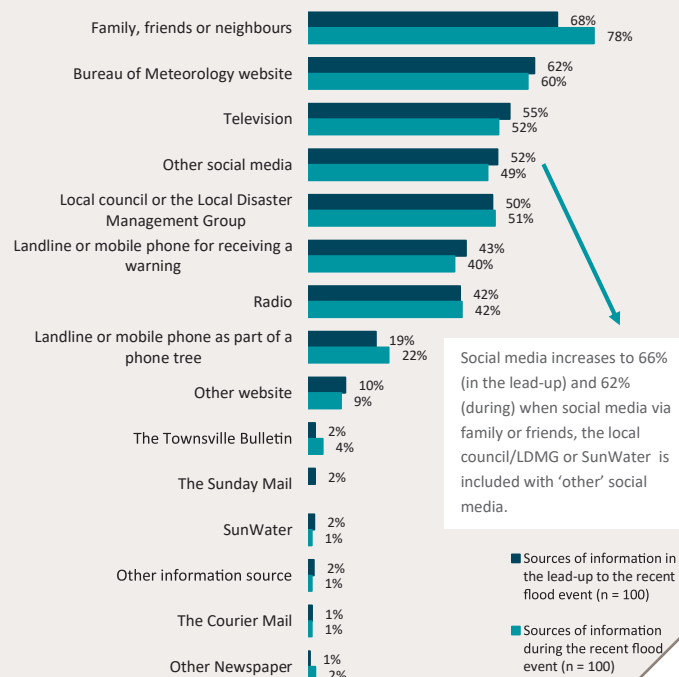
Q17a/b. In the lead-up/during the recent flood event which, if any, of the following sources of information did you use?

TOWNSVILLE STUDY AREA



Q17a/b. In the lead-up/during the recent flood event which, if any, of the following sources of information did you use?

WESTERN STUDY AREA





## Public warnings and communication

### Emergency Alert

Emergency Alert (EA) is the national telephone warning system used by emergency services to send voice messages to landlines and text messages to mobile phones within a defined area about likely or actual emergencies.

EA is one system in a suite of tools that was used during the Monsoon Trough event.<sup>131</sup> The system relies on telecommunications networks to send messages. Message delivery cannot be guaranteed. Supporting doctrine for the use of EA in Queensland is available on the disaster management website and includes the *Queensland Emergency Alert Manual* and associated user templates and information sheets.

Seven local governments issued EAs during the Monsoon Trough event. All seven local governments have at least one pre-prepared message and/or map loaded on the EA Portal, which is managed by the SDCC Watch Desk. However, only Flinders and Douglas local governments used the pre-prepared messaging and/or maps from the portal. There are many reasons for this including the need to make the message more relevant and specific to the unfolding event.

In total, 78 EAs were issued between 26 January 2019 and 11 February 2019 with almost 1.5 million text messages and more than 230,000 voice messages sent across the Flinders, Charters Towers, Hinchinbrook, Townsville, Douglas, Burdekin and Palm Island local government areas.

The Office found that the EA process worked well across the Monsoon Trough event through both larger and smaller local authorities. For example, Flinders Shire Council, a smaller local authority, issued 10 EAs between 2 February and 7 February 2019. The local government preceded the use of some EAs with phone calls to residents. This prepared residents, so they knew what to expect when the EA was received. Flinders Shire Council warned the community about bridge closures and flood warnings and told the Office that they received good support from QFES and QPS. The Flinders Shire Council noted the use of EA 'got people interested.' Flinders Shire Council provided the Office with anecdotal evidence that EA was well received by the community.

While the system worked well overall, the need for ongoing training and exercising of the EA process with local governments is essential.

From the community survey, MCR identified that more than half of the Townsville study area residents and just under half of the western study area residents used their landline or mobile phone for receiving warnings.<sup>132</sup> Almost 100 per cent from the Townsville study area said the warning message was easy to understand.<sup>133</sup> These results highlight the success of EA and the need to plan for its ongoing use in the future.

The Office found one instance of unnecessary delay in the issuing of an EA caused by an incorrect process being used. The Office has commented on this in previous reviews and has noted in this event that the efficiency of issuing EAs appears much improved.

Despite the success of campaigns, the Office found that not all stakeholders shared the same level of understanding of the EA process.

### Finding 21

**More effective use of Emergency Alert during this event through improvements to process and timely outputs was observed.**

### Finding 22

**Greater consistency of understanding can be achieved through the continued delivery of the detailed Emergency Alert (EA) training being provided to Queensland Fire and Emergency Services (QFES) Emergency Management Coordinators and other key positions.**



## Response • Information sharing and Requests for Assistance

For disaster management groups (including sub-groups), an important role of their members and advisors is to share information, advice and guidance to assist the group to make informed decisions.

Greater information sharing leads to more informed decision-making processes and better outcomes. It was found that in some instances limited information sharing and communication occurred within disaster management groups, leading to inappropriate actions being taken, including taking action too early. As an example, the timing of evacuation centre closures in Townsville occurred in contrast to the thoughts of some members and stakeholders. Further details of this example are outlined in the Evacuation component of this section.

Benefits would be gained from members and advisors having the opportunities to provide information and advice to support effective disaster management, and regularly review and assess disaster management plans. This would involve disaster management group members and advisors openly providing input or raising concerns around disaster management group decisions.

Additionally, chairs of disaster management groups should look to create an environment where members and advisors feel comfortable contributing to group decision-making. Benefits would be gained from members and advisors proactively and cooperatively working together. The maturity of the disaster management group must be such that members have the ability and confidence to raise issues, seek clarification and gain consensus.

The Office found that the Townsville LDMG had a high level of information and intelligence within its capability and at its disposal. However, on occasions the group and stakeholders would have benefited from greater sharing of information and communication out to district and state groups and agencies. This would have enhanced situational awareness for all entities and improved capacity to identify support requirements.

The Office also found that enhanced relationships and shared communication between some members and advisors within the Townsville LDMG would support greater community outcomes. As an example, enhanced communication and information-sharing between the DHPW and the Townsville LDMG during this event would have provided greater situational awareness around the impact on Government controlled assets and temporary housing arrangements.

### Finding 23

**Informal support was provided by neighbouring Local Disaster Management Groups, in a cooperative environment, which achieved better results for affected communities.**

During this event it was found that support by neighbouring LDMGs was provided to some small communities. This was generally undertaken as these neighbouring LDMGs had better access to the small communities. As an example, during the Monsoon Trough event, the Burdekin LDMG undertook resupply activities for the small community of Woodstock, to support the neighbouring Townsville LDMG, in which the town is located. This was a positive outcome for the Woodstock residents and enabled the Townsville LDMG to focus on the most impacted locations in its area.

Similar support was provided to communities in both Winton and Charters Towers (i.e. Hervey Range) LDMGs. These neighbouring support arrangements were undertaken on an 'as required' basis.





## » Information sharing and requests for assistance

### Finding 24

**Advantages were gained by agencies establishing operation centres at locations best suited for delivering the necessary functions, with appropriately authorised, skilled and experienced manager/s placed at these centres to support local leadership and direction.**

In addition to direct information sharing between agencies, effective general communication between agencies and groups was also evident.

Communication between agencies and groups was evident and there are many examples of effective communication between agencies in the exchange of information and support arrangements. Interestingly, poor communication was often the issue for the small number of identified concerns around support or coordination activities. Agencies and groups should continually consider the issue of supportive and effective communications in all phases of disaster management and implement practices that promote this outcome.

During this event some agencies (e.g. Department of Agriculture and Fisheries, Department of Environment and Science, Department of Housing and Public Works and Queensland Rail) adopted the practice of establishing regionally-based command centres, where senior managers of their agencies were deployed.

This practice aligns with emergency services and how they establish operations centres. This practice enabled these senior managers to gain enhanced situational awareness and appreciation, which in turn provided faster more effective decision-making. It was found that for some agencies there is merit in adopting a similar practice.

Advantages would be gained in these agencies coordinating their activities (e.g. staff movements and resource allocations) especially where managers are situated and providing leadership from regionally based command centres.

Managing Requests for Assistance (RFAs) during an event is an important activity for all agencies and groups. The practice of RFAs identifies key issues that are beyond the capacity of the requester and the need for additional support.

Systems to share information (such as RFAs) between agencies and local, district and state groups should support a common situational awareness between stakeholders and help to inform decision making.

As noted in *The Cyclone Debbie Review*, three different operating systems are used across local, district and state levels to share key information such as RFAs. Sharing across these three levels requires an information exchange platform (IXP) to enable the interconnection of local (mostly Guardian), district (DIEMS operated by QPS) and State (EMS operated by QFES) between these systems.

When a local level RFA is received at district level it is assessed and either approved or declined. If approved, it can be resolved through DDMG capacities. If beyond the capacity of the district it can be escalated to state level for support. If declined at district level, it is commonly returned to the LDMG for re-assessment or LDMG resolution based on advice provided.

*SES, Police and QFES Swiftwater Rescue teams confer on the 'shore' of the Lynd Highway, north of Charters Towers, on 7 February 2019 before setting out to cross swollen Hann Creek, one of the many Burdekin River system tributaries.*

Queensland Police Service



## »» Information sharing and Requests for Assistance

Similarly, the State group will either approve or decline a request from a DDMG. When the request is beyond the capacity of the state level or requires the support of a national agency it will be escalated to the Commonwealth level. This includes the Defence Assistance to the Civil Community (DACC) process to request Australian Defence Force support, which is addressed in greater detail later in this section.

When an RFA is approved, district and State groups will process the RFA through their coordination centre cells (e.g. planning, logistics) and task member agencies to undertake actions. These agencies usually operate their own unique information management systems to coordinate these tasks. They may also escalate the tasks within their own agency to resolve them.

Although there were only a small number of formal RFAs during the Monsoon Trough event, the Office found evidence of information sharing being delayed, and on occasion it was inaccurate or unclear. This led to differing levels of understanding of what was being requested. Further to system barriers between the different levels, the Office uncovered evidence of content and administrative challenges with RFAs.

For example, the Townsville DDMG received 18 formal RFAs from its LDMGs during the event. In addition to these the DDMG also managed many informal RFAs across the disaster district.

Of the formal requests received by the Townsville DDMG, 11 were managed at the district level. The remaining seven were managed at the SDCC, with all of these being approved and actioned by State or escalated to Commonwealth level for further action. The Office found that while requests for assistance were approved and actioned, opportunities exist to improve communication processes and timings to enhance understanding for RFA outcomes.

For a number of years, it has been widely understood and acknowledged that real-time task-sharing and situational awareness through an automated

exchange of data would enable a more efficient processing of RFAs through to their conclusion. However, the Office notes that the current templates, process and systems resulted in less effective delivery of desired outcomes for some RFAs. The utilisation of several templates in some instances resulted in varying levels of understanding and delaying of RFA actions or requirements.

For example, one RFA requested specialist aerial surveillance to provide critical point-in-time topography mapping and flood peak dynamics impacting affected areas. After some amendments the content in the RFA adequately explained the importance of timing and technical actions requested. The RFA was supported and approved, and, progressed for actioning through the necessary disaster management levels from local to Commonwealth. Taking into account RFA amendments this process took in excess of 24 hours.

Information relating to the RFA was transferred across the different information management systems utilised by the respective levels. However, as action had not occurred as requested it was believed at the local and district levels that this RFA had not been completed, and therefore not approved. Extensive inquiries conducted by the Office revealed the RFA had been completed, as best it could, utilising available resources. The Office was further revealed that inefficient communication processes and systems resulted in insufficient information being relayed within agencies and across disaster management groups. This resulted in a misunderstanding as to the outcome of the RFA.

The Office considers the RFA process and associated templated forms could be improved to develop a more streamlined process that is more effective in delivering accurate information recording. This should include the requirement of verbal validation for significant requests. For example, requests for ADF assistance should be undertaken collaboratively. They should involve the requesting LDMG, DDMG and State representatives and include subject matter experts or

national representatives for clarification, as needed.

Although the issue of the RFAs in this event overall did not have any serious consequences, it created confusion and concern around the effectiveness of the RFA processes and system. It is evident achieving a common situational awareness across the different agencies and disaster management groups continues to be impeded by technical barriers.

The Office considers there is still room for improvement in the exchange of information and interoperability between the three systems used by local, district and state.

Despite the ongoing issues raised with information sharing, the Office was told of innovative solutions to overcome barriers. These included:

- Impact data was being captured by various agencies such as Townsville City Council, QFES and the Queensland Reconstruction Authority (QRA). Damage assessment information is highly sought-after following the impact of an event. A comprehensive understanding of impacts for this area was gained by integrating the data from the Townsville's Disaster Dashboard, QRA's mapping systems and various agency reports (e.g. QFES). This was then shared for better informed recovery planning.
- QH used its Noggin Incident Management System for the first time in the State Health Emergency Coordination Centre. This system significantly improved the department's capacity to respond to and manage incidents and issues during the event. The system improved processes and streamlined reporting and increased the rigour of information management. QH told the Office that the system will be rolled out to Hospital and Health Services across the state over the next few years. It is also the same system used by the State Disaster Coordination Centre and will allow better information management and interoperability.



## &gt;&gt;&gt; Information sharing and requests for assistance

**Finding 25**

There were some delays identified in timely actioning of requests for assistance due to a range of technical and administrative obstacles leading to misunderstandings between local, district and State levels. These issues have been previously identified in *The Cyclone Debbie Review* and are under consideration.

**Recommendation 8**

The provision of system-wide tools, education, guidance and testing for requests for assistance is strengthened to enhance understanding and outcomes.

*Aerial view to the south west of the electricity sub-station on Abbott Street in the flooded Townsville suburb of Oonoonba, bound on its eastern side by a swampy tributary of the Ross River.*

*Energy Queensland*



## Response • Resourcing, coordination and deployment

For this event it was found in most instances that the coordination of services was undertaken well. Agencies worked collaboratively to deliver resources to enable requested services to be delivered. Examples were found of:

- the DTMR working with local, district and State groups to enable better road access for responders and resupply providers along the Bruce Highway
- the ADF providing a vast array of resources and trained personnel as prioritised by the Townsville DDMG
- private contractors, Queensland Government Air and ADF providing air services to support disaster management operations, including medical retrievals and resupplies
- the DHPW supporting State Government agencies in assessing and re-opening buildings.

The Office observed local commercial media working cooperatively with LDMGs to provide many important community messages and warnings. Agencies were also observed to have applied lessons learned from past events.

As an example, QFES dispatched its flexible habitat to Townsville to support deployed staff and volunteers involved in the clean-up phase. This portable facility housed around 100 personnel, including a facility management team. The QFES flexible habitat has been used in past disaster events and helped to reduce the impact on the already stretched available accommodation within Townsville.

For this event a decontamination component was incorporated into the flexible habitat facility to address the high level of vehicles and equipment contaminated during the event and in clean-up processes. The Office was told that the addition of this decontamination component proved successful and will be used as the model for future deployments.

Another example was the collective role the DHPW undertook for this event. Staff were pre-deployed, with up to 100 staff deployed at the peak of this event.

The DHPW provided support to residents of 235 social houses in Townsville (160 houses uninhabitable as a result of the event). This included providing ongoing advice and reporting to disaster management groups (local, district and State) and establishing and resourcing a housing recovery hub in Townsville that assisted more than 450 people.

It also supported the return of 760 affected State Government assets to operational status within two months of the event. In addition, the DHPW processed \$30 million worth of grant applications, 805 Emergency Housing Assistance Response applications, assisted 1,818 Townsville residents requiring housing assistance, and conducted 239 assessments to validate Structural Assistance Grant applications.

*Drone-eye view of the QFES 'flexible habitat' complex at Reid Park in the Townsville suburb of Railway Estate on the southern shores of Ross Creek.*

*Queensland Fire and Emergency Services*





## » Resourcing, coordination and deployment

DHPW also facilitated the rapid establishment of temporary accommodation camps for Queensland Rail workers and contractors in the north west (i.e. Julia Creek 128 beds, Richmond 60 beds) in collaboration with local councils and businesses to support a hastened recovery of the damaged rail line and submitted close to 200 situational reports for the whole event. All of this was undertaken whilst conducting normal business activities.

From a deployment and pre-deployment perspective, other State agencies effectively mirrored DHPW's approach.

Queensland Health deployed an additional 91 staff across clinical, public health and mental health professions to the Townsville and Central West regions. The Queensland Ambulance Service (QAS) deployed an additional 62 staff to Townsville and attended 105 weather-related incidents.

The Queensland Reconstruction Authority (QRA) deployed damage assessment staff to assist QFES, technical experts and recovery officers to assist councils.

The Queensland Fire and Emergency Services (QFES) deployed 877 additional staff (224 from State Emergency Service, 292 from Rural Fire Service, 332 Fire and Rescue personnel and 29 other QFES personnel) across Mount Isa, Charters Towers, Ayr, Townsville and Ingham with SES staff undertaking nearly 5,000 tasks.

The Queensland Police Service (QPS) deployed 308 of its staff to Townsville (not including about 50 personnel who assisted with cleaning QPS staff houses). QPS deployed staff were selected based on required skill sets (e.g. disaster management, staff welfare, water police, criminal investigators, general duties and marine mechanic).

Throughout this event the QPS addressed a 25 per cent increase in emergency response activities, 15 per cent increase in Triple Zero calls and 10 per cent increase in calls for service. In Townsville City alone the QPS experienced approximately 2,500 (14 per cent) additional calls for service across this event.

Townsville City Council deployed more than 80 trucks and 52 council crews to support the community and other responding agencies during the floods

Within the Townsville LDCC approximately 28 local council staff worked on a 24-hour basis as part of its communications team, and an additional 30 staff worked in the council's call centre on a 24-hour basis. More than 800 council staff worked a 24-hour roster to ensure essential services provided by the local council were reliable (e.g. water, sewage treatment, waste facilities and roads), and that other disaster related services were available (e.g. evacuation centres, shelters and sandbags).

The council also oversaw more than 700 jobs conducted by not-for-profit entities were overseen (e.g. Combined Churches, Team Rubicon and Samaritan's Purse).

*Aerial view of one of the temporary accommodation camps established by DHPW in the north west to support railway repair and reconstruction crews.*

*Department of Housing and Public Works*





**160**  
SOCIAL HOUSES UNINHABITABLE

**450**  
PEOPLE ASSISTED AT HOUSING RECOVERY HUB

TSV RESIDENTS  
NEEDING HOUSING  
ASSISTANCE  
**1818**

**760**  
STATE GOVERNMENT ASSETS  
RESTORED TO OPERATION  
WITHIN TWO MONTHS

**188+**  
TEMPORARY BEDS FOR  
WORKERS & CONTRACTORS

**239**  
STRUCTURAL ASSISTANCE  
GRANT ASSESSMENTS

INCREASE IN CALLS  
**15%**  
**2500**  
ADDITIONAL CALLS  
FOR SERVICE IN  
TSV CITY ALONE

**360**  
ADDITIONAL  
FRONTLINE  
+ SUPPORT  
STAFF : TSV

**62**  
ADDITIONAL STAFF  
WEATHER-RELATED  
INCIDENTS ATTENDED  
**105**



**800+**  
COUNCIL STAFF ON 24HR ROSTER



Deployment and servicing  
offered by agencies.



COMMUNICATIONS + CALL CENTRE TEAMS



**58+**



**700+**  
JOBS BY  
NOT-FOR-PROFIT  
ORGANISATIONS



**80+52**  
TRUCKS + CREWS DEPLOYED BY TOWNSVILLE CITY COUNCIL



## »» Resourcing, coordination and deployment

Some recovery agencies, such as DAF, also took the step of deploying additional staff into areas at an early opportunity and as the event was unfolding in the response phase. By doing so the agency placed itself in a forward position to initiate recovery activities at the earliest opportunity. This action demonstrated an increased understanding and maturity of their respective roles, including the need for increased intelligence, readiness, planning and preparedness for an event and the ability to transition to recovery more quickly when staff are *in situ*.

However, agencies should be aware that they are not acting as a response agency when pre-deploying staff in this way. They are preparing for relief and recovery. To better educate staff around this concept, benefits would be gained from providing more internal training and conducting exercising with other agencies in the response phase of the disaster to prepare for the Recovery Phase.

Ensuring the safety and wellbeing of staff being deployed into a disaster area, especially when the disaster is still occurring, is a priority for all agencies. Whilst it is positive to observe recovery agencies pre-deploying staff and resources early, planning to do this safely should be considered by all recovery-based agencies.

For example, DAF identified this as an area for enhancement as one of their staff, deployed to a community in the Cape during the event, reported using a small boat to cross a high-flowing flooded river.

The Office observed that disaster coordination centres worked effectively in prioritising multiple activities to meet community needs and disaster coordinator expectations.

The Office also found that, generally, local, district and State disaster management groups worked collaboratively in line with Queensland's disaster management arrangements.

The Office also observed evidence of agencies adapting and improvising to overcome barriers.

As an example, QPS utilised ADF high clearance vehicles for flood evacuations of trapped residents in Townsville when other vehicles were already exhausted. These vehicles were ideal for the role they played and were operated by highly-skilled ADF officers.

Formal and informal relationships were utilised to meet service delivery. As an example, there was a need to provision major food stores to towns and cities in north Queensland. Coles and Woolworths worked collaboratively with LDMGs and DDMGs, TMR and QPS to undertake an escorted convoy of food trucks from Brisbane to north Queensland.



**Empty dairy cabinet in a Townsville supermarket: a coordinated resupply effort from Brisbane was made.**

Queensland Ambulance Service

**Street rescue conducted by an Australian Army Light Armoured Vehicle (ASLAV) in Townsville.**

Queensland Police Service





## Resourcing, coordination and deployment

Under the council-to-council support program, originally recommended in the 2012 Flood Commission of Inquiry, assistance was provided during disaster response operations. Over several weeks local councils and the Local Government Association of Queensland (LGAQ) contributed 25 staff to affected councils at Townsville, Flinders, Richmond, McKinlay, Cloncurry and Winton.

Leadership was demonstrated with clear aims and objectives being set and decisions communicated in a timely manner. In Townsville there were clear decisions and directions being provided from LDMG and DDMG leaders relating to public warnings and evacuation timings. The chair of the Richmond LDMG provided clear direction for fodder drops to ensure environmentally-safe fodder was provided to primary producers in the correct manner.

Liaison officers were appointed and performed the roles required of them.

As an example, the Energy Queensland liaison officer in the Townsville DDMG provided advice and support to the Local Disaster Coordinator and District Disaster Coordinator around de-energising and re-energising households in flooded communities for safety of emergency service personnel.

Agencies utilised a ready force of trained staff from across the State and interstate to deploy extra capacity to the north, as well as support State level operations (e.g. SDCC). The pre-deployment and deployment of QFES, QAS and QPS staff to the north reinforced a sense of safety for some community residents throughout the affected areas.

The Department of Communities, Disability Services and Seniors (DCDSS) employed its Ready Reserves program using a contingency of volunteer staff released from Queensland Government agencies to support its recovery activities. As the Ready Reserves program is reliant on State government staff that volunteer to assist, it remains vulnerable to having sufficient depth of volunteers to adequately perform its function and to volunteers being released from their respective home agency.

Ready Reservists have access to online training and have 'just in time' training provided prior to or during each event to ensure they are prepared to carry out their respective roles.

State government agencies are encouraged to promote this program, and to release staff in a timely way to enable them to perform vitally important disaster relief and recovery activities (including release for associated training and exercising during 'peace time'). During this event the Ready Reserve workforce was supplemented by staff from interstate jurisdictions which provided several deployments of trained reservists.

### Finding 26

**Agencies that responded most effectively had invested significant effort to ensure persons deployed have been previously identified, trained and had opportunity to build relationships with stakeholders.**





## Australian Defence Force and Defence Assistance to the Civil Community

Over recent years, the Australian Defence Force (ADF) has been involved in a number of natural disaster relief efforts across Australia and internationally.<sup>134</sup> Since 2008, the ADF has assisted in Indonesia, Samoa, Tonga, Fiji, Papua New Guinea and Haiti, as well as Gippsland, Numurkah, Wagga Wagga, South East Queensland, Bundaberg and Townsville.<sup>135</sup>

The history of Townsville has been shaped by the presence of Defence and is regarded as Australia's largest garrison city. Townsville hosts four major Defence establishments:

- Lavarack Barracks
- RAAF Base Townsville
- Townsville Field Training Area
- Port of Townsville's Berth 10 (designed for the Royal Australian Navy).<sup>136</sup>

The ADF is an essential part of the economy in Townsville with permanent presence being a key stimulus for the city's growth.<sup>137</sup>

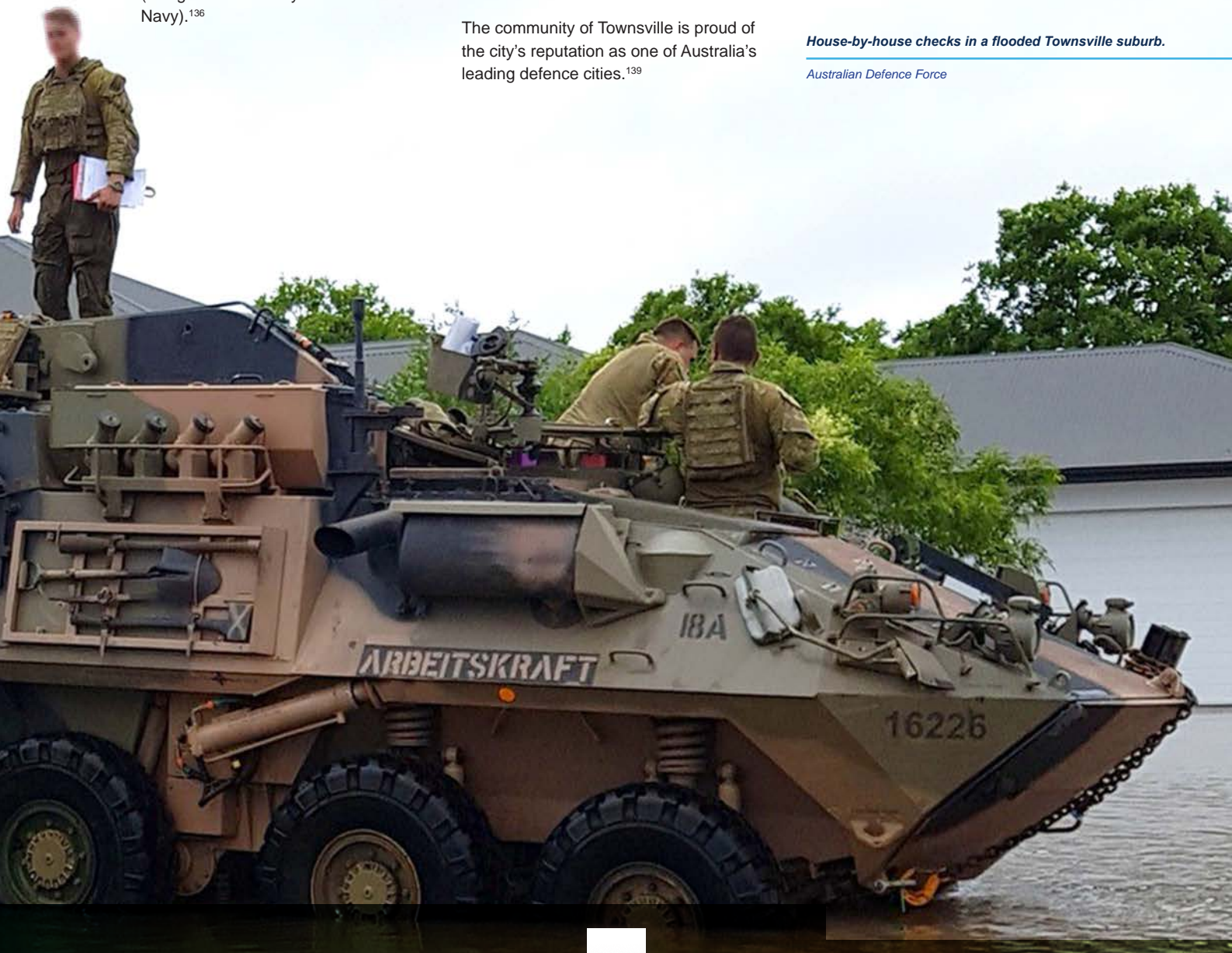
It is estimated that there were approximately 7,500 defence force personnel based in Townsville in 2017. Defence personnel and their dependents account for approximately eight per cent of Townsville's population.<sup>138</sup>

The community of Townsville is proud of the city's reputation as one of Australia's leading defence cities.<sup>139</sup>

**'The ability for servicemen and their families to interact within the community of Townsville was an important aspect in planning (the barracks) ...'**<sup>140</sup>

*House-by-house checks in a flooded Townsville suburb.*

*Australian Defence Force*



## Defence assistance to the community

Federal government support via Emergency Management Australia (EMA), is available if a jurisdiction has exhausted all its government, community and commercial options.

EMA maintains COMDISPLAN, which governs federal non-financial assistance to Australian states and territories in an emergency or disaster. COMDISPLAN includes provision of assistance from the ADF.

The ADF can also directly provide local emergency assistance without recourse to COMDISPLAN, for up to 48 hours.<sup>141</sup>

More extensive Defence Assistance to the Civil Community (DACC) assistance may then be formally requested through EMA if a state government can find no alternative or immediate sources of assistance in an emergency or disaster.

### DACC Process in QDMA

Defence Assistance to the Civil Community (DACC) is the arrangement where the Australian Defence Force (ADF) can assist the community with the response to disaster events. The ADF may provide assistance to the community following a request for DACC.

DACC can be requested by either local, district or State groups and is made via the QDMA Request for Assistance process to the SDCC. Once DACC requests are approved by the State Disaster Coordinator, the request is submitted to the Attorney-General, EMA.

The three categories of DACC utilised within QDMA are:

#### Category 1 – Local Emergency Assistance

Category 1 is managed locally where requests are directed to the ADF Local Commander.

Emergency assistance for a specific task(s) provided by the Senior Australian Defence Force Officers/Unit Commander/Administrator, from within their allocated resources, in localised emergency situations where immediate action is necessary to save human life, alleviate suffering, prevent extensive loss of animal life or prevent widespread loss and damage to property. Duration of assistance shall normally not exceed 48 hours.<sup>142</sup>

#### Category 2 – Significant Emergency Assistance

Category 2 requests can be initiated by either local, district or State groups.

Emergency assistance, beyond that provided under DACC 1, during a more extensive or continuing disaster response directly related to saving human life or alleviating human suffering or preventing the loss or damage to property when State/Territory resources are inadequate.

This may include short term recovery activities during the transfer of tasks to local and State recovery agencies in the immediate aftermath of an emergency. Duration of assistance shall depend on nature, scope of emergency and available resources.<sup>143</sup>

#### Category 3 – Emergency Recovery Assistance

Category 3 requests can be initiated by either local, district or State groups.

Emergency assistance associated with recovery from a civil emergency or disaster, which is not directly related to the saving of life or property that involves longer term significant recovery activity, such as reconstruction of the physical infrastructure and the restoration of emotional, social, economic and physical wellbeing.

Duration of assistance shall depend on nature, scope of recovery effort and available resources.<sup>144</sup>



## ► What was expected

The Office would expect to find that there is knowledge of the various support arrangements available to Queensland, including which ones are appropriate to the need, what they provide and who is authorised to make requests for assistance. Documented arrangements would be known, and pre-existing relationships would support a coordinated and responsive outcome for the community.

The Office expected to find requests for ADF assistance are made via the RFA process to the SDCC and DACC requests follow existing protocols and procedures, as well as Queensland's disaster management arrangements, with accurate records of DACC requests maintained.

It would be expected that requests for assistance would be based on evidence of identified risk, community need and known capacity limits. The arrangements would facilitate deployments to Queensland, of people and assets that match the skills, roles and standards requested.

*Army vehicles with a QPS liaison officer aboard made welfare checks in flooded Townsville streets.*

*Queensland Police Service*



## ► What was found

The COMDISPLAN was activated early by EMA 'in anticipation of requests for Australian Government assistance in support of the Queensland Government' in response to significant rainfall and flooding throughout northern and central Queensland. EMA deployed a Liaison Officer to the Queensland SDCC from 2 February 2019, by which time there were major flood warnings for the Flinders, Cloncurry, Ross, Herbert and Haughton Rivers.

COMDISPLAN states:

**Before a request is made under COMDISPLAN a jurisdiction must have exhausted all government, community and commercial options to provide that effect.<sup>145</sup>**

The ADF is an advisory member on the Townsville LDMG. Defence personnel are committed to working with the Townsville City Council to protect the community, evidenced by their attendance, in conjunction with the council, at a three-day *Queensland Disaster Management Training Framework* course in August 2017.<sup>146</sup>

During this event, ADF established an internal taskforce and began providing support to flood affected areas in northern Queensland. In accordance with DACC arrangements, a request for assistance was made to the SDCC on 2 February 2019 for Defence personnel and assets.

In Townsville, ADF liaison officers were embedded in the LDCC to support the response operation and provide assistance with intelligence products. During a Townsville LDMG meeting, it was identified that assistance with evacuation efforts would be required due to the area forecast for impact. While ADF had not been involved with planning of the Townsville LDMG Evacuation Sub-plan, they supported QPS with targeted evacuations. Teams of QPS and ADF personnel door knocked at-risk properties and provided community warnings and messages for residents to evacuate.

On 7 February 2019, a request for assistance was made through the Townsville DDCC. As local QPS resources were at capacity, ADF personnel were requested to assist with welfare checks of flood inundated properties.

While the Office heard coordination of ADF resources and assets worked well, there remains an opportunity to further strengthen the support ADF can provide by including key personnel in the development of LDMG and DDMG plans and sub-plans (e.g. evacuation).

The Office also heard that the ADF assisted with the supply and distribution of sandbags, established a supplementary evacuation centre at the Lavarack Barracks gym, manned established evacuation centres, and provided fuel to an aged care facility at risk of generator failure.<sup>147</sup> In recovery, Defence also assisted with bulk waste disposal.

The Office heard evidence that the support provided by ADF personnel to the Townsville LDMG was extremely useful. ADF resources deployed to assist the Townsville City extended beyond those capabilities in the LDMGs and DDMGs. However, the Office heard both positive and negative accounts of the process to request assistance through the DACC arrangements. While the process ensures assistance is requested and provided through Queensland's disaster management arrangements, doing so from start to finish can take vital time, particularly for DACC 2 and 3 requests. Many State and Commonwealth agencies have pre-existing and ongoing relationships with the community in which they operate which can result in the ability to provide timely on-the-ground support.



## Defence assistance to the community >> What was found

Despite many Defence personnel losing their own homes in the Townsville floods, they continued to help the city get back on its feet.

**‘I put it to the back of my mind and tried not to think about what was happening ... there were people who needed our assistance more, so we had to put our stuff aside, so we could help the community ... I was very happy that we were out there to help our community, we put the community first.’<sup>148</sup>**

While the ADF is a large part of the community in Townsville, they were mindful that, if prioritised by DDMGs, they would also support other local government areas. ADF personnel were prioritised to assist and support parts of north west Queensland. Approximately 150 personnel assisted graziers in Richmond, McKinlay, Cloncurry and Carpentaria to sustain livestock cut off by floodwaters. Three helicopters delivered more than 41 tonnes of livestock feed to McKinlay and Cloncurry Shires. The Royal Australian Air Force delivered 500 sets of personal protective equipment to Cloncurry, McKinlay, Richmond, Winton and Flinders as well as fuel to flood-affected communities.<sup>149</sup>



### Finding 27

**The successful outcomes achieved in response and early relief measures were in no small part due to the engagement, effort and professionalism of the Australian Defence Force personnel involved.**

The Office heard that ADF support was well received by local governments as Defence personnel assisting were advised that the ADF was there to support operations with the lead remaining with the LDMG.

The Office was told that where DACC arrangements required rapid implementation, as was the case in Townsville, pre-planned coordinated arrangements and operational tasking between the ADF and other agencies would have greatly enhanced the timely provision of support and services. This would complement the ADF approach of “sustains, improves, fixes.” Enhanced pre-planning could be applied to a range of support tasks from sandbagging to mobility support for police and paramedics. Aside from enhancing the provision of timely support and expertise by the ADF, the pre-planned arrangements could also form an integral part of improved out-of-season collaborative exercising.

### Finding 28

**The ‘freedom of action’ afforded to the Australian Defence Force commander resulted in timely and effective deployment of personnel and equipment to best suit the task at hand.**

Notwithstanding the identified need for an increased level of pre-planning, the Office also heard that the ADF Townsville brigadier was given “freedom of action” under the arrangements, allowing flexibility to respond and undertake the role of providing support and expertise as, when and how required.



## Defence assistance to the community >> What was found

Rather than work only to a strictly prescribed set of tasks and activities, the ADF was provided a degree of flexibility to undertake priority and time critical operations, by an appropriate person. The freedom of action approach for ADF support should be encouraged for future events.

Within the civilian context of disaster management, the concept of “freedom of action” supports the notion of having appropriately trained and equipped individuals supported by the delegation of authority to enable them to make critical decisions and commit resources. This approach is equally applicable regardless of the phase of the event and promotes and supports community outcomes, potentially in a more responsive manner.



*An Army CH-47 Chinook helicopter becomes airborne at RAAF Base Townsville with a load of fuel drums for western airports and isolated properties.*

Australian Defence Force

*RAAF C-27J Spartan A34-006, a twin-engined transport/cargo aircraft of 35 Squadron, on the apron at Richmond Airport, with its aft ramp doors opening to unload a cargo of personal protective equipment (PPE). Behind, the crew of privately-owned Bell UH-1H Iroquois VH-UHE stands by to begin onwards delivery flights across the north west.*

Australian Defence Force / Queensland Police Service

*The Queensland Ambulance Service and ADF representatives shared a joint operations room in Townsville, seen here at 2.12pm on 13 February 2019.*

Queensland Ambulance Service



### Finding 29

There is a risk of over reliance on, or expectations of, Australian Defence Force availability in terms of both capability and capacity. There are many factors domestically and internationally that may influence this availability.

### Recommendation 9

Greater emphasis be placed on pre-planned and pre-determined arrangements between the Australian Defence Force and state and local agencies.





*Personnel at RAAF Base Amberley, west of Brisbane, on 5 February 2019 prepare the first sortie of C-17A Globemasters loaded with 70 tonnes of supermarket items, perishable food and fresh produce for delivery to Townsville.*

*That evening, C-17A serial A41-213 unloaded its cargo on a wet Townsville Airport apron the airport had briefly closed to civilian traffic from the evening of 3 February; and reopened on the morning of 5 February 2019.*

Australian Defence Force

A41-213

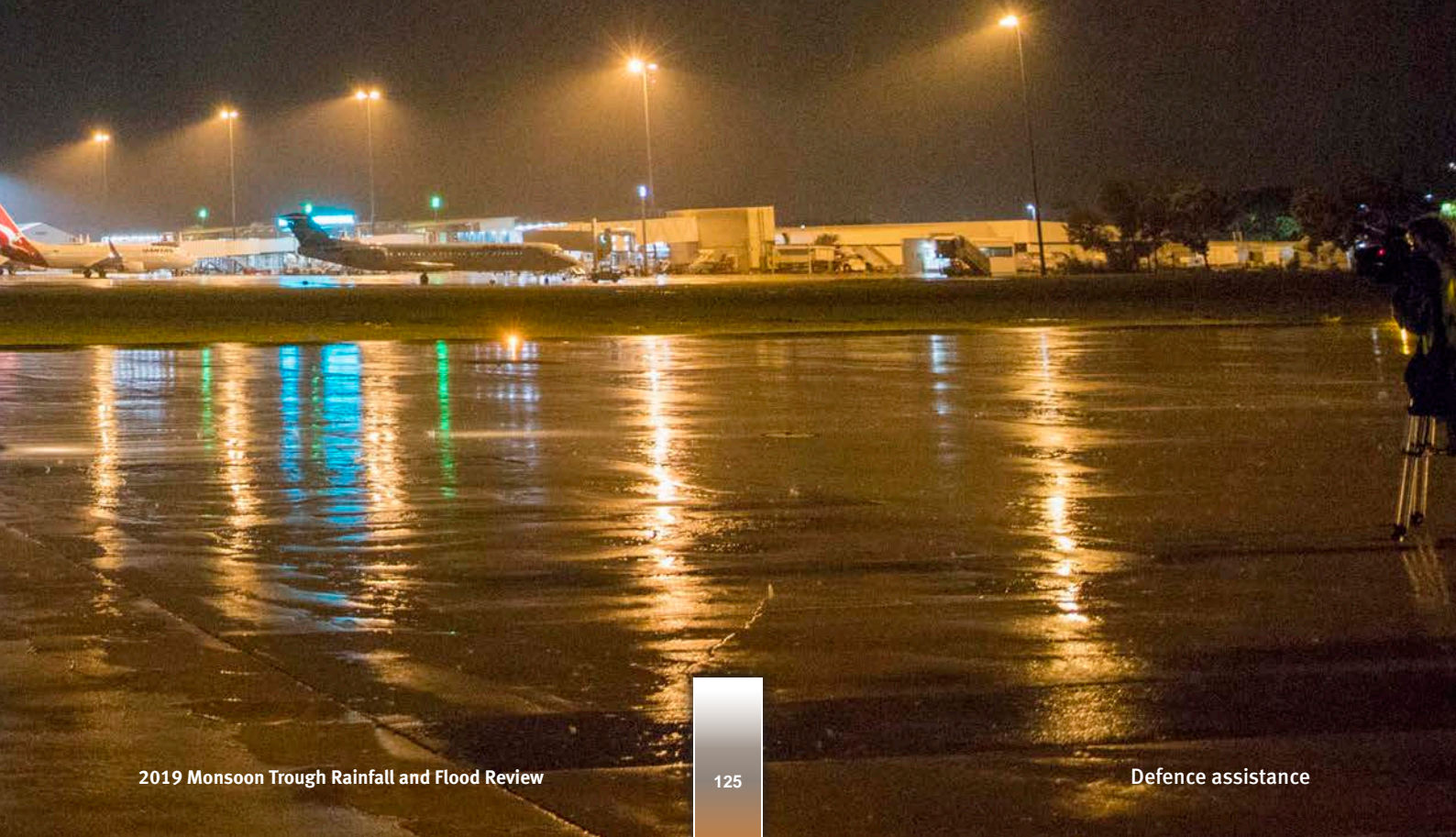






*The deteriorating conditions at Townsville Airport on 3 February 2019 are clearly shown in this view of an Army MRH-90 helicopter being loaded with bottled water for the isolated town of Cungulla, 70km south east of Townsville at the mouth of the swollen Haughton River.*

Australian Defence Force





## Evacuation

### ► What was expected

The Office's consideration of expectations in the Preparation and Planning phase found evacuation plans and contingencies in Townsville were well placed, especially for cyclones and storm tides. For the Response phase, the Office expected to see those with evacuation-related roles and responsibilities would have the required skills and knowledge, developed through training, exercising and a lessons management function, to promote continuous improvement.

It was also expected that planning would involve key stakeholders and address known hazards and risks, identify priorities and responsibility for performing functions. The closure of evacuation centres needs to be coordinated and planned between all relevant agencies and included within the transition from response to recovery. Specific plans and activities around the evacuation of the vulnerable in the community should be enacted during disaster events.<sup>150</sup>

It was also expected that support persons and agencies for identified vulnerable persons (e.g. aged, young, disabled, non-English speaking, tourists/visitors, Indigenous and the homeless) enacted plans and worked collaboratively to ensure their safe and managed evacuation to suitable locations.

### Finding 30

**The actions of Energy Queensland staff during assisted evacuations provided increased safety to evacuees and responders.**

### Recommendation 10

**Energy Queensland and Local Disaster Management Groups consider establishing formal arrangements that embed measures that assist evacuation plans to increase levels of safety.**

### ► What was found

The decision to evacuate is significant and carries risk to both those being evacuated and those managing the evacuation.

Evacuation became a key component of the response phase for Townsville City in this event. Approximately 8,000 residences were impacted in Townsville with several thousand persons evacuated from their homes. Australian Red Cross reported that 2,490 evacuees were supported across five evacuation centres in Townsville City during the event.

The Office found that Townsville City was the most significantly impacted area for evacuations in this event. Flinders local council did open an evacuation centre, but the centre was not required to provide actual support to anyone as evacuated residents utilised support from friends, neighbours or family.

For Townsville City, the evacuation of thousands of its residents during the Monsoon Trough event was a major response activity which was very distressing for many of the evacuated residents. To the credit of all those involved in this activity, the mass evacuation of these residents was undertaken successfully with no loss of life.

The Townsville LDMG already had in place an evacuation and transport sub-plan which it enacted for this event. Its Evacuation Sub-Group was activated and a senior ranking QPS officer was placed in charge of its operations. The decision to advise residents to self-evacuate was based on intelligence developed utilising rain forecasts and flood models. Due to the changing weather conditions and associated forecasts these models were regularly revised, with new evacuation timings and zones developed as a result. Based on pre-prepared scripts, a series of community warnings and evacuation alerts were disseminated to target identified flood zones and their residents. This was supported by door-to-door messaging undertaken by QPS and ADF staff.

To aid the Evacuation Sub-Group in its role, the Townsville LDMG health sub-plan was activated. This was used to identify and target evacuation messaging to vulnerable persons residing within the identified evacuation zones. Additionally, the Townsville LDMG Shelters and Evacuation Centre sub-plan was enacted, with a total of six evacuation centres being utilised in Townsville (including one centre within the ADF Townsville Lavarack Barracks for ADF staff and families). Due to the unprecedented rainfall and flood levels most of the designated evacuation centres were unavailable for use, and as a result, designated cyclone shelters were utilised instead.

Unfortunately, many residents failed to heed the evacuation alerts and warnings. Based on intelligence gained within the Townsville LDCC, a determination was made by the chair of the Townsville LDMG to commence assisted evacuations of residents stranded in flooded buildings. With the use of ADF amphibious vehicles and local council heavy trucks, hundreds of residents were assisted with their evacuation from flooded residences by QPS and ADF staff. QFES also undertook many assisted evacuations utilising their swiftwater rescue capabilities. This was in addition to the 65 lives saved in the Monsoon Trough event from actual swift water rescue tasks.

To enable improved safety for both evacuees and rescuers, Energy Queensland proactively de-energised low-lying areas in advance of flood waters. Additionally, Energy Queensland staff partnered with QPS and ADF personnel involved in the evacuation process by deactivating networks to prevent any possible chance of injury, as well as preventing damage to buildings from electricity ignition/sparks.



Townsville evacuation centres were well managed by the Australian Red Cross, with assistance from QAS, QPS and QH. QPS provided assistance in managing community safety in the centres, as well as recording evacuees through the *Register.Find.Reunite* platform. QAS and QH provided public health support to evacuees. Evacuees praised these agencies for their hard work and management of these centres in difficult circumstances.

Evacuation centres in Townsville were closed in a progressive manner as evacuee numbers declined and alternate accommodation was sourced. It was found that as evacuation centres were closed, remaining evacuees were transferred to other evacuation centres. The Office found that some evacuation centres were arguably closed prematurely, with evacuees being placed in other centres that were already close to full capacity. This created additional tension and discomfort in these centres and placed increased pressures on those managing them. It was also found that increased information sharing and consultation with Australian Red Cross and other stakeholder agencies, such as DHPW, around the managed closure of evacuation centres could have been improved. This would have reduced the pressure on finding alternate temporary accommodation for evacuees being removed from evacuation centres.

As disasters do not discriminate it is possible in an event that evacuation centres will accommodate a diversity of community members. Consequently, having measures in place to best support a varying demographic of evacuees is important. Agencies and groups who traditionally provide social services within the community would benefit from enhancing their plans to encapsulate persons from varying demographics.

The Office acknowledges that some of these evacuation centres were contained in school facilities and there were pressures to close these centres as soon as possible to enable the schools to re-open. It is therefore understandably important to get the balance right between the need to support evacuees and enable schooling to re-commence.

The Office also heard that there is an opportunity to enhance community messaging around plans to support the evacuation of pets and animals within impacted areas in Townsville. Lessons learned from previous events indicate that some residents will not evacuate without their pets.

Currently Townsville City Council have a no pets policy at evacuation centres. It is acknowledged that Townsville City Council did have plans for pet evacuations and safekeeping however this planning related to impacts other than flooding, such as storm tides and cyclones.

The Office also noted that storage facilities identified for evacuated pets by Townsville City Council were unavailable due to the high flooding levels.

Ultimately, it is the responsibility of owners to plan for the safety of their pets in disaster events, including the planning of alternative accommodation for pets. However, the Office believes that LDMG evacuation planning should also consider plans for sudden evacuations of pets and alternative storage options for all identified risks, including flood events.

The Office also believes that greater community education around pet owners developing their own pet management plans for disasters would be advantageous. This should contribute to lessor pressures on LDMGs and other stakeholders (e.g. Royal Society for the Prevention of Cruelty to Animals) to manage pets in disasters.

As mentioned earlier in this section, the Office found evacuation plans and contingencies in Townsville were well placed, especially for cyclones and storm tides. However, the uniqueness and enormity of the Monsoon Trough event has subsequently identified opportunities for learnings and improvements related to riverine flooding and evacuations.



*Not everyone could be reached by the many community messaging channels but help was still at hand.*

Queensland Police Service

### Finding 31

**Improved planning for the managed closure of evacuation centres will deliver benefits to evacuees and those responsible for managing these centres.**

### Recommendation 11

**The Department of Housing and Public Works should be included within Local Disaster Management Group evacuation centre planning and plans and assist with decision-making around the relocation of evacuees from evacuation centres.**

## Education

**On 31 January 2019, all 56 State government schools in Townsville and surrounding areas were closed, with coordinated messaging to families for approximately 20,850 students affected at the peak of the Monsoon Trough event.**

Under policy, school principals for State governed schools have the authority to close schools. The decision by Principals to close schools takes into consideration the condition of the school and the safety and wellbeing of staff and students. For this event, the decision to close the State governed schools in the Townsville district was elevated to Deputy Director-General level.

This process was undertaken as some principals in Townsville were unable to access their schools to assess their condition. Information provided to DoE members via the DDMG and LDMGs indicated access to schools was hampered by flooding, with the safety and wellbeing of staff and students at risk should they attempt to attend school.

Based on this information the Deputy Director-General decided to close the schools in Townsville. This decision was made in consultation with the North Queensland Regional Director, and, the Director-General for the Department of Education (DoE) informed by information provided through the Queensland Disaster Management Committee.

DoE was mindful of the community recovery benefits from re-opening schools at the earliest opportunity, however returning students to a safe and healthy school environment was a higher priority.

Upon safe access being obtained, principals inspected their respective schools. Where required, rapid damage assessment was conducted through the DHPW. Damage was repaired and included mould removal. State schools were re-opened by principals upon completion of repairs and certification by DHPW. These activities became part of an already extensive workload placed on that agency by this event.

The Office was told that although some schools were initially cleaned at an industrial grade, the mould returned within 24 hours, and they needed to be re-cleaned. It was found that as a result of this process State schools re-opened at different times in Townsville and it was not uncommon to see several schools in the one street not open at the same time.

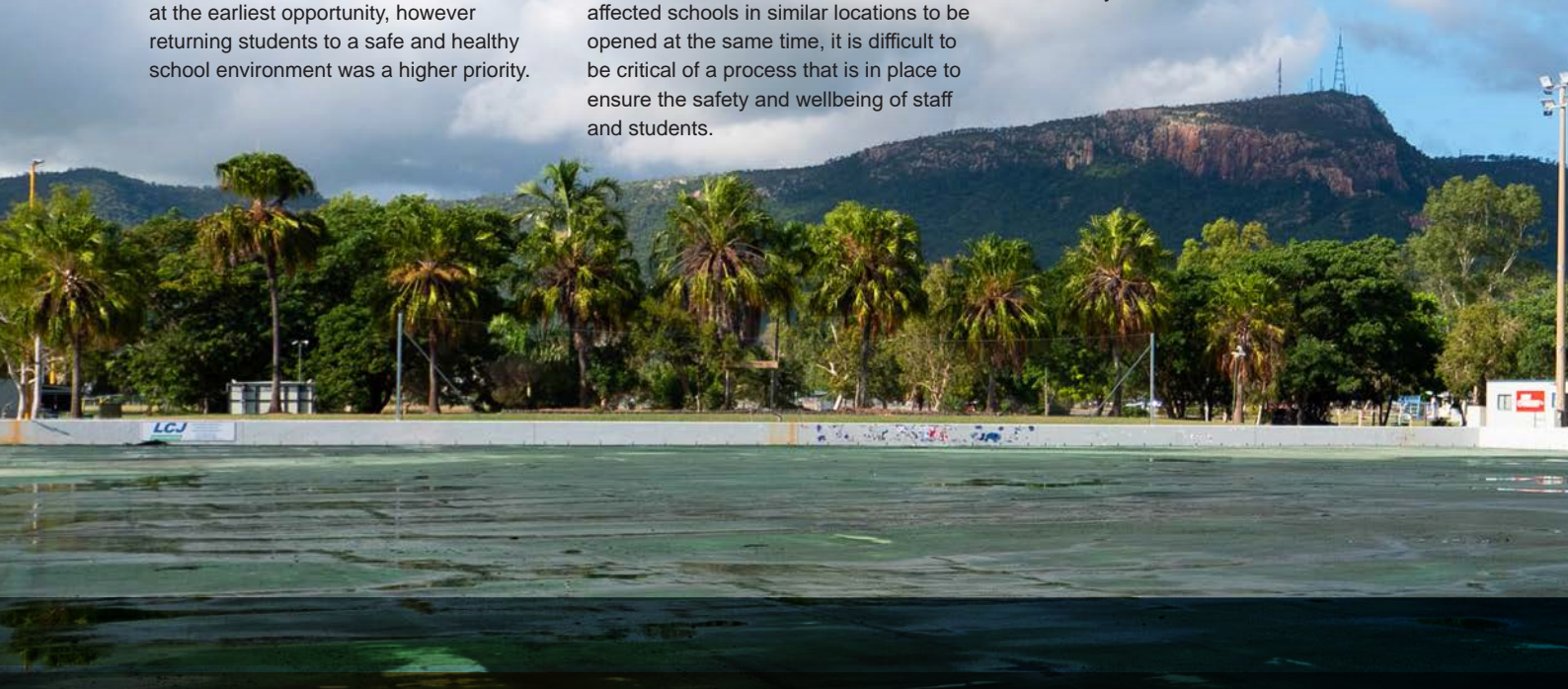
Oonoonba State School was the most impacted school in this event, having sustained one and a half metres of flood water through it. As a result, this school required the longest repair period, with students housed at a nearby school for two months while repair works took place.

DoE re-opened affected schools through a progressive and controlled process. While it may have been ideal for all affected schools in similar locations to be opened at the same time, it is difficult to be critical of a process that is in place to ensure the safety and wellbeing of staff and students.

With respect to the Catholic Education schools within the Townsville Diocese the Office found that some different practices occurred around the closure and opening of their schools for this event. The closure of Catholic Education schools requires the approval of the Executive Director for the Diocese. This decision is undertaken in consultation with school Principals. As with DoE schools, the decision to close schools is based on the safety and wellbeing of staff and students.

For large-scale disasters where multiple schools are affected, such as the Monsoon Trough event, Catholic Education will usually follow any decision made by the DoE to close schools, which is what happened in this event. The Office found Catholic schools in Townsville City closed at the same time as the State governed schools.

The decision to reopen the Catholic Education schools in Townsville followed a similar process to that undertaken by the DoE. School Principals inspected the schools and made the decision to open them when and where it was safe to do so. This decision was based on the health and safety integrity of the school facilities and also the safe travel access to the school by staff and students.







**Oonoonba State School at 9:20am on 7 February 2019 after the flood waters receded.**

Department of Housing and Public Works

**Later the same day, members of Joint Task Force 658, from The 3rd Battalion, The Royal Australian Regiment, began assisting with the cleanup of the Oonoonba State School facilities.**

Australian Defence Force

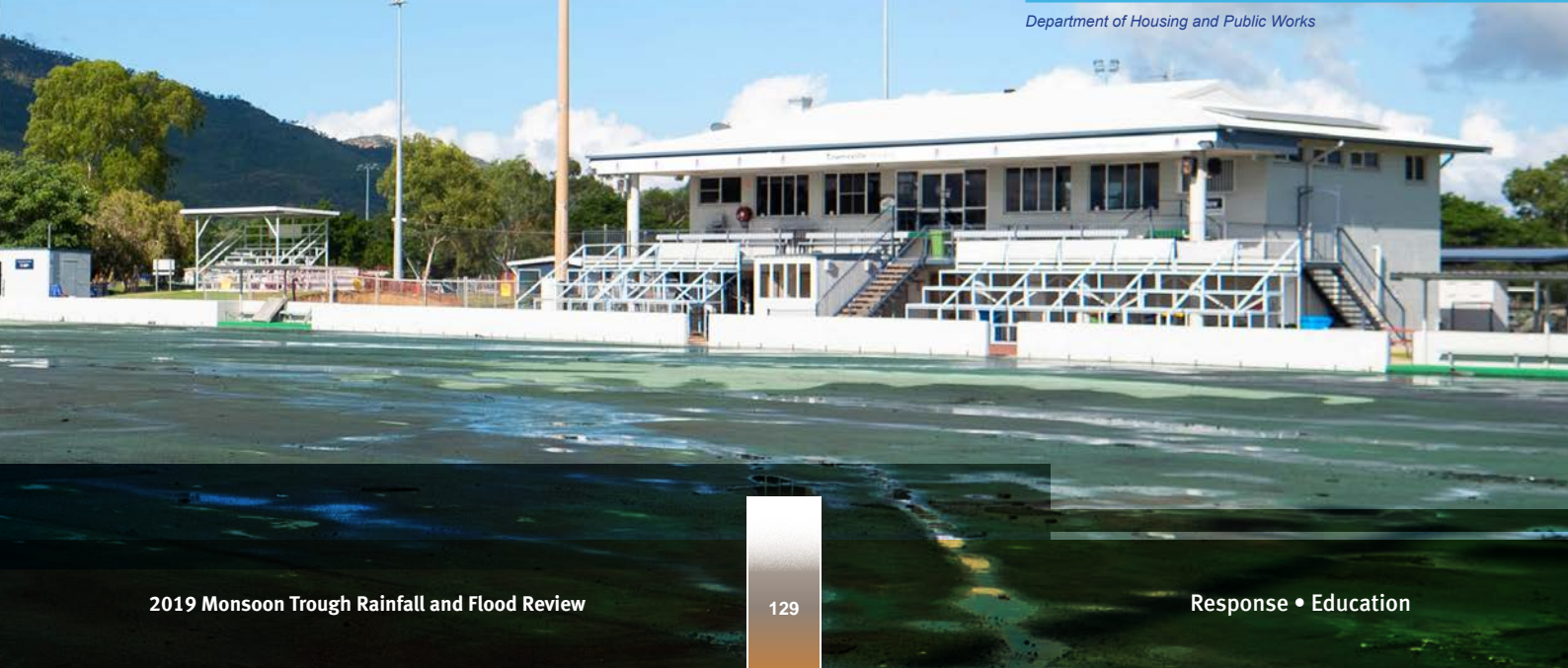


Catholic Education was able to repair and open its schools relatively quickly by engaging directly with multiple local repairers straight away. By opening the schools quickly, the ability for mould to develop was reduced. For the Catholic Education schools in Townsville City only one school was badly affected by this event, with half of the school closed due to flood inundation. The remainder of this school was safe enough to utilise while repairs were undertaken to the damaged facilities.

The Office found that for the first three days that the Catholic Education schools in Townsville City were open, about 60 per cent of students attended. This enabled the schools to portion parts off and undertake mould treatment for the affected buildings. Similar to the Queensland Education schools, mould treatment was required on more than one occasion. This usually occurred after a building or classroom had been left shut and unused for more than one day.

**This view to the south west towards Mount Stuart shows one of the waterlogged playing fields of the Townsville Hockey Association, part of an extensive complex of sporting grounds flanked by the William Ross State High School and the Southern Cross Catholic College in the hard-hit suburb of Annandale on the southern side of the Ross River.**

Department of Housing and Public Works







*Aerial view of a damaged rail culvert five kilometres east of Julia Creek on 8 February 2019, with the Flinders Highway converging above. The inset view, from 5 March, shows some of the track reconstruction works well underway across the north west within one month of the event.*

*Salvation Army Outback Flying Service / Queensland Rail*



## Relief and early recovery

This section considers the phase of relief and early recovery regarding the Monsoon Trough event.

Relief and early recovery activities and arrangements have been considered due to the timing associated with finalising the review. This timing extends from the appointment of the State Recovery Coordinator on 8 February to 29 March 2019.

This section looks at:

- recovery governance in Queensland
- expectations regarding roles, the five functional areas of recovery, plans and operations
- relief and early recovery support to Townsville and north west Queensland
- managing offers of assistance, including donated goods, services and volunteer effort
- federal and State funding policy arrangements.

This section also includes three case studies which highlight good practice and innovation:

- fodder drops and relief in Richmond
- agency collaboration and cooperation for carcass removal in north west Queensland
- biological remediation in the Ross River Dam spillway.



## Overview

Disaster relief is the effort to meet the needs of persons affected by a disaster, to minimise further loss through the provision of immediate shelter and basic human needs.<sup>151</sup> Disaster recovery is defined as the 'coordinated process of supporting disaster-affected communities' psychosocial (emotional and social), and physical wellbeing; reconstruction of physical infrastructure; and economic and environmental restoration'.<sup>152</sup>

Recovery from a disaster is a complex and lengthy process.<sup>153</sup> The time required for a community to recover differs from location to location and is influenced by the context and extent of disaster impacts.<sup>154</sup> Recovery consists of overlapping stages of renewal and adaptation to a new equilibrium.<sup>155</sup> It is more than the replacement or rehabilitation of what was destroyed. It is a complex social and development process providing the opportunity to improve aspects beyond previous conditions.<sup>156</sup> Recovery operations occur across three phases:

Recovery operations occur across three phases:

- phase one: post-impact relief and early recovery
- phase two: recovery and reconstruction
- phase three: transition.<sup>157</sup>

*The three phases of recovery and their inter-relatedness.*

*Queensland Reconstruction Authority*



The focus for this review is on phase one: post-impact relief and early recovery. Post-impact relief and early recovery activities include:

- undertaking impact and damage assessments
- appointing a recovery coordinator
- establishing recovery groups at local, district and State levels
- transitioning from immediate post-disaster response operations to short term recovery operations including the development, planning, consultation and implementation of recovery plans.

The transition from response to recovery in large scale or geographically dispersed events is a process in which response, relief and recovery operations occur concurrently. There will be occasions when relief and response activities are blurred. The reality is that it doesn't matter how particular activities are defined, rather that it is recognised as a priority, planned for and delivered.



## Relief and early recovery ▷ What was expected

### Recovery governance in Queensland

In Queensland, governance for relief and recovery is set up through legislation, plans and frameworks.

The DM Act establishes the legislated requirements for disaster management and disaster operations.<sup>158</sup> It authorises the preparation of plans and guidelines, and the establishment of disaster management groups and the Office, whose functions include the making of standards.

The DM Act has a more specific emphasis on disaster operations than on relief and recovery as a phase of disaster management. Previous work by the Office has highlighted the opportunity for greater clarity of responsibilities for recovery and this should be considered for any future review of the DM Act.

The *Queensland Reconstruction Authority Act 2011* seeks to ensure Queensland and its communities effectively and efficiently recover from the impact of disaster events, and to improve resilience of communities for potential disaster events.

More detail governing recovery is found in the *Queensland Recovery Plan* (Recovery Plan), a sub-plan of the *State Disaster Management Plan*, and a supplementary document to the *Strategic Policy Statement* and the DM Guideline.

The *Queensland Recovery Plan* states:

**Queenslanders have a bias towards resilience. This is borne from our experience and capacity to adapt to our changing circumstances and recover from disasters in a relatively short amount of time. Recovery from disasters is a key component of our pathway to resilience in a disaster context.**<sup>159</sup>

The Recovery Plan aims to harness this bias towards recovery and resilience, by aligning with international recovery frameworks and adopting the principle that successful recovery relies on a community-led approach. The Recovery Plan informs local governments, local and DDMGs, Queensland Government agencies, government-owned corporations, statutory bodies representing the State, NGOs and other disaster recovery stakeholders of good recovery practice that should be employed across all entities during recovery operations and planning.<sup>160</sup>

It was expected that the Premier would appoint an expert State Recovery Coordinator who would ensure the effective coordination of recovery planning and operations for the Monsoon Trough event.<sup>161</sup>

The Office also expected an event-specific State Recovery Plan will be developed for this event, including State Recovery Sub-Plans based on the five broad functional areas; Human and Social, Economic, Environment, Building and Roads and Transport.

In Queensland it would also be expected that the five functional recovery groups would be activated. These groups are responsible for providing resources and support to local and district recovery groups, and for coordinating, linking and facilitating recovery planning, issues management and recovery activities at the State level across the five functional areas of recovery.

## Relief and early recovery » What was expected

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The Office expected that the QDMC would provide strategic direction for this event, including the identification and coordination of State and Commonwealth resources for disaster relief and recovery operations. The Office expected recovery strategies for the Monsoon Trough event to:

- outline effective recovery plans and operations
- recognise potential limitations and constraints in LDMGs
- identify lead and supporting agencies across all hazards
- guide adaptive and scalable recovery operations
- identify mechanisms for coordinating and managing offers of assistance, resources, and volunteers
- inform State level recovery coordination.<sup>162</sup>

The Office expected LDMGs to be responsible for leading recovery efforts in line with the DM Guideline, and that local government would be primarily responsible for managing events in their local government area, with an emphasis on local community-led recovery remaining central to recovery activities.<sup>163</sup>

It is also expected that there would be evidence of a disaster relief and recovery capability within councils in line with the local government functions under the DM Act.<sup>164</sup> It is also expected that there would be targeted and coordinated relief arrangements that ensure the provision of basic services for communities in need.

Relief and recovery arrangements should be coordinated, timely and reflect the urgency of the situation on the ground. It would also be expected that LDMG and DDMGs, in supporting councils, ensure effective disaster management, including plans that provide for successful operational activity.<sup>165</sup>

The community should be at the centre of recovery activities and operations. It was expected that recovery operations would be based on community need and that they were locally-led and coordinated by appropriate agencies and organisations. Ideally, recovery activities support the activities initiated by local communities, improving the community's capacity to cope with future events, working in partnership with community groups and local leaders. The Office also expected to find that relief and early recovery operations would minimise the likelihood of unintended consequences impacting the community.



## Relief and early recovery ► What was found

The recovery from the Monsoon Trough event was in its very early stages when the Office commenced the review. The Office therefore looked at post-impact relief and early recovery of this event.

The Office expects the *North and Far North Queensland Monsoon Trough - State Recovery Plan 2019-2021* will address the need to monitor outcomes, metrics and measures of success regarding the progress of recovery. The Office also expects the implementation of that plan will largely address the recommendations of this report regarding the need to monitor the effectiveness of recovery.

While the monitoring of the implementation of the recovery plan will in part be focused on individual recovery activities and associated metrics, measures and project outcomes, the intent of Recommendation 12 here is to adopt a systematic view to inform future improvements in the Queensland Disaster Management System's approach to recovering from such events.

The unprecedented size, scale and significant impact of this event on Queensland, as outlined extensively in this review, compels the need for a thorough and independent review of recovery for this event.

Recognising that the task will be ongoing for a number of years, it would be pertinent to review progress of this recovery incrementally.

On 8 February 2019, the Premier appointed Major-General Stuart Smith AO DSC (RET.) as State Recovery Coordinator for this event.

For the first time, the CEO of QRA chaired the SDCG when it transitioned from response to recovery. The State Recovery Coordinator established a centre in Townsville to coordinate recovery planning and operations across the affected areas in the north of the State.

Damage and impact assessment activities for affected areas in Townsville were completed in a timely manner, with information being reported back to LDMGs.

### Rapid damage statistics by local government area.

Queensland Reconstruction Authority

| LGA             | Inspected    | Of Damaged:  |               |              |
|-----------------|--------------|--------------|---------------|--------------|
|                 |              | Damaged      | Uninhabitable | Minor        |
| Townsville      | 7,998        | 3,299        | 1,236         | 2,063        |
| Hinchinbrook    | 175          | 29           | 2             | 27           |
| Burdekin        | 83           | 16           | 2             | 14           |
| McKinlay        | 15           | 12           | 9             | 13           |
| Douglas         | 5            | 4            | 3             | 1            |
| Richmond        | 4            | 3            | 3             | —            |
| Palm Island     | 164          | 4            | —             | 4            |
| Cassowary Coast | 7            | 1            | —             | 1            |
| Charters Towers | 6            | 1            | —             | 1            |
| Cloncurry       | 4            | —            | —             | —            |
| Mount Isa       | 3            | —            | —             | —            |
| Whitsunday      | 3            | —            | —             | —            |
| <b>TOTAL</b>    | <b>8,467</b> | <b>3,369</b> | <b>1,255</b>  | <b>2,114</b> |

## Recommendation 12

The progress of recovery for this event be reviewed incrementally over the next 2 to 3 years, with a formal, independent report provided on the effectiveness of the recovery after 3 years.

## Relief and early recovery » What was found

The Office was told that, as impact assessments were occurring in Townsville, and early reports of cattle losses in the north western communities emerged, it was clear to those involved that impacted communities were going to need additional support over a long period of time to recover.

This level of support was needed to cater not only to the number of communities being impacted, but also due to the scale (or extent) of loss to families and communities.

Unique to this event was the collective impact experienced in communities which saw significant damage and losses in north west Queensland. Flinders, Richmond, Winton, McKinlay, Cloncurry and Carpentaria all experienced areas of isolation, inaccessibility and cattle losses due to flooding and exposure. These locations, when grouped together, crossed the boundaries of three disaster districts in north west Queensland. All of these local areas required similar community recovery support and services to be established.

Whilst the option to create a temporary district for recovery through flexible arrangements is legislated under the DM Act, the North Queensland Regional Organisation of Councils provided an existing network and community of practice. This network leveraged established relationships and a regional approach to supporting similarly impacted communities.

The Office found that the Townsville District Disaster Coordinator, Executive Officer and Emergency Management Coordinators were proactive in visiting local council areas.

They regularly met with chairs of LDMGs throughout their district to gain a first-hand understanding of the impacts of the event and to provide support as needed. The Office found that these visits became important in aiding coordination for early relief activities across the Townsville District.

The Office also heard from several local leaders how helpful, and in some cases how reassuring, this was for them as they navigated making critical decisions during a protracted event.

The Townsville DDMG Human and Social Recovery Sub-Group activated for this event to support the LDMGs in providing emotional, social, physical and psychological health and wellbeing services for individuals, families and communities.<sup>166</sup>

The Mount Isa district human and social recovery sub-group was activated by the Mount Isa District Disaster Coordinator. This helped ensure the district recovery plan was considered and that links were made to LDMG and DDMG members. This also enabled the district to increase situational awareness of the human and social impact of the Monsoon Trough event, and services being provided.

This was particularly important in this district, as the human and social recovery DDMG member from the Community Recovery Branch of DCDSS was fully occupied with managing the community recovery activities in Townsville. The appointment of alternative staff and supporting resources was required and provided through the Ready Reserve.

The Human and Social Recovery group comprised of council representatives and recovery partners from the Mt Isa Disaster District and two affected councils from the Townsville Disaster District (Flinders and Richmond). Reports were provided to both District Disaster Coordinators.

The DCDSS advised that support was targeted at the local level and Cloncurry was used as a central base for human social recovery operations for the north west Queensland councils.

Regular verbal and written reports were also provided directly to north west Queensland councils to update them on recovery activities being undertaken within the local government areas and across the regions, including attendance at community engagement events, and engagement by community with local pop-up recovery hubs.

Notwithstanding these efforts, the Office identified opportunities to enhance human and social recovery in the north western areas impacted:

- early communication about roles and responsibilities of human social recovery representatives
- awareness of and enacting local and district recovery plans
- more effective engagement with established members of LDMGs and DDMGs
- a more consistent and ongoing presence of relief and recovery agency representatives. The Office heard that representatives from government agencies often arrived in towns, but only stayed a short while and then left.

Previous reviews have also identified the value of DDMG involvement beyond response to assist with recovery coordination, communication and resourcing.

The DDMG support during the Monsoon Trough event shows the benefits of strong partnerships and provides a good practice approach to be replicated in future events.

The Office identified that opportunity exists for DDMGs to be more involved in supporting LDMGs in recovery. The Office observed levels of expertise, situational awareness, prioritisation and support could be provided by DDMGs to enhance local recovery operations.



## Relief and early recovery &gt;&gt;&gt; What was found

Additionally, District Recovery Groups can assist in achieving the strategic recovery objectives set by the State Recovery Coordinator and supported by the QDMC and SDCG.

The Office found that most local recovery plans were activated in a timely manner, with local recovery groups establishing their functions in the early stages of recovery. The Office observed that some LDMGs were slower in understanding the need for, and implementing, an event specific recovery planning process. In these cases, the groups were still ascertaining local needs for relief and recovery, including the level of impact and appropriate recovery activities and services that would be required.

It was found that, with support from the Townsville DDMG, local recovery approaches within the Townsville District were similar to those initiated by Hinchinbrook Shire Council in 2009 where a locally-led recovery approach, supported by other agencies, assist disaster-impacted members of the community to recover quickly, effectively and remain sustainable.

These approaches also incorporate development strategies within disaster recovery to enhance the resilience of all sectors of the community for subsequent disaster events.

Relevant work in this recovery area by the Office shows that the Hinchinbrook Recovery Plan has emerged as the benchmark for recovery plans for the LDMGs. Its governance structure is based on four recovery pillars; human-social, economic, built environment, and natural environment.

It was evident to the Office that some local recovery groups had never experienced or planned for an event like this. In some cases, groups were hampered by limited capability and capacity to deal with relief and recovery activities of this scale.

Resourcing, planning, training and exercising were all identified as areas where opportunities for improvement exist. The need for extensive planning, including the depth of resourcing required to maintain an operation of this size for an extended period, are all potential opportunities for future focus. It is noted that at the time the Office undertook its review, QRA officers were actively engaging and assisting local governments to develop their local recovery plans.

The most effective local recovery groups were found to have strong plans in place, including MOUs, service contracts and other arrangements with non-government agencies, state organisations and other stakeholders.

This level of preparedness and planning and investment in the development of capacity and capability of LDMG members were vital in effectively establishing disaster relief and recovery.

The Office found evidence of supportive council-to-council assistance occurring. This included councils outside the affected areas providing staff and resources to the most impacted council areas.

For example, Sunshine Coast and Redland City Councils sent two staff members each to assist Richmond and Flinders Shire Councils.

This demonstrated the strong relationships between local leaders in Queensland, as well as across the disaster management sector.

Prearranged agreements and good support were provided by Local Government Association of Queensland (LGAQ). LGAQ was active in providing direct support to local councils including providing LGAQ staff to assist Cloncurry and McKinlay Shire Councils.

LGAQ also enabled additional fly-in resources with relevant disaster management experience and other council expertise to support impacted councils with business as usual operations.

### Finding 32

**Local Disaster Management Groups and District Disaster Management Groups functioned best when agencies were able to provide consistent locally based attendance.**

### Finding 33

**Agency planning should consider the identification of the depth of resourcing required for protracted and complex events. This should include the provision of suitably trained, equipped and experienced personnel to support Local Disaster Management Groups as required.**

### Finding 34

**Some Local Disaster Management Groups required additional support beyond existing planning to develop effective relief and early recovery planning and operations.**

*Cattle gathered on the only high ground for kilometres in all directions on 8 February 2019: the rail line embankment near Julia Creek.*

*Salvation Army Outback Flying Service*



## Relief and early recovery >>>> What was found

The Office found initial relief efforts were sound overall and targeted communities and individuals who were most in need. Relief was delivered in a timely manner with good cooperation and coordination between agencies and disaster management groups. The Office heard many examples of agencies developing innovative solutions, when faced with extremely challenging situations, to provide initial relief and early recovery efforts across affected areas. A number of agencies highlighted that their relief and early recovery activities were effective because of lessons learned from previous events including early mobilisation as the scale of the event unfolded.

Additional human and social recovery representatives for the Community Recovery Branch of DCDSS were also sourced through the Ready Reserve Program. QH mental health staff, and counselling staff from NGOs including the Australian Red Cross and the Salvation Army, were also in attendance at the Townsville hubs. Relief and recovery hubs and support services established in Townsville included:

- Rental Recovery Hub
- Business Recovery Hub including a Townsville Small Business Recovery Centre
- Community Recovery Hubs
- Community Recovery Hotline
- Emergency Housing Hub
- Community Recovery outreach visits
- Community Recovery Referral and Information Centres.

A community recovery hub is established to provide information, practical support, and to make application for a range of grants offered by government. Recovery hubs have a range of government and non-government agencies attending depending on the event and community needs. A recovery hub is usually established and coordinated by DCDSS to support affected individuals, families and communities.

The Office found that messaging surrounding the hubs and their purpose included social media platforms, established hotlines, multi-media messaging and printed materials.

Coordinating offers of assistance for donated goods and volunteer support proved initially challenging at the local council level in the north western areas. This was due to the lack of established relationships with local councils, and limited community and volunteer support agencies that had experience in disaster events or an existing presence in the region. Organisations such as GIVIT and Volunteering Queensland (VQ) have service models which use local charities and community organisations to coordinate goods, donations and volunteering on the ground. Initial isolation and accessibility issues also impacted this type of service delivery. However, support around donation management from GIVIT has since been taken up by some of the western councils.

## Rental recovery help after the floods

### Do you rent, own or manage a rental property?

Come into our dedicated **Rental Recovery Hub** where you can get coordinated help and advice about:

-  getting homes back on line as soon as possible
-  finding short to medium term rental accommodation
-  preserving tenancies
-  rights and responsibilities
-  dispute resolution
-  property repairs

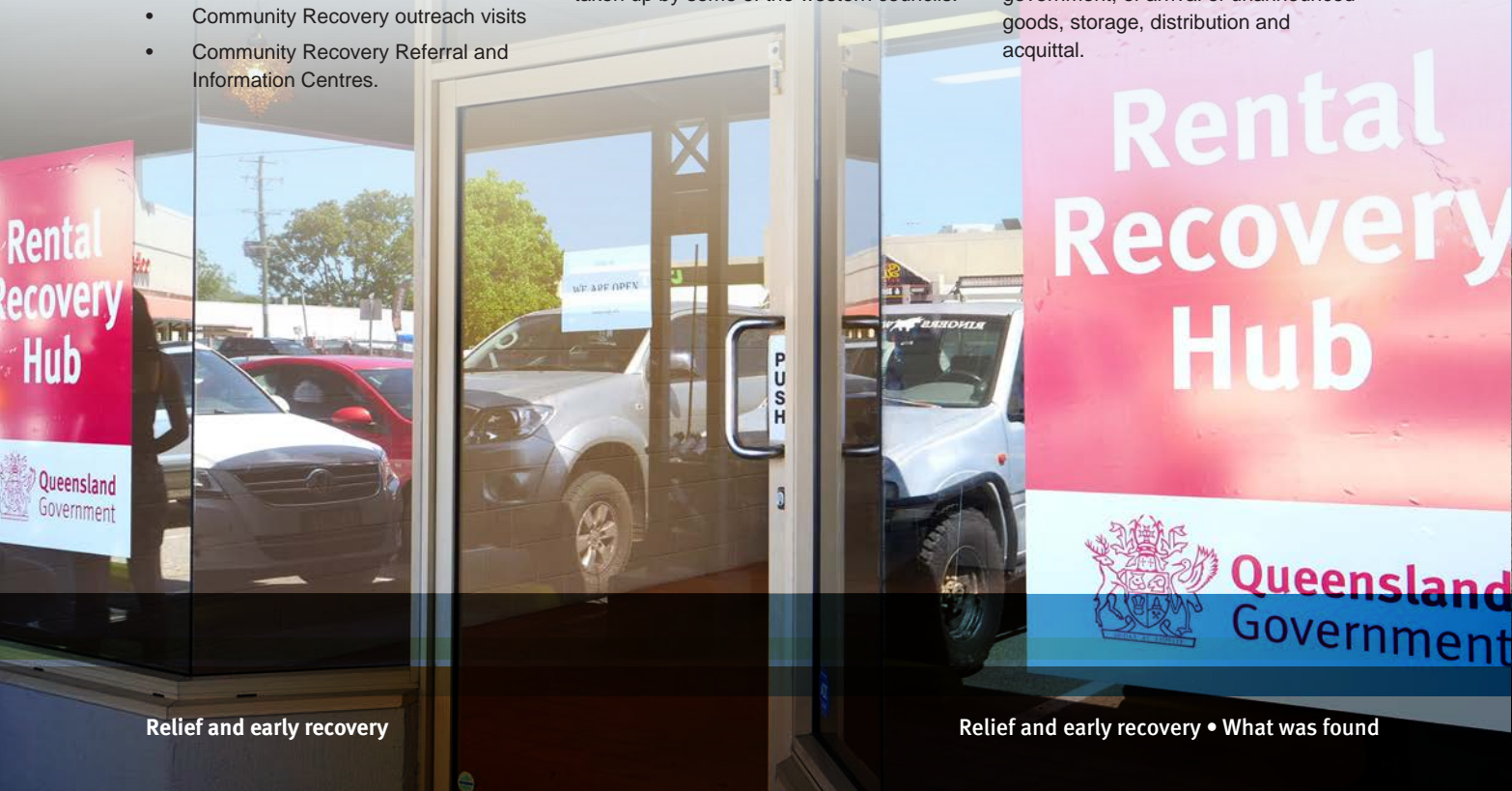
**We're working together**, case by case, with affected renters, owners and real estate agents to quickly resolve housing situations.



**Rental Recovery Hub**  
Rising Sun Shopping Centre  
10-14 Ross River Road, Mundingburra  
Open 10am to 3pm, 7 days a week  
**13 QGOV (13 74 68)**  
[qld.gov.au/alerts](http://qld.gov.au/alerts)



The early stages of relief and recovery saw a significant outpouring of goodwill in the form of financial donations, donations of goods and services and volunteering offers. GIVIT estimated that one month into their efforts they had surpassed the amount of donations received for the equivalent period of Tropical Cyclone Debbie more than tenfold. This is not uncommon. The Office has previously heard that while donations are appreciated and recognised as part of the recovery process, they do pose challenges for the community and local government; of arrival of unannounced goods, storage, distribution and acquittal.





## Relief and early recovery &gt;&gt;&gt;&gt; What was found

Councils, especially in the north west of Queensland, are generally not experienced in managing offers of assistance on this scale. Most did not have plans or arrangements in place with disaster management groups to support prior to the event. Some were able to quickly establish MOUs with community groups to help coordinate goods.

Cloncurry Shire Council took on that role directly, due to a lack of capacity within the town to manage the offers. This created additional work for council, but ensured resources supplied met the needs of the local community.

The Office met with officials from the north western LDMGs who, whilst appreciative of help, were often handling calls for offers of assistance from the general public on their personal phones. It was reported that affected residents were grateful for the aid they received; however, some aid and assistance offered and sent during this event was not requested by locals and not in fact needed by the affected communities.

The unsolicited assistance ranged from trucks of steak requiring cold storage on arrival, to people wanting to travel to the region to help graziers with re-fencing. Other calls came from religious and volunteering groups not established in the impacted towns.

The Office heard that there was a significant effort to organise the transport of hay and donated goods from other areas in Queensland and interstate into affected shires and council areas. This included fodder being driven through drought-affected areas into the region that had not been thoroughly considered in the context of locally based short, medium and long-term recovery needs. While individuals and organisations had good intentions, some local officials raised concerns about the donated fodder including:

- biosecurity (weed infestation and future impact to locally grown fodder)
- local fodder/ fodder already being available on nearby properties
- timing of donated fodder drops due to limitations of local air assets and poor weather conditions.

Local officials advised that a better understanding and coordination of fodder drops, including early liaison with locals, would have helped ensure assistance went to those who needed it most.

For some local officials, key lessons for future events included liaising with affected councils before offers of aid or assistance are provided, as capacity to distribute aid on the ground in affected communities is often limited. Consultation and planning must be a prerequisite to determining appropriateness of aid and assistance.

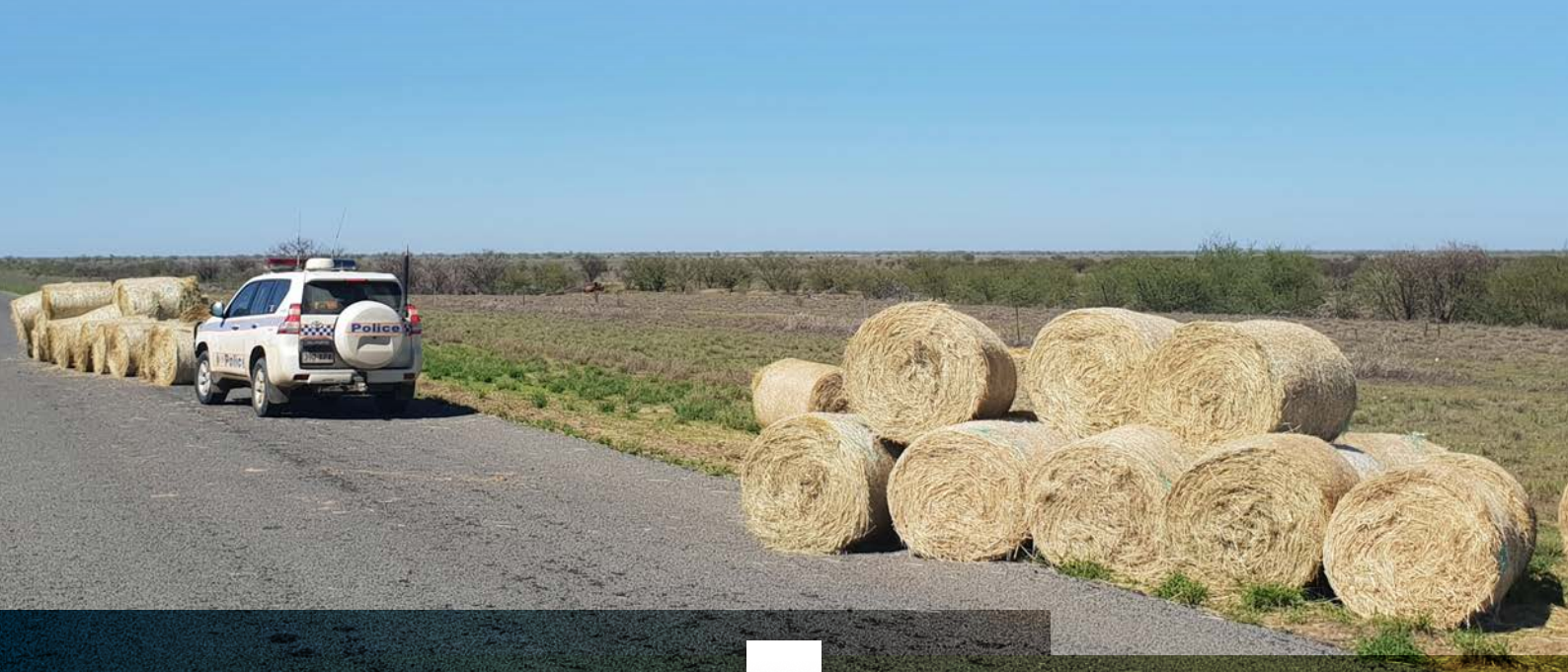
The Office found relief and recovery hubs were established quickly in Townsville and the north west from 4 February 2019, as access became available. This included representatives from State government and local based agencies. 'Pop up' hubs and outreach service centres were established from 14 February 2019 in Cloncurry, Richmond and Julia Creek.

Queensland Health staff travelled with the early outreach centre staff and worked with councils to determine appropriate times to visit regional areas. QH recognised the importance of working with regional councils and health officers on the ground to determine if early mental health support was immediately required.

QH provided a suite of services for regional communities including phone and radio contact support services and scheduled regional visits. As a result of this event, QH has secured funding from QRA for additional mental health clinicians to work in regional Queensland.

*Some of the rolls of fodder distributed along roads throughout the north west, seen here on 12 February.*

*Queensland Police Service*





## Case Study 1

# Richmond fodder drop relief February 2019

*Last light at Richmond Airport at 7.07pm:  
a Robinson R22 hover-taxies to its parking position  
on the crowded apron as another helicopter  
makes its approach to runway 09  
at the end of the day's flying on 12 February.*

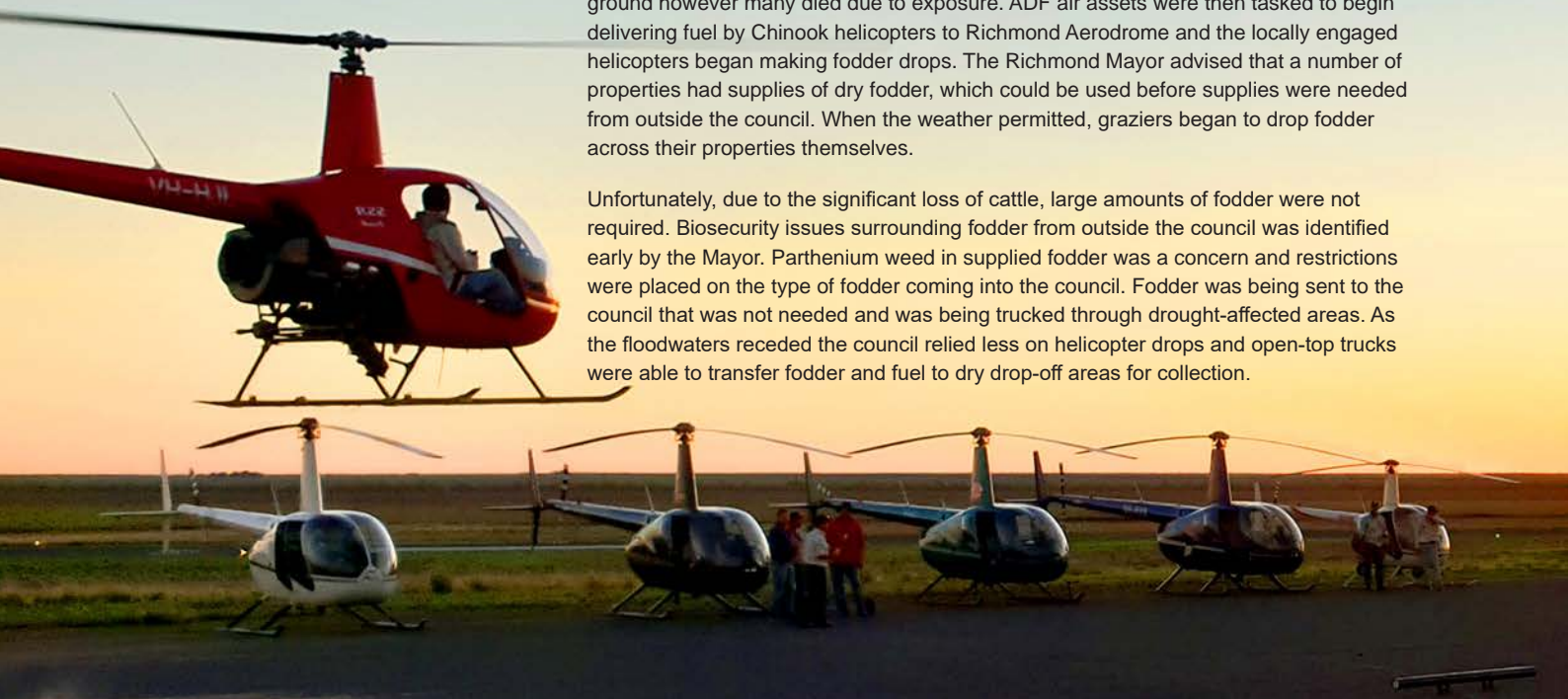
Queensland Police Service

## Understanding and responding to local needs

The Richmond Shire Council LDMG stood up on 1 February 2019, triggered by the increasing flooding event and the closure of the Flinders Highway. Subsequently, LDMG meetings were held over the next two weeks. For those in the Richmond and surrounding councils this was an unprecedented event, and one no-one had ever been through an event like it.

As the flood waters rose, most experienced graziers began to move their stock to higher ground however many died due to exposure. ADF air assets were then tasked to begin delivering fuel by Chinook helicopters to Richmond Aerodrome and the locally engaged helicopters began making fodder drops. The Richmond Mayor advised that a number of properties had supplies of dry fodder, which could be used before supplies were needed from outside the council. When the weather permitted, graziers began to drop fodder across their properties themselves.

Unfortunately, due to the significant loss of cattle, large amounts of fodder were not required. Biosecurity issues surrounding fodder from outside the council was identified early by the Mayor. Parthenium weed in supplied fodder was a concern and restrictions were placed on the type of fodder coming into the council. Fodder was being sent to the council that was not needed and was being trucked through drought-affected areas. As the floodwaters receded the council relied less on helicopter drops and open-top trucks were able to transfer fodder and fuel to dry drop-off areas for collection.



The Mayor also spoke of the devastating scenes that the often quite young pilots were witnessing as they delivered the fodder, noting how these normally resilient and strong young people were clearly being affected by what they were witnessing.

**‘They were essentially first responders to this event.  
It was the first time some property owners had  
encountered someone coming to check on them.  
Often and really only there to drop off supplies,  
the pilots would find themselves helping  
property owners and their families assess  
their levels of damage and loss of cattle.  
The pilots would report in at the end of the day and  
share their experience with [the] Mayor and local council staff.’**

*Truckie Brad Willoughby, QPS Chief  
Superintendent Kev Guteridge and Richmond  
Mayor John Wharton stand by hay collected  
at the Richmond Sale Yards on 9 February.*

Richmond Shire Council / Mayor John Wharton





This helped the LDMG understand the levels of impact and who may be needing more support. It also provided the pilots a chance to connect over a barbeque and “offload” after such long and challenging days. For Mayor Wharton, key lessons were:

#### Effective disaster planning and preparedness

- The Richmond Shire Council had, as part of its seasonal preparedness, called for tenders in 2018 for air drops of fodder and in September 2018 had appointed two local preferred helicopter companies with pre-arranged costs. These suppliers were then used during the 2019 event. Additional helicopter support was sourced through the preferred suppliers.
- In 2018, the council mapped thorough GPS coordinates for every local property including houses in the council and had also recorded all contact details. This became invaluable as the council was able to contact landowners and better coordinate fodder drops.

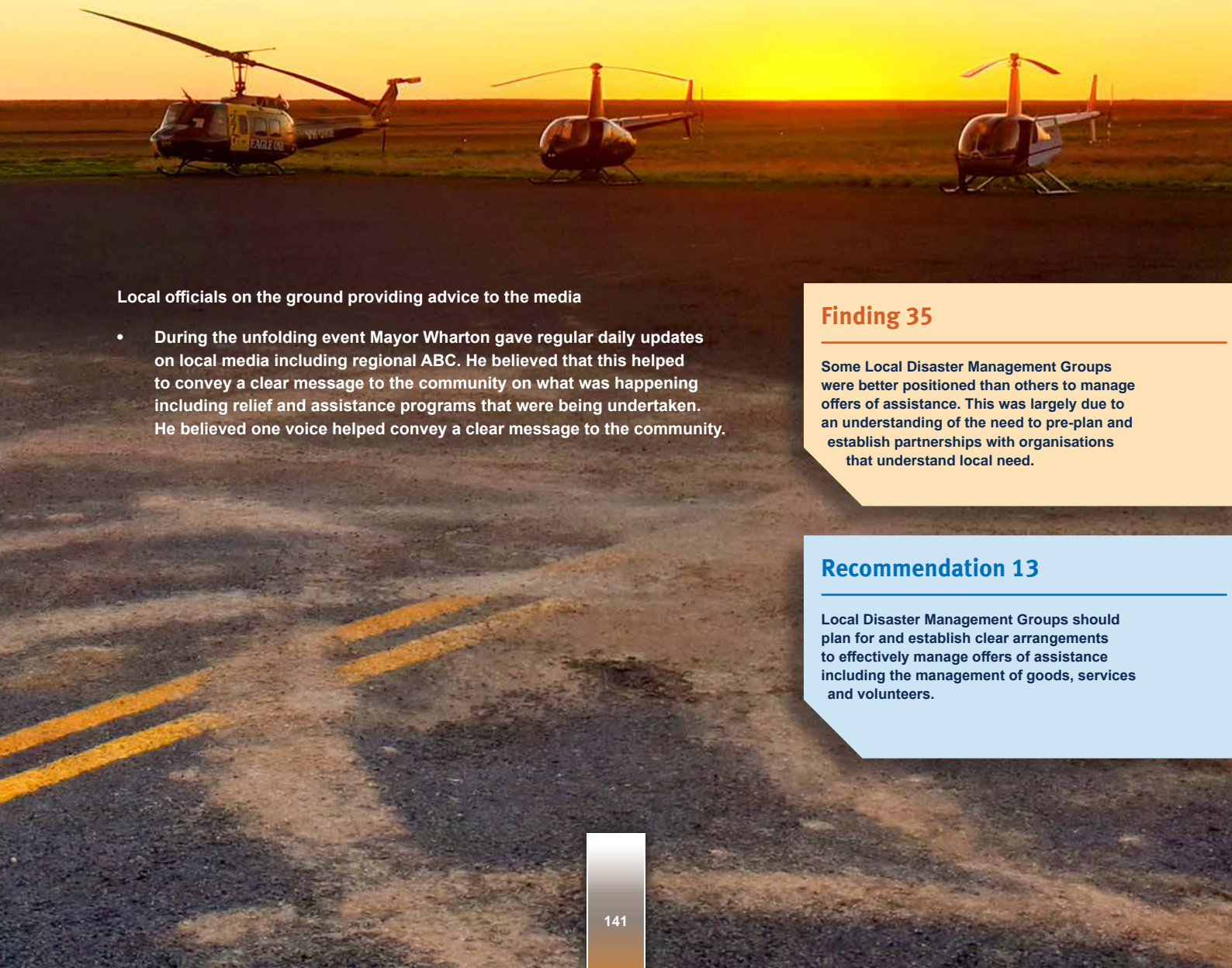
#### The importance of local knowledge and receiving support and assistance that is needed

- Mayor Wharton said that during the telephone conferences with State and Federal politicians he was asked ‘what did he want?’. Because of his knowledge of the unfolding events and the extensive knowledge of his community, Mayor Wharton was able to advise that he needed only aviation fuel. The supply of the fuel enabled the council to manage the initial fodder drops where they were needed. As Mayor Wharton said, ‘We got the support we needed, and no one turned up to tell us how to do it.’



*Together with Julia Creek, Richmond was selected to be a forward refuelling base by the ADF, with heavy-lift transports like this CH-47 Chinook delivering supplies of Jet A1 turbine fuel and Avgas as well as portable fuelling equipment to support property owners’ own helicopters and aircraft in their recovery efforts.*

*Richmond Shire Council / Mayor John Wharton*



#### Local officials on the ground providing advice to the media

- During the unfolding event Mayor Wharton gave regular daily updates on local media including regional ABC. He believed that this helped to convey a clear message to the community on what was happening including relief and assistance programs that were being undertaken. He believed one voice helped convey a clear message to the community.

### Finding 35

Some Local Disaster Management Groups were better positioned than others to manage offers of assistance. This was largely due to an understanding of the need to pre-plan and establish partnerships with organisations that understand local need.

### Recommendation 13

Local Disaster Management Groups should plan for and establish clear arrangements to effectively manage offers of assistance including the management of goods, services and volunteers.



## Collaboration, coordination and Innovation

Recovery activities particularly at the local level benefit from close connection to those managing the recovery, close integration with those agencies responsible for recovery and a collaborative culture in disaster recovery.<sup>167</sup>

Effective collaboration and coordination between recovery entities promotes an integrated approach which will achieve better outcomes and results for the affected community. *‘Each recovery function must undertake recovery activities in the spirit of cooperation, collaboration and integration, with a focus on mutually beneficial outcomes across multiple functions.’*<sup>168</sup>

Individuals are able to share their knowledge and experiences through both informal and formal relationships and lessons management.

These relationships become invaluable when those responsible for developing recovery strategies and responses are faced with situations that have not been experienced before or considered as likely to occur.

The Office heard numerous accounts from those involved in recovery operations that they faced destruction and damage to property, infrastructure and animals on a scale that they had not seen before.

As one senior government official observed:

**‘Although the north-west local councils had plans in place and are well-versed and prepared for disasters, they were still overwhelmed by this event. This was due to the enormity and unexpectedness of it.’**

As another stakeholder involved in recovery suggested:

**‘The number and size of issues we faced meant we had to at times put aside our response and recovery plans.’**

*Fleets of QFES, SES and Rural Fire Service vehicles gathered at the Reid Park operations site in the Townsville suburb of Railway Estate.*

*Queensland Fire and Emergency Services*

The Office heard of a number of examples of government agencies involved in relief and recovery drawing on their professional informal and formal relationships to develop strategies to respond to the unique problems and issues presented by this event.

For example, QH was looking to quickly deploy health clinicians to north west Queensland communities to provide relief and recovery support to isolated regional communities. Air access to the remote communities was the only viable option due to significant damage to roads and rail infrastructure. The Royal Flying Doctor Service (RFDS) was already providing response and recovery support to affected communities across the region. Prior to the event unfolding, the head of the QH Aeromedical Retrieval and Disaster Management Branch and the newly appointed CEO of the RFDS met to explore ways to enhance interoperability and cooperation in disaster management throughout regional Queensland. Shortly after this meeting the flood event unfolded, and both senior managers arranged for the RFDS to fly QH specialists into affected communities. Both agencies are developing more formalised arrangements to support disaster relief and recovery as a result of their successful collaboration and effective response to this event.

Another example included the DHPW recognising during the relief and early recovery stages the potential for a rental shortage in Townsville due to displaced residents having to seek accommodation. Senior managers within the DHPW reached out to their counterparts in peak industry organisations including the Real Estate Institute of Queensland, Rental Tenancies Authority, Insurance Council of Australia and other government departments to establish Recovery Rental Hubs to provide rental assistance advice to affected families. As a result of this cooperation, stakeholders intend to develop more formal arrangements to better prepare for disaster recovery.







*Cloncurry Shire Council Mayor Greg Campbell (centre) briefing Captain Andrew Shone (left), Brigadier Stephen Jobson CSC (Commander Joint Task Force 646, centre) and Queensland Reconstruction Authority Senior Project Manager Richard Peace (right) on flood-affected areas of Cloncurry Shire on 23 February 2019.*

*Australian Defence Force*



## Case Study 2

# Carcass removal, north west Queensland, February 2019

## Agency collaboration and cooperation

North west Queensland is one of the largest regions in Queensland covering more than 200,500 square kilometres, stretching from the Northern Territory border in the west to the Great Dividing Range in the east. The region includes the shires of Flinders, Richmond, McKinlay, Cloncurry and Mount Isa.<sup>169</sup> Agriculture, mining and construction are the three largest contributors to Gross Regional Product within the region. While output from the mining industry dominates exports,<sup>170</sup> beef cattle production is Queensland's largest agricultural industry and plays an important role in the Queensland economy, particularly in the north west region.<sup>171</sup>

For the last seven years, a number of shires in north west Queensland have been experiencing drought conditions including four shires that were fully drought-declared in 2018: McKinlay, Richmond, Flinders and Winton.<sup>172</sup> Graziers in these drought-affected areas had been reducing the size of their livestock (destocking) whilst retaining healthier cattle, weaners (eight to 10-month-old cows) and breeders. As one grazer in the drought affected region observed:

**During this time, farmers have been supplement[ing] their stock with hay and molasses doing what they can to maintain their beloved animals and to preserve their prized genetics.<sup>173</sup>**

As the first rains began to fall in late January 2019, graziers initially viewed this as a blessing, especially in the severely drought-affected shires. However, as the rains continued and, in some areas, more than a year's worth of pre-drought annual rain fell in just a few days, the situation quickly became devastating.<sup>174</sup>

Some sites in north west Queensland received accumulated totals more than four times the February average.<sup>175</sup> The rainfall caused major flooding across Gulf River catchments including the Flinders, Cloncurry and Leichardt Rivers. The Flinders and Leichardt and their tributaries swelled to create a vast inland sea. As one local official observed:

**Some people have lived in this community for a long time and for generations no one has ever seen or been through an event like it. There was no sun. It went more than a metre higher than the 1974 record.**

Due to the large amount, and speed, of the water flowing through the north west region, early stock losses were caused by drowning. After floodwaters began to recede, livestock losses continued due to exposure through a drop in temperature and sustained winds of up to 60 kilometres per hour. Livestock were often trapped in water and muddy ground, continually exposed to the elements.

Graziers drove their cattle to higher grounds however they were exposed to the elements. Cattle that had survived after battling without food and against cold winds were now fighting against pneumonia.

As one AgForce official noted:

**Stock losses will be much higher than normal, because drought-weakened cattle are more susceptible to being caught and drowned in floodwaters or dying of exposure in the wet, cold winds.**

Even as floodwaters receded, damaged roads and inaccessible country due to muddy ground meant graziers were unable to get out to inspect their properties and locate stranded cattle. Often the only way to locate cattle and provide fodder was through air drops. As one local official observed, *'it's still boggy and wet, you can't get anywhere yet. We need things to dry out'*.

The mortality rate is now estimated to be about 500,000 cattle and 30,000 sheep, with approximately 800 properties affected, AgForce estimating the cost to cattle producers would likely exceed \$1 billion. The effects of the event will be ongoing and have caused a huge reduction in breeding stock which will have long-term consequences. Entire generations of genetics have been lost. As well as the death of cattle and sheep, significant loss to farming infrastructure occurred, including estimates of 10,000km of fencing (the distance from Brisbane to New Delhi), 1000km of water pipelines and 15,000km of on-farm roads.

**Cattle struggle up the walls of a dam to escape the floodwaters.**

Department of Agriculture and Fisheries





The economic impact in the affected regions may also be significantly higher when reduced revenue to supporting industries and businesses is considered. Early estimates suggest the economic impact in affected regions will be proportionately higher if backward and forward supply chain linkages are considered (e.g. backward to farm supplies and forward to abattoirs).<sup>176</sup> As one local official observed:

**It is important not to just cost this flood at the value of the stock lost, the multiplier is the value the industry gives to the nation. The downstream effects include jobs, not only in the regions but also in the cities and the export dollars it brings to this country. The ongoing impact will be profound.”**

Due to the significant livestock losses and the wide spread of carcasses, the situation presented unique challenges for local and State authorities including:

- extended time since death resulting in significant decay;
- difficulties in carcass handling due to advanced decay.
- waterlogging of black soils delaying movement of vehicles and machinery;
- reduced availability of relevant machinery in affected areas;
- odour and disease concern due to proximity to urban and residential areas; and
- potential water resource contamination.

Carcass disposal options were further limited due to a number of conditions including remoteness of the affected areas, lack of timber for burning, access to some areas being difficult and potential impacts of improper disposal on the environment, human and other animals.

While a number of options for carcass disposal were considered including burning, composting and rendering, the most practical option in this unique situation was determined to be burial of the carcasses. To support local authorities and graziers on the ground, staff from the Departments of Agriculture and Fisheries; Environment and Science and members of the ADF developed a *Carcass Disposal Fact Sheet*.

Affected shires worked together, establishing a fodder drop group (as discussed in Case Study 1) to support the coordination of support from State and federal agencies. As the cattle losses became more clearly understood, a coordinated effort to support local needs and issues around carcass disposal became apparent.

To reduce the impact on local resources and to share capacity for supporting and servicing impacted communities a collaborative group of local, regional, State and federal entities was established to cater to this.

It was identified by DAF quite early on that it would be of benefit to integrate the fodder and carcass disposal working groups to better coordinate early relief and recovery efforts.

The subsequent merging of the two groups into the North West Recovery Working Group (NWRWG), facilitated a greater level of coordination across the three affected districts in the region and fostered increased cooperation between federal and State agencies and local councils including Cloncurry, Flinders, McKinlay, Richmond and Winton. Federal support included grants to graziers to assist them with carcass disposal and ADF assistance in implementing the *Carcass Disposal Strategic Master Plan*. The NWRWG also ensured advice and support could be provided directly to those on the ground who were managing the carcass disposal.

Reflecting the expanding recovery efforts in the region, the North West Animal Industry Recovery Working Group replaced the NWRWG to facilitate consultation and feedback from the councils across the region. The group also included representatives from all State agencies who were on hand at all meetings to respond directly to issues raised by councils. A major function of the group was to provide local councils with the tools and information they needed to effect recovery. For DAF officials the key lessons from the formation of the regional recovery groups included:

- the scale, size, and geographical spread of the event meant the establishment of the working groups ensured they became the most efficient and effective way to provide support directly to local councils and officials
- groups could provide direct advice and information to a large geographical area and large number of councils at the same time
- resources and assistance could be provided quicker to local councils
- groups were able to be more flexible and adaptable to council needs.

The establishment of the regional working groups allowed for more effective integration of federal and State support and services but local officials were still responsible, through their communities, for leading carcass removal operations. As one senior government official observed; *‘the role of the State agencies was enabling. The doing was done by the locals.’*

*Behind: the vast inland sea between Townsville and Mount Isa, seen from an RAAF C-17 relief flight on 10 February.*

Australian Defence Force



## Case Study 3

# Biological remediation in the Ross River Dam spillway

**Townsville City Council – Disaster Recovery, Biological Remediation and Catchment Priming using Probiotic Formulations. Ross River Spillway Event, February 2019.<sup>177</sup>**

A consequence of the receding water below the Ross River Dam was a large concentration of dead fish contained within the spillway. Townsville City Council staff suggested that 95% of the deceased fish mass was comprised of the noxious fish, *Tilapia sp.* Total deceased fish numbers were estimated by council staff in the field as being upwards of 100,000 and at a weight of approximately 100 tonnes.

Tilapia are an invasive species, 'mouth breeders' and can carry more than 1,000 eggs at a time in their mouths to protect the eggs from predators. In Queensland it is illegal for anyone to have Tilapia in their possession including eating them.

As the fish began to decay, Townsville City Council was required to develop a solution to manage not only the noxious odours but also ensure that the noxious fish did not spread downstream. Clean-up strategies considered included removing the fish to a secondary site for disposal but with the costs of doing this estimated to be well over \$100,000 this was viewed as prohibitive.

The General Manager (GM) of Environmental Services for Townsville City Council, who oversaw the clean-up, began to look at alternative solutions to deal with the dead fish. One method considered was the use of probiotics to rapidly decompose the large volumes of dead fish. The GM had previously used probiotics to aid in decomposing vegetation matter post-flooding, however its effectiveness on decomposing fish and animal products was not known.

A number of local organisations began working with the Townsville City Council to plan how best to dispose of the rotting fish including Ecocentric Services (environmental consultants) and VRM BioLogik, which prepared the probiotic treatment. To spread the prepared treatment, Townsville City Council crews worked with a local metal fabrication company to modify a hydrovac truck, (normally used for excavation of earth by using high pressure water and a powerful vacuum) to allow for rapid application and extended use of the products.

Over a four-week period, the various organisations were able to administer a combination of biological treatments to manage odours, accelerate biological decomposition of the fish, reduce risks of spreading noxious fish, significantly reduce clean-up costs, improve water quality prior to release of water downstream and ultimately convert approximately 100 tonnes of putrefying noxious fish into a positive environmental outcome.

## Finding 36

Agencies often relied on informal interpersonal relationships to develop innovative solutions to overcome significant challenges in managing relief and recovery activities.





Day  
3

*Progressive treatment of the spilling basin beneath the Ross River Dam wall began with the sprayed application of a probiotic agent on the near-solid mass of dead tilapia (background photo, day 1); within three weeks the decontaminated water could be released downstream.*

*Townsville City Council*



Day  
9



Day  
16



Day  
19



## Managing Volunteers and Spontaneous Volunteers

Volunteers have been a long-standing way to boost capacity for disaster management, particularly at the local level. Volunteers can provide support to disaster affected communities, aid in building community resilience and can assist with disaster response and recovery.<sup>178</sup> Volunteers are characterised as:

- Trained volunteers – individuals formally affiliated with an emergency service organisation or NGO, and act under their respective organisations' direction and authority.<sup>179</sup>
- Spontaneous volunteers – individuals and groups are motivated, often because of traditional and social media coverage, to assist disaster-impacted communities.<sup>180</sup>
- Potential spontaneous volunteers – individuals or groups of people who seek or are invited to contribute their assistance during and/or after an event, and who are unaffiliated with any part of the existing official emergency management response and recovery system and may or may not have relevant training, skills or experience.<sup>181</sup>

Spontaneous volunteers can and have contributed significantly to a range of important activities in the immediate aftermath of a disaster, including first aid and the assessment of community needs including search and rescue. As the International Federation of Red Cross and Red Crescent Societies have emphasised, 'the success of relief efforts by those spontaneously offering their help depends on the capacity of agencies and authorities to integrate them quickly and effectively into a coordinated strategy.'<sup>182</sup>

Effective volunteer management requires a strong understanding of the local area and how and where volunteers should be deployed. Effective planning including developing pre-existing arrangements will greatly assist with the coordination of affiliated and spontaneous volunteers, including ensuring proper registration, supervision, training and insurance activities are undertaken and completed.

In Queensland, Volunteering Queensland (VQ) is the peak body for managing offers of help from spontaneous volunteers in times of disasters. They also offer a service that matches the offers of spontaneous volunteers with the needs of councils and other agencies seeking extra support. VQ manages the *Emergency Volunteering - Community Response to Extreme Weather* (EV CREW) service to recruit, register, roster and deploy volunteers, including locally-registered spontaneous volunteers with locally-based partner organisations.

Risks can arise when spontaneous volunteers are not properly managed; including arrival in affected towns that are under-prepared for post-disaster conditions with a lack of suitable accommodation, food supplies, safety or work equipment and appropriate matching of skills and experience and adequate training for roles to which they may be deployed.<sup>183</sup> Further risks may arise when volunteers are not suitably covered or protected by insurance. To minimise risks, it is important that local arrangements include effective management of spontaneous volunteers prior to an event.<sup>184</sup> Collaborative planning assists in managing the expectation of community involvement in disasters. Registering and managing offers of help from volunteers enables this.<sup>185</sup>



## Managing Volunteers and Spontaneous Volunteers

There are mixed views on who or what organisation/s are best placed to manage spontaneous volunteers. Councils have varying capacity to manage volunteers and may enter into agreements including MOUs with external agencies, without fully appreciating the full implications involved in effective volunteer management.

Townsville City Council, for example, had established an agreement with an external NGO to manage volunteers during disasters including clean-out of houses and some environmental clean-ups. This NGO was deployed and tasked for this event under the direction and control of the LDMG. Several other local groups also registered spontaneous volunteers on the ground in Townsville outside of this arrangement.

The Office heard of strong neighbour-to-neighbour support for recovery efforts in Townsville. This was supported by a strong presence by the ADF and volunteer groups, State agencies and NGOs in recovery activities.

The Office heard that there were different organisations involved in registering spontaneous volunteers in Townsville. This impacted on the centralised rostering of spontaneous volunteers and establishing early spontaneous volunteering operations. The Office heard some volunteer organisations involved in recovery operations in Townsville did not have the capacity to, and were not prepared for, managing significant numbers of spontaneous volunteers. A representative from VQ was later invited to Townsville to provide support to organisations working with spontaneous volunteers and assisted in the deployment and management of spontaneous volunteers.

In 2018, the Office identified that the Townsville DDMG would benefit from strengthening 'clarity of roles and responsibilities and the development of formal agreements and contracts' with relief and recovery stakeholders and suppliers. The Office further observed:

*As external groups may be utilised to undertake these tasks, it is important they are aware of their obligations, are appropriately skilled and qualified to deliver as required within the arrangements and can work collaboratively with each group. The Office saw little application of the Queensland Policy for Offers of Assistance and support guidelines.<sup>186</sup>*

The management of Offers of Assistance would have been more effective in this event if stronger relationships, plans and arrangements between local councils, volunteer groups and peak bodies, such as VQ, had been established prior to this event. The Office also believes that lessons learned from the management of spontaneous volunteers for this event should be considered in future disaster recovery planning and preparedness.

### Finding 37

**Local spontaneous volunteers could have been better managed to make the best use of their time and skills and to leverage community involvement to meet local community needs.**

### Recommendation 14

**Councils should formalise arrangements with entities that have the skills, capability and capacity to effectively manage spontaneous volunteers. These should be documented and integrated into planning and exercising.**



## Federal and State funding policy arrangements

Queensland has been impacted by numerous disaster events often resulting in large-scale expenditure by governments in the form of financial schemes, loans and grants to assist the recovery and reconstruction of impacted communities and essential infrastructure.

The Queensland Government, via the QRA, administers two disaster relief and recovery funding arrangements:

- **Disaster Recovery Funding Arrangements (DRFA)**, which outline the agreed Australian Government and State Government cost sharing arrangements that may be activated following an eligible disaster to provide assistance to impacted community members, small businesses, not-for-profit organisations, primary producers, local governments and State government agencies.

- **State Disaster Relief Arrangements (SDRA)**, a wholly State-funded program that may be activated for all hazards and provide assistance where personal hardship and distress is experienced following the impact of a disaster event. The Queensland Government SDRA are published at [www.qra.qld.gov.au](http://www.qra.qld.gov.au)

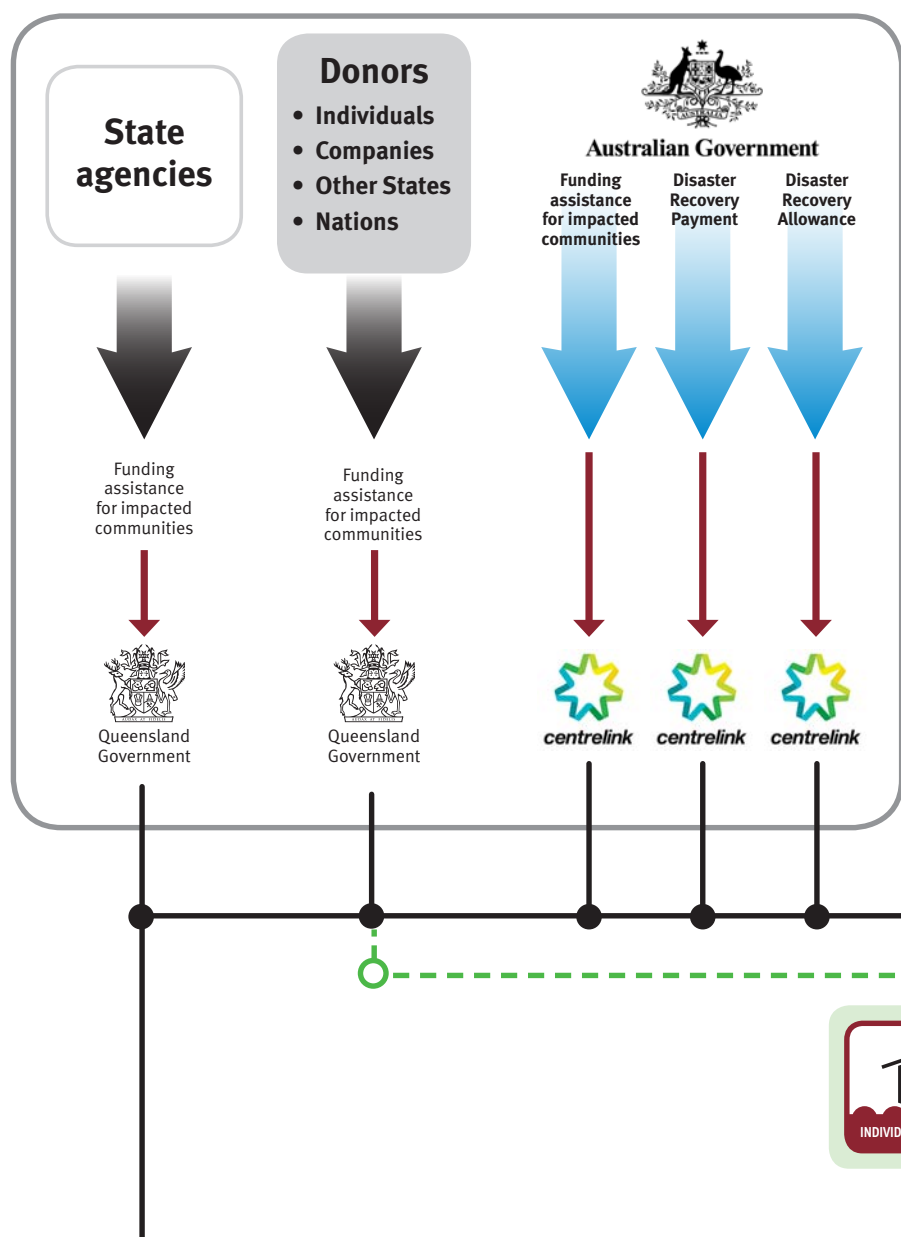
This does not prevent a range of other types of assistance and support being provided to communities impacted by disasters in Queensland. This is particularly important for large scale complex events such as the Monsoon Trough event. The complex and cascading impacts of this event has required significant support for disaster-affected individuals and communities.

There is a wide range of assistance provided to communities impacted by disasters in Queensland, including funding by both the State and Commonwealth.

The adjacent graphic seeks to break down, simplify and visually outline individual elements involving State and Commonwealth funding assistance in Queensland. A more detailed written outline and explanation of this graphical outline of funding assistance follows.

# Queensland

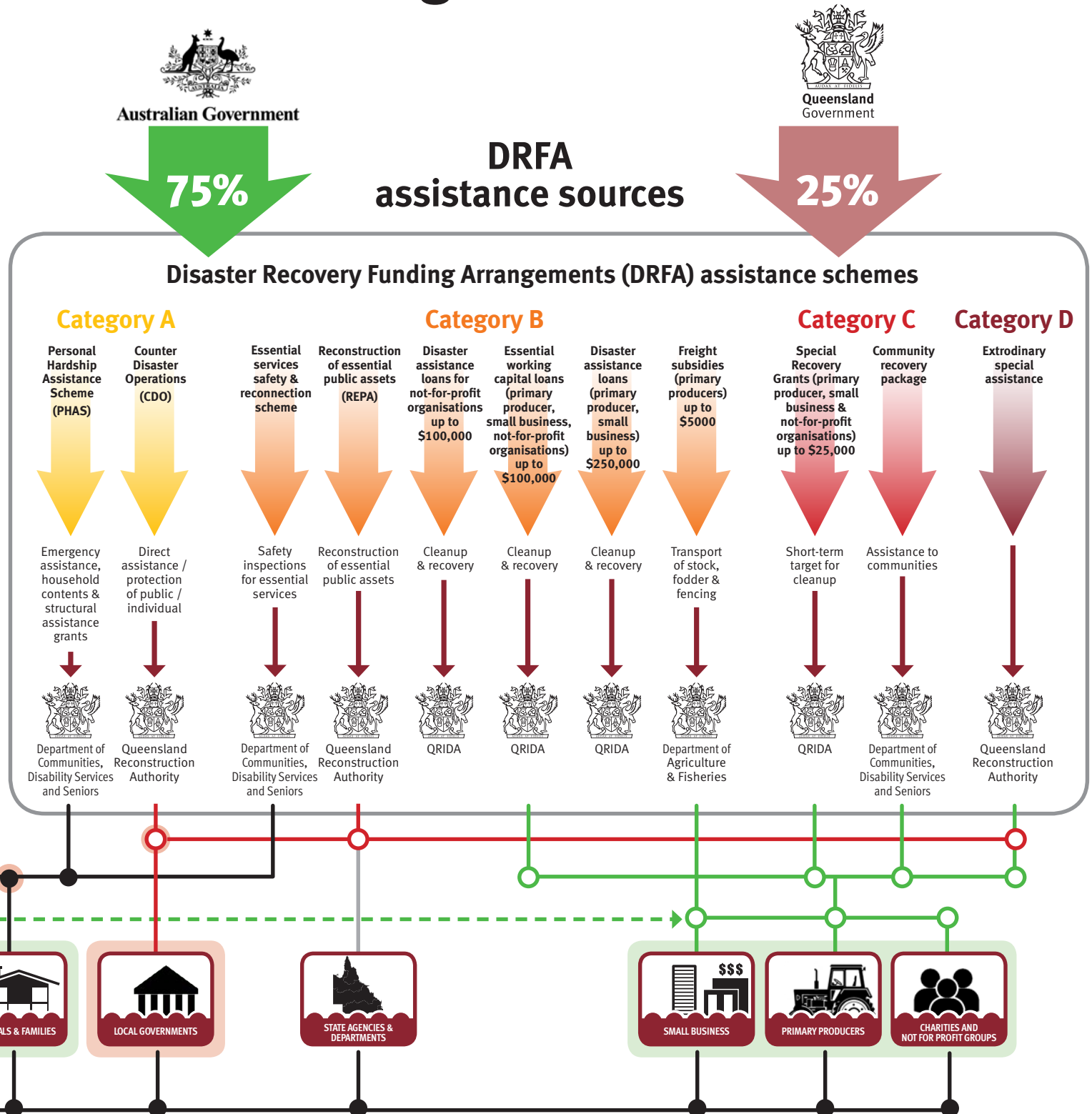
## Non-DRFA assistance schemes





## Federal and State funding policy arrangements

# Disaster Funding Assistance





## Federal and State funding policy arrangements

### Commonwealth assistance

There are two standard types of Commonwealth assistance, upon determination by the Minister for Defence Industry, Emergency Management Australia, which are available to support affected communities in the event of a major disaster. This assistance is 100 per cent Commonwealth funded and is made available at the discretion of the Commonwealth.

#### Australian Government disaster recovery allowance

The Australian Government Disaster Recovery Allowance (AGDRA) provides income support payments to employees, primary producers and sole traders who can demonstrate they have experienced a loss of income as a direct result of a disaster event.

AGDRA is activated by the relevant Federal Minister who has power under Social Security Act section 36A to determine in writing that an event is a major disaster. The Minister may determine an event to be a major disaster if satisfied that a disaster has had such a significant impact on individuals that an Australian Government response, in the form of income support, is required and that the event was of national significance. When arriving at such a decision, the Minister must take into account a range of factors including:

- the number of workplaces that are disrupted
- the extent to which the nature or extent of the disaster is unusual.

AGDRA provides fortnightly payments for up to 13 weeks up to the applicable rate of Newstart or Youth Allowance, depending on the person's circumstances. AGDRA is available to Australian residents who are sixteen years and older. However, AGDRA is not available to those already receiving another income support payment or pension such as the Age Pension, Newstart Allowance or Service Pension. The AGDRA is administered by Centrelink in the Federal Department of Human Services.

For the recent Monsoon Trough event AGDRA was activated for the local government areas of Burdekin, Burke, Carpentaria, Charters Towers, Cloncurry, Cook, Doomadgee, Douglas, Flinders, Hinchinbrook, McKinlay, Palm Island, Richmond, Torres, Torres Strait Island, Townsville, Winton and Wujal Wujal.

#### Australian Government disaster recovery payment

The Australian Government Disaster Recovery Payment (AGDRP) provides one-off financial assistance to eligible Australians adversely affected by a disaster event. The rate of AGDRP is \$1000 per eligible adult and \$400 per eligible child. Claims for this payment can be lodged with Centrelink in the Federal Department of Human Services for a period up to six months.

AGDRP is activated by the relevant Federal Minister who has power under Social Security Act section 36A to determine in writing that an event is a major disaster. The Minister may determine an event to be a major disaster if they are satisfied that a disaster has such a significant impact on individuals that an Australian Government response is required. When arriving at such a decision the Minister is also required to take into account the following factors:

- the number of individuals affected
- the extent to which the nature or extent of the disaster is unusual.

AGDRP is available only for people who have been seriously injured, have lost their homes or whose homes have been directly damaged, or are the immediate family members of a person who has died, as a direct result of the floods.

For the recent Monsoon Trough event AGDRP was activated for the local government areas of Burdekin, Burke, Carpentaria, Charters Towers, Cloncurry, Cook, Doomadgee, Douglas, Flinders, Hinchinbrook, McKinlay, Palm Island, Richmond, Torres, Torres Strait Island, Townsville, Winton and Wujal Wujal.

### Joint Commonwealth / State assistance

Emergency Management Australia (EMA) in the Australian Government Department of Home Affairs, governs the Disaster Recovery Funding Arrangements (DRFA).

The DRFA is the national arrangement for payment of financial assistance by the Commonwealth to any state or territory for the purpose of disaster relief and recovery. The DRFA came into effect on 1 November 2018 to replace the former Natural Disaster Relief and Recovery Arrangements (NDRRA). Events activated prior to 01 November 2018 remain under the NDRRA guidelines.

The DRFA is jointly funded by the Commonwealth/state governments with the Commonwealth reimbursement dependent on specific conditions for:

- state financial thresholds being met
- eligibility criteria meeting the Commonwealth funding conditions.

Under DRFA, state and territory thresholds are calculated annually as a percentage of total general government sector revenue in the financial year two years prior to the current financial year. The first threshold is 0.225 per cent of the state's total general government sector revenue and grants in the financial year two years prior to the relevant financial year; and the second threshold is 1.75 times the state's first threshold.

For 2018/19 financial year, the Queensland Government is required to cover the first \$126 million, before Commonwealth reimbursement occurs. Once the Queensland Government exceeds the first threshold, the Commonwealth will reimburse 50 per cent of eligible expenditure (limited to Category A and B expenditure), and on exceeding the second threshold of \$221 million, 75 per cent of eligible expenditure will be reimbursed.



## Federal and State funding policy arrangements

For eligible expenditure incurred under Category C, this is reimbursed at 50 per cent once the second threshold has been exceeded. Category D expenditure is reimbursed at a rate determined at time of approval (usually a 50/50 cost sharing), noting the Queensland Government must exceed the second threshold. Expenditure is reimbursed each financial year for expenditure incurred in the preceding financial year. This can include expenditure incurred against disasters in the previous three financial years.

In Queensland, this program is managed on a whole-of-government basis by the QRA. QRA also works closely with state and local government partners to deliver value for money and best practice expenditure and acquittal of public reconstruction funds within disaster-affected communities.

The assistance measures detailed in the DRFA Guidelines and the Queensland Disaster Relief and Recovery Arrangements Guidelines aim to provide a 'safety net' to those in immediate need and who are unable to affect their own recovery.

Eligibility of expenditure under these Guidelines should not be a consideration when determining whether action should be undertaken, or assistance given in response to, or recovery from a disaster event.

In carrying out eligible measures, state agencies, local governments and communities must act consistently with the Australian Government principles that:

- Australian Government and/or state government assistance is intended to support eligible response and recovery measures which complement other strategies such as insurance, mitigation planning and implementation.
- Recovery is a shared responsibility for individuals, households, businesses and communities, as well as for all levels of government where access to capital or appropriate strategies for natural disaster mitigation are considered.
- Assistance is not to supplement or operate as a disincentive for self-help by way of either access to capital or appropriate strategies for natural disaster mitigation or provide compensation.
- The assistance measures are designed to achieve an efficient allocation of resources
- Those affected in the same way by the same eligible disaster should receive the same assistance, within the limitations of the arrangements within the Guidelines.
- The financial exposure to taxpayers (at all levels of government) should be minimised.

While the measures within the Guidelines provide a measure of financial support, the primary responsibility for the safeguarding and reconstruction of private and public assets remains with the owner.

### Category A measures

#### Personal Hardship Assistance Scheme (PHAS)

PHAS is administered by the DCDSS. Like all DRFA relief measures PHAS is not compensation and can only be activated when DCDSS identifies that local service providers have reached their capacity to provide a service to people identified as experiencing personal hardship as a direct result of a disaster, or where community capacity has been exhausted.

Supplementing the principle that "those affected in the same way by the same eligible disaster should receive the same assistance, within the limitations of the arrangements within the Guidelines" there is a need to understand that "equitable isn't the same as equal". Targeted support is provided to individuals to consider circumstances and vulnerabilities. The current PHAS grants are summarised by their purpose, eligibility criteria and amounts available, in the sub-sections below.

#### Emergency hardship assistance (EHA)

EHA, which is provided under DRFA *Clause 4.2.2 a) Emergency food, clothing or temporary accommodation*, meets the immediate needs of individuals and families affected by an eligible disaster, and who are unable to meet basic needs within their own means. Queensland offers grants of \$180 for individuals and up to \$900 for families to provide assistance for food, clothing, emergency accommodation and medical supplies.

Assistance is only available for seven days following activation of this grant, unless extended by the Minister of Communities, Disability Services and Seniors. Grants may be paid in cash, direct deposits and issued debit cards. Alternative delivery methods may be used in discrete communities instead of cash to ensure essential items are purchased.

EHA is the only PHAS grant available where there is no residential requirement: people only need to be within the impact area to be eligible. As such, recipients may be visitors from interstate and overseas. This is of particular importance in tourism locations, which are primarily located in more cyclone-affected coastal areas.

#### Essential services hardship assistance (ESHA)

ESHA, which is provided under DRFA *Clause 4.2.2 a) Emergency food, clothing or temporary accommodation*, assists those who are directly impacted by the loss of one or more essential services to their principal place of residence for more than five days. Eligible essential services are: water, gas, electricity and sewerage.



## Federal and State funding policy arrangements

Assistance is only available for seven days following activation of this grant, unless extended by the Minister of Communities, Disability Services and Seniors. Recipients must be impacted at their principal place of residence and not be insured. There is however, no income test applied to claimants. Consent must be given so that DCDSS can confirm the interruption to essential services through utility providers. Queensland offers maximum grant amounts of up to \$150 for individuals and \$750 for families and couples.

ESHA was introduced in 2016 as a result of recommendations made in the QRA Review of the Queensland Disaster Relief and Recovery Guidelines in June 2015 following TC Marcia. The intention of the newly introduced grant was to provide scalable relief funding for individuals and families who, through the loss of services, were experiencing prolonged hardship.

The existing EHA (then known as Immediate Hardship Assistance) was deemed inadequate to deal with prolonged hardship, primarily due to the inability to store food in refrigeration.

### Essential Household Contents Grant (EHCG)

EHCG, which is provided under DRFA *Clause 4.2.2 b) Repair or replacement of essential items of furniture and personal effects provides a contribution towards the repair or replacement of uninsured essential household contents that have been lost or damaged in a disaster.* This includes a prescribed schedule of items: food, cooking utensils, beds and bedding, linen, furniture, floor coverings and whitegoods.

Queensland offers assistance of up to \$1765 for an individual and up to \$5300 for couples/families. EHCG is available only for Queensland residents but caters for either tenants or owner occupiers. Applicants must meet income criteria and be able to demonstrate ownership of the items to be replaced and not be insured for household contents.

### Structural assistance grant (SAG)

SAG, provided under DRFA *Clause 4.2.2 c) Essential repairs to housing, including temporary repairs and repairs necessary to restore housing to a habitable condition*, assists affected residents repair damage directly caused by the disaster to their principal place of residence within the eligible disaster area, including caravans and vessels, in order to return it to a safe, habitable and secure condition.

To be eligible, applicants must own and reside in the affected property, not be insured and meet income criteria. Queensland offers grant assistance of up to \$10,995 for an individual and \$14,685 for couples/families.

### Category B measure

#### Essential Services Safety and Reconnection Scheme (ESSRS)

ESSRS can also be made available to alleviate distress. ESSRS is intended to assist residents with the inspection and reconnection of essential services that have been damaged by an eligible disaster. The scheme provides financial assistance to individuals and families as a contribution towards safety inspections of and repairs to residential essential services (i.e. electricity, gas, water and sewerage) damaged by an eligible disaster. To activate this relief measure, DCDSS must identify that local service providers have reached their capacity to provide a service to people identified as experiencing personal hardship as a direct result of a disaster, or that there are no local service providers to assist.

Queensland offers a grant that comprises of \$200 for inspection of each other four essential services, and a maximum \$4200 for the repair and/or replacement of affected essential service equipment based on receipts for works completed. The repair/replacement component may be spent on one or more of the eligible essential services. To be eligible, applicants must both own the affected property within the eligible disaster area and occupy it as their principal place of residence. They must also meet the income criteria and be uninsured.

This relief measure is available under DRFA *Clause 4.3.2. 1) - Grants to a needy individual whose assets have been significantly damaged.* Unlike the other grants available to individuals and families, ESSRS is only available upon activation of the DRFA and not the SDRA, which is wholly funded by Queensland. As such, it is not available for events that do not meet the Commonwealth Government's criteria to activate the DRFA (e.g. eligible expenditure exceeds the \$240,000 small disaster criterion, meets the definition of an eligible disaster).



## Federal and State funding policy arrangements

### Alternate approaches

Taking into consideration the circumstances of some regional and remote communities are welfare communities, alternate service delivery methodologies are investigated and utilised as an alternative to the monetary grants. These may include:

- the concept of vouchers being provided to eligible applicants made redeemable through the local community store for Emergency Hardship Assistance. Voucher amounts may be less than the capped amount available.
- vouchers similar to the above for Essential Household Content Grants (EHCG). It has been identified this grant may be insufficient to purchase essential contents and may be necessary to revise the costings per item within the EHCG list.
- the provision of food baskets or essential goods in lieu of cash payments.

These alternate approaches are requested and supported by the local government as they are best placed to identify the level of assistance required in their community.

### Additional assistance and non-government organisations as service delivery

State agencies such as DCDSS routinely operate and deliver services through NGOs. These systems are standard mechanisms for service delivery to individuals and communities in “normal times”. During a disaster these services surge to deliver expanded functions to impacted individuals and communities. This is outside of the DRFA arrangements. Although every effort is made to support all those impacted, the rigid eligibility criteria that underpins the DRFA means that some individuals who need support are outside of the activated areas for a relief measure. These NGOs continue to operate and deliver targeted services to those impacted outside of the activation area to support those in need and hardship. Similarly, not all within an impacted area need assistance and some can facilitate their own recovery without support. All relief measures are applicant based where individuals “opt-in” and are required to sign statements that they have been directly impacted by the event and are suffering hardship.

Other types of support provided to impacted individuals outside of these standard types of support include:

- Australia Post may waive mail redirection fees for 12 months if your property is directly impacted and you are required to temporarily relocate.
- Registry of Births, Deaths and Marriages will provide free replacement life event certificates to those people who have had their certificates lost, damaged or destroyed in a declared disaster area.
- other agencies, such as TMR, will waive the replacement of lost, damaged or destroyed documentation, such as driver's licence, in the aftermath of severe disasters.
- DPHW can provide emergency accommodation to displaced residents under its *Temporary Emergency Accommodation Plan* as well as providing direct support to social housing tenants.
- local governments may extend due dates for bills and/or partially wave rates and other fees.





*SES volunteers at work in the Townsville clean-up.*

*Queensland Fire and Emergency Services*



## Conclusion

The 2019 Monsoon Trough Rainfall and Flood event was extraordinary in terms of size, scale and impact.

The event impacted approximately 56 per cent of Queensland's land mass with a total of 39 local government areas activated for disaster recovery funding.

In Townsville, the impact of the monsoon trough was rated between a 1-in-500 to 1-in-1000 event while, to the west, floodwaters 700 kilometres long and 70 kilometres wide covered 15,000 square kilometres in the Flinders and Norman river basins.

Up to 500,000 cattle and 30,000 sheep were lost, while 10,000 kilometres of fencing, 15,000 kilometres of on-farm roads and 1000 kilometres of water pipe were damaged, along with 307 kilometres of rail line.

The Community Recovery Hotline received 66,256 calls while 37,693 people received services by Community Recovery Hubs or Pop Up Hubs.

In the wake of this significant impact, the review set out to assess the effectiveness of disaster management preparedness, planning and procedures of State and local government agencies and other entities for this event.

The review included:

- extensive consultation and engagement with individuals and entities across the sector including targeted interviews in key impacted areas and communities
- commissioned work from independent experts in community surveying, hydrology and flood management, and
- comprehensive assessment and evaluation against *Queensland's Standard for Disaster Management*.

Overall, this review found that, generally, disaster management arrangements in north and north west Queensland were effective in preparing for and responding to the Monsoon Trough event.

A maturing of Queensland's disaster management system was clearly evident, with local leaders and agencies demonstrating the learning of lessons identified from past events. This helped shape performance and underpinned effective preparation and decision making in this event. This has resulted in the refinement of arrangements and operations in sharing responsibility to keep the community safe.

The Office also found relief and early recovery efforts had commenced at the time of writing the report and had, in the most part, been effective, targeting communities and individuals who were most in need. The Office identified that agencies had developed innovative solutions to adapt to and overcome significant challenges in managing response, relief and early recovery activities.

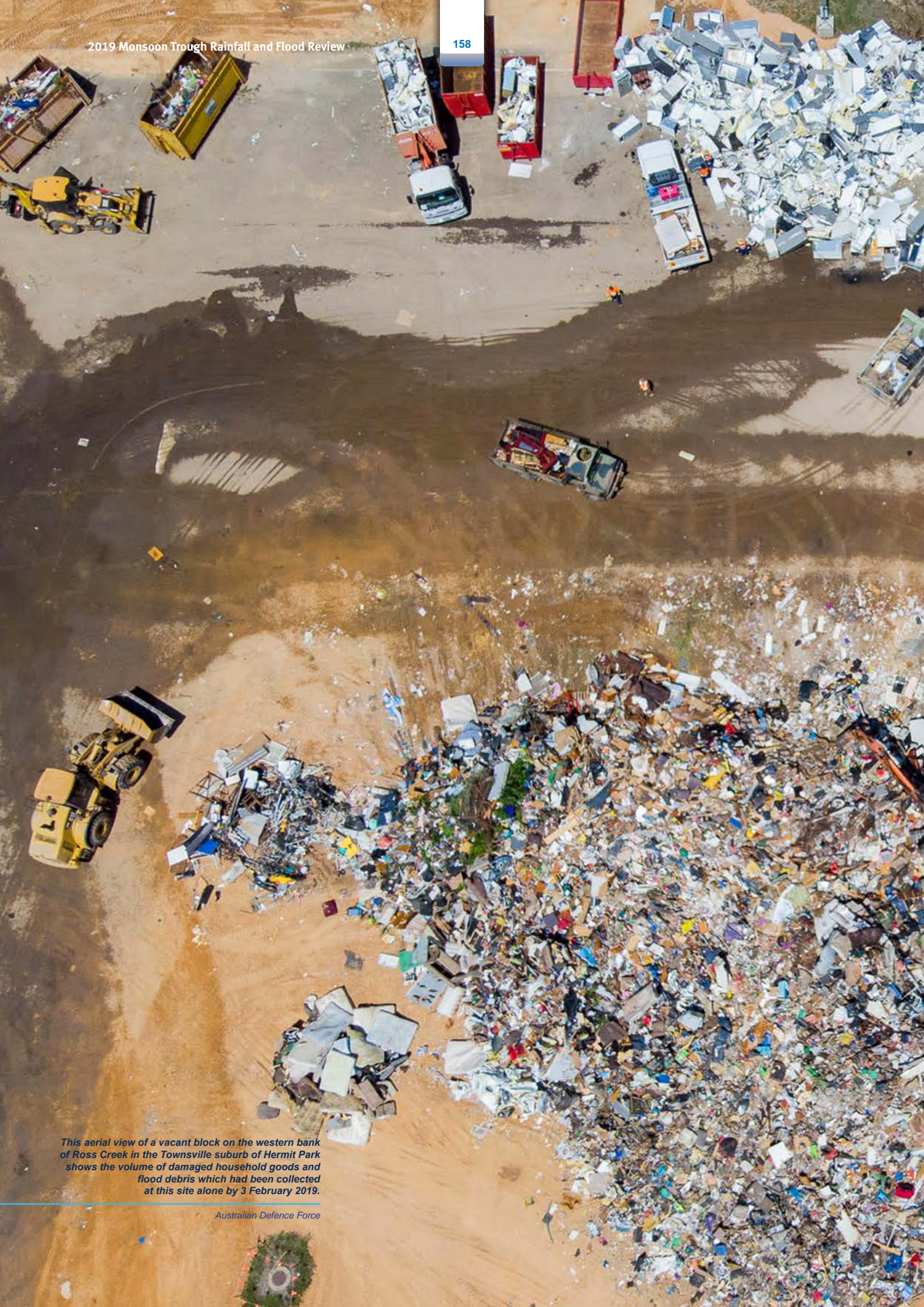
While the findings of this review reflect a largely positive position, a focus on continuous improvement is vital to developing the disaster management capabilities needed for future events.

Accordingly, this review also identified a number of broad opportunities for improvement including the need for:

- further work to be undertaken around public flood risk messaging and community education
- the on-going development of online 'dashboards' as the local 'point of truth' during disasters
- State Government agencies with key roles and responsibilities around disaster recovery to provide increased support in the development of recovery plans at the local level
- a revision of evacuation centre management plans to better manage vulnerable persons, and
- the establishment of clear local plans and arrangements regarding offers of assistance.

Addressing these improvement opportunities will support the ultimate goal of providing all Queenslanders with the best possible disaster management arrangements.





*This aerial view of a vacant block on the western bank of Ross Creek in the Townsville suburb of Hermit Park shows the volume of damaged household goods and flood debris which had been collected at this site alone by 3 February 2019.*







## Appendix A Review terms of reference

### The 2019 Monsoon Trough Rainfall and Flood Review

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#### Terms of reference for a review of preparedness for and response to the monsoon trough rainfall and flooding event across Queensland

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##### Purpose

Section 16C of the *Disaster Management Act 2003* provides the Inspector-General Emergency Management with functions including:

- to regularly review and assess the effectiveness of disaster management by the State, including the State disaster management plan and its implementation;
- to review, assess and report on performance by entities responsible for disaster management in the State against the disaster management standards;
- to report to, and advise, the Minister about issues relating to the functions above;
- to make all necessary inquiries to fulfil the functions above.

In accordance with these functions, the Office of the Inspector-General Emergency Management will assess the effectiveness of preparedness activity for and response to the monsoon trough rainfall and flooding event in January and February 2019 that occurred in Queensland.

##### Approach

For the weather event in January and February 2019, the Review team will work closely with the Queensland Police Service, Queensland Fire and Emergency Services, local, State and federal agencies, and other relevant entities to assess:

- the preparation and planning by State and local governments and the community;
- the response to the weather event, including measures taken to:
  - inform the community;
  - protect life and private and public property; and
- manage the supply of essential services;
- dam operations, in particular for the Ross River Dam, and associated emergency procedures;
- resourcing, overall coordination and deployment of personnel and equipment; and
- other related matters the Inspector-General Emergency Management considers relevant, including for example land use planning and building codes.

The Review will identify lessons that will inform continuous improvement in Queensland disaster management arrangements. The scope of these lessons will be bound by the Standard for Disaster Management in Queensland and other relevant doctrine.

In conducting the Review, the team will consider the views of community members, relevant agencies and operational staff, and also be informed by any relevant expert advice.

## Appendix B Definitions

The following definitions are sourced from the *Queensland Disaster Management Lexicon* or the *Queensland Disaster Management Guideline*, unless noted otherwise.

| TERM                                       | DEFINITION  |
|--|---|
| <b>Activation</b>                          | The commencement of a process or activity in response to a trigger. An activation is not a declaration, nor is it dependant on the declaration of a disaster situation (see definition for declaration). For example, activation of relief measure, as detailed in the <i>Queensland Disaster Relief and Recovery Arrangements</i> .                                    |
| <b>All-Hazards Approach</b>                | This approach assumes that the functions and activities applicable to one hazard are most likely applicable to a range of hazards   |
| <b>Briefing</b>                            | The process of advising personnel of the details of the incident or event with which they will be dealing.  |
| <b>Capability</b>                          | The ability to achieve a desired effect in a specific environment/context.  |
| <b>Capacity</b>                            | The combination of all the strengths, attributes and resources available within an organisation, community or society to manage and reduce disaster risks and strengthen resilience. Capacity may include infrastructure, institutions, human knowledge and skills, and collective attributes such as social relationships, leadership and management.                  |
| <b>Community</b>                           | <ul style="list-style-type: none"> <li>• A group with a commonality of association and generally defined by location, shared experience, or function.</li> <li>• A social group which has a number of things in common, such as shared experience, locality, culture, heritage, language, ethnicity, pastimes, occupation, workplace, etc.</li> </ul>                   |
| <b>Consequence</b>                         | The outcome or impact of an event that may be expressed qualitatively or quantitatively. There can be more than one consequence from an event. Consequences are generally described as the effects on people, society, the environment and the economy.   |
| <b>Control</b>                             | The overall direction of emergency management activities in an emergency situation. Authority for control is established in legislation or in an emergency plan and carries with it the responsibility for tasking other organisations in accordance with the needs of the situation. Control relates to situations and operates horizontally across organisations.     |
| <b>Coordination</b>                        | The bringing together of organisations to ensure disaster management before, during and after an event. It is primarily concerned with a systematic acquisition and application of resources (people, material, equipment, etc.) in accordance with priorities set by disaster management groups. Coordination operates horizontally across organisations and agencies. |
| <b>Coordination Centre</b>                 | A centre established at State, district or local government level as a centre of communication and coordination during times of disaster operations.  |
| <b>Dam Hazard</b>                          | A dam hazard is a reasonably foreseeable situation that may cause or contribute to the failure of the dam or require an automatic or controlled release of water from the dam; if either of these may cause harm to persons or property.  |
| <b>Dam Hazard Event</b>                    | A dam hazard becomes a dam hazard event when person or property may be harmed due to the event but the actions undertaken by the dam owner is unlikely to require a coordinated response involving two or more relevant entities.   |
| <b>Damage assessment</b>                   | The process of collecting quantifiable data that enables the assessment of the impact of an event. Data collected could be used to inform Impact Assessments  |
| <b>Debrief</b>                             | A meeting at the end of an operation with the purpose of assessing the conduct or results of an operation.  |
| <b>Declaration of a Disaster Situation</b> | The formal procedure to enable declared disaster powers under the <i>Disaster Management Act 2003</i> (ss64-69) as required. Specific powers may be used to prevent or minimise loss of life, injury or damage.   |



| TERM   | DEFINITION   |
|--|--|
| <b>Declaration of an Emergency Situation</b>     | An emergency situation declared under the <i>Public Safety Preservations Act 1986</i> (s5).  |
| <b>Declared Area</b>                             | <ul style="list-style-type: none"> <li>For a disaster situation declared under s64(1) of the <i>Disaster Management Act 2003</i> – the disaster district, or the part of the disaster district, for which the disaster situation is declared; or</li> <li>For a disaster situation declared under s69 of the <i>Disaster Management Act</i> – the State or, if the disaster situation is declared for a part of the State, the part.</li> </ul>  |
| <b>Disaster</b>                                  | A serious disruption in a community, caused by the impact of an event, that requires a significant coordinated response by the State and other entities to help the community recover from the disruption.   |
| <b>Disaster Management</b>                       | Arrangements about managing the potential adverse effects of an event, including, for example, arrangements for mitigating, preventing, preparing for, responding to and recovering from a disaster.   |
| <b>Disaster Management Group</b>                 | Means the State group, a district disaster management group or a local disaster management group.  |
| <b>Disaster Management Plan</b>                  | The State group, DDMGs and LDMGs must prepare a plan ( <i>State Disaster Management Plan</i> , <i>District Disaster Management Plan</i> and <i>Local Disaster Management Plan</i> ) for disaster management in the State, disaster district and local government's area respectively.  |
| <b>Disaster Management Stakeholder</b>           | Any individual, group, corporation, business, organisation, agency, who may affect or be affected by a decision, activity or outcome of disasters or hazards and the approach to prevention, preparedness, response or recovery phases.  |
| <b>Disaster Management System</b>                | The Queensland disaster management system refers to the legislation, regulations, plans, standards, policies, technology systems, guidelines and associated publications in place to facilitate effective disaster management across the four phases of prevention, preparedness, response or recovery phases.   |
| <b>Disaster Operations</b>                       | Activities undertaken before, during or after an event happens to help reduce loss of human life, illness or injury to humans, property loss or damage, or damage to the environment, including, for example, activities to mitigate the adverse effects of an event.  |
| <b>Disaster Risk</b>                             | The potential loss of life, injury, or destroyed or damaged assets which could occur to a system, society or a community in a specific period of time, determined probabilistically as a function of hazard, exposure, vulnerability and capacity.   |
| <b>District Disaster Management Group (DDMG)</b> | The group established under s22 of the <i>Disaster Management Act 2003</i> . The DDMG provides whole-of-government planning and coordination capacity to support local governments in disaster management and operations.  |
| <b>Escalation point</b>                          | The point at which the capability and/or capacity of an entity to manage the current situation or event has been exceeded, resulting in an escalation to the next level of Queensland's disaster management arrangements for assistance, to continue to effectively manage the event.  |
| <b>Emergency Alert</b>                           | A national telephone warning system that provides Australian emergency authorities with an enhanced ability to warn the community in the event of an emergency. The warning system is another tool available for organisations to issue emergency warnings. Emergency Alerts will be issued via landline and mobile telephones.  |
| <b>Emergency Event</b>                           | An emergency event arises from a dam hazard where persons or property may be harmed and any of the following apply: a coordinated response to the event involving two or more relevant entities; the event is arising from a disaster situation declared under the <i>Disaster Management Act 2003</i> ; or an entity performing functions under the <i>State Disaster Management Plan</i> , under that plan, require the owner of the dam to give the entity information about the event. |

| TERM                                 | DEFINITION   |
|--------------------------------------|--|
| <b>Emergency Management</b>          | Emergency management is also used, sometimes interchangeably, with the term disaster management, particularly in the context of biological and technological hazards and for health emergencies. While there is a large degree of overlap, an emergency can also relate to hazardous events that do not result in the serious disruption of the functioning of a community or society.   |
| <b>Evacuation</b>                    | The planned movement of persons from an unsafe or potentially unsafe location to a safer location and their eventual return.   |
| <b>Evacuation Centre</b>             | A building located beyond a hazard to provide temporary accommodation, food and water until it is safe for evacuees to return to their homes or alternative temporary emergency accommodation.   |
| <b>Event</b>                         | <p>An event means any of the following:</p> <ul style="list-style-type: none"> <li>• a cyclone, earthquake, flood, storm, storm tide, tornado, tsunami, volcanic eruption or other natural happening</li> <li>• an explosion or fire, a chemical, fuel or oil spill, or a gas leak</li> <li>• an infestation, plague or epidemic</li> <li>• a failure, or disruption to, an essential service or infrastructure</li> <li>• an attack against the State</li> <li>• another event similar to an event mentioned above.</li> </ul> <p>An event may be natural or caused by human acts or omissions.</p> |
| <b>Exercise</b>                      | A controlled, objective-driven activity used for testing, practising or evaluating processes or capabilities.  |
| <b>Exposure</b>                      | The elements within a given area that have been, or could be, subject to impact of a particular hazard. Exposure is also sometimes referred to as the 'elements at risk'.  |
| <b>Functional Lead Agency</b>        | An agency allocated responsibility to prepare for and provide a disaster management function and lead relevant organisations that provide a supporting role.   |
| <b>Functional Plan</b>               | A functional plan is developed by lead agencies to address specific planning requirements attached to each function. Although the functional lead agency has primary responsibility, arrangements for the coordination of relevant organisation that play a supporting role are also to be outlined in these plans.  |
| <b>Hazard</b>                        | A process, phenomenon or human activity that may cause loss of life, injury or other health impacts, property damage, social and economic disruption or environmental degradation. (United Nations Office for Disaster Risk Reduction, 2017)   |
| <b>Hazard mapping</b>                | The process of establishing geographically where and to what extent particular phenomena are likely to pose a threat to people, property, infrastructure and economic activities.  |
| <b>Impact assessment</b>             | The analysis of consequences of an event, including psychosocial (emotional and social), economic, natural and built environment.  |
| <b>Incident</b>                      | <p>An event, occurrence or set of circumstances that:</p> <ul style="list-style-type: none"> <li>• has a definite spatial extent</li> <li>• has a definite duration</li> <li>• calls for human intervention</li> <li>• has a set of concluding conditions that can be defined</li> <li>• is or will be under the control of an individual who has the authority to make decisions about the means by which it will be brought to an end.</li> </ul>  |
| <b>Intelligence</b>                  | The product of a process of collecting and analysing information or data which is recorded and disseminated as intelligence to support decision making.  |
| <b>Jurisdiction</b>                  | The State or territory in which an agency, organisation or statutory position has authority or responsibility.   |
| <b>Lean Forward</b>                  | An operational state prior to 'stand up' characterised by a heightened level of situational awareness of a disaster event (either current or impending) and a state of operational readiness.  |
| <b>Level of Risk (or risk level)</b> | Magnitude of a risk, or a combination of risks, expressed in terms of the combination of vulnerability, consequence and their likelihood.  |



| TERM   | DEFINITION   |
|--|--|
| <b>Levels of Activation</b>                        | <p>The <i>Queensland Disaster Management Arrangements</i> are activated using an escalation model based on the following levels:</p> <ul style="list-style-type: none"> <li>Alert – a heightened level of vigilance due to the possibility of an event in the area of responsibility. Some action may be required and the situation should be monitored by staff capable of assessing and preparing for the potential threat.</li> <li>Lean forward – an operational state prior to ‘stand up’ characterised by a heightened level of situational awareness of a disaster event (either current or impending) and a state of operational readiness. Disaster coordination centres are on standby, prepared but not activated.</li> <li>Stand up – the operational state following ‘lead forward’ whereby resources are mobilised, personnel are activated and operational activities commenced. Disaster coordination centres are activated.</li> <li>Stand down – transition from responding to an event back to normal core business and/or continuance of recovery operations. There is no longer a requirement to respond to the event and the threat is no longer present.</li> </ul> |
| <b>Liaison Officer</b>                             | A person who liaises between a coordination centre and their home entity (e.g. SDCC and Energy Queensland) during disaster operations. Liaison officers communicate and coordinate their activities to achieve the best utilisation of resources or services provided to the centre (e.g. provide technical or subject matter expertise, as well as, capability and capacity of their home entity).  |
| <b>Likelihood</b>                                  | The chance of something happening whether defined, measured or determined objectively or subjectively, qualitatively or quantitatively and described using general terms or mathematically. (Standards Australia/Standards New Zealand Standard Committee, 2009).  |
| <b>Local Disaster Coordinator (LDC)</b>            | The person appointed as the local disaster coordinator under s35 of the <i>Disaster Management Act 2003</i> . The function of the local disaster coordinator is to coordinate disaster operations in the local government area for the LDMG.   |
| <b>Local Disaster Management Group (LDMG)</b>      | The group established under s29 of the <i>Disaster Management Act 2003</i> , in place to support Local Government in the delivery of disaster management services and responsibilities in preventing, preparing for, responding to and recovering from disaster events.  |
| <b>Local Disaster Management Plan (Local plan)</b> | A plan prepared under s57 of the <i>Disaster Management Act 2003</i> that documents arrangements to manage disaster planning and operations with the local government area of responsibility.  |
| <b>Mitigation</b>                                  | Activities intended to reduce or eliminate risks or lessen the actual or potential effects or consequences of an event.  |
| <b>Monitoring</b>                                  | Continual checking, supervising, critically observing or determining the status to identify change from the performance level required or expected. Monitoring can be applied to a risk management framework, risk management process, risk or control. (Australian Emergency Management Institute, 2015)  |
| <b>Natural Hazard</b>                              | Those which are predominantly associated with natural processes and phenomena. (United National Office for Disaster Risk Reduction, 2017)  |
| <b>Network</b>                                     | A group or system of interconnected people or things. (Australian Emergency Management Institute, 2015)  |
| <b>Offers of assistance</b>                        | The offering of financial donations, volunteers, goods and services from individuals, corporations, businesses or organisations.   |
| <b>Operational Plan</b>                            | An operational plan is a response plan which outlines a problem/concern/ vulnerability and identifies the appropriate action (what? who? how? when?) to address the situation. The operation plan sits within the disaster management plan and is developed after conducting a risk assessment.  |
| <b>Phases of Disaster Management</b>               | Prevention, Preparedness, Response and Recovery.   |

| TERM  | DEFINITION   |
|---|--|
| <b>Place of Refuge</b>  | An alternative or in addition to evacuation where individuals shelter within their homes, workplace or with family/friends if considered safe to do so. (Queensland Disaster Management Guideline)   |
| <b>Plan</b>   | A formal record of agreed emergency management roles, responsibilities, strategies, systems and arrangements.  |
| <b>Planning process</b>   | The collective and collaborative efforts by which agreements are reached and documented between people and organisations to meet their communities' emergency management needs. It is a sequence of steps which allows emergency management planning to take place.  |
| <b>Policy</b>   | Provides a deliberate system of principles and statement of intent to guide decisions and achieve rational outcomes.   |
| <b>Preparedness</b>   | The knowledge and capacities developed by governments, response and recovery organisations, communities and individuals to effectively anticipate, respond to and recover from the impacts of likely, imminent or current disasters.   |
| <b>Prevention</b>   | Activities and measures to avoid existing and new disaster risks.  |
| <b>Queensland's disaster management arrangements (the Arrangements)</b> | Whole-of-government arrangements to ensure the collaborative and effective coordination of planning, services, information and resources for comprehensive disaster management.  |
| <b>Queensland Disaster Management Committee (QDMC)</b>                  | The group established under s17 of the <i>Disaster Management Act 2003</i> and chaired by the Premier to make strategic decisions about prevention, preparedness, response and recovery for disaster events and to build Queensland's resilience to disasters.   |
| <b>Recovery</b>   | The coordinated process of supporting disaster-affected communities' psychosocial (emotional and social), and physical wellbeing; reconstruction of physical infrastructure; and economic and environmental restoration.   |
| <b>Residual risk</b>  | The disaster risk that remains, even when effective disaster risk reduction measures are in place, and for which emergency response and recovery capacities must be maintained.  |
| <b>Resilience</b>   | A system or community's ability to rapidly accommodate and recover from the impacts of hazards, restore essential structures and desired functionality, and adapt to new circumstances.  |
| <b>Response</b>   | Actions taken directly before, during or immediately after a disaster in order to save lives, reduce health impacts, ensure public safety and meet the basic subsistence needs of the people affected.   |
| <b>Risk</b>   | The concept of risk combines an understanding of the likelihood of a hazardous event occurring with an assessment of its impact represented by interactions between hazards, elements at risk and vulnerability. (Geoscience Australia)  |
| <b>Risk Assessment</b>  | An approach to determine the nature and extent of risk by analysing potential hazards and evaluation existing conditions of vulnerability that together could potentially harm exposed people, property, services, livelihoods and the environment on which they depend. (United Nations Office for Disaster Risk Reduction, 2017)   |
| <b>Risk Management</b>  | The systematic application of management policies, procedures and practices to the tasks of identifying, analysing, assessing, mitigating and monitoring risk. (Australian Emergency Management Institute, 2015)   |
| <b>Risk Management Framework</b>  | A set of components that provide the foundations and organisational arrangements for designing, analysing, assessing, mitigating and monitoring risk. (Australian Emergency Management Institute, 2015)  |
| <b>Risk Register</b>  | A table, list or other representation of risk statements describing sources of risk and elements at risk with assigned consequences, likelihoods and levels of risk. Risk registers are produced by risk assessment processes, summarising the outputs of these processes to inform decision making about risks. Risk registers record the identification, analysis and evaluation of emergency risks. (Australian Emergency Management Institute, 2015) |



| TERM   | DEFINITION   |
|--|--|
| <b>Service delivery</b>                            | The act of providing a service or conducting an activity that is an entity's normal business.  |
| <b>Shared understanding</b>                        | Knowledge and awareness of a situation, person, or thing, that is shared across and between different entities to provide a common frame of situational awareness.   |
| <b>Shelter in Place</b>                            | An alternative or in addition to evacuation where individuals shelter within their homes, workplace or with family/friends if considered safe to do so.  |
| <b>Situational Awareness</b>                       | Situational awareness or situation awareness is the perception of environmental elements and events with respect to time or space, the comprehension of their meaning, and the projection of their status after some variable has changed, such as time, or some other variable, such as a predetermined event. It is also a field of study concerned with understanding of the environment critical to decision makers. |
| <b>Stand Up</b>                                    | The operational state following 'lean forward' whereby resources are mobilised, personnel are activated, and operational activities commenced.<br>Disaster coordination centres are activated.   |
| <b>State Disaster Coordination Centre</b>          | A permanent State level operational facility located at the Emergency Services Complex, Kedron, Brisbane.  |
| <b>State Disaster Management Plan (State Plan)</b> | A plan prepared under s49 of the <i>Disaster Management Act 2003</i> that documents planning and resource management for disaster management for the State.  |
| <b>Susceptible</b>                                 | Likely or liable to be influenced or harmed by something (Oxford Dictionary 2018).   |
| <b>Timely</b>                                      | Done or occurring at a favourable or useful time. This does not necessarily mean quickly; rather, it means something occurs or is done at the time when it will be of most use or effect.  |
| <b>Volunteers</b>                                  | People who are formally affiliated with an emergency service organisation or non-government organisation, and act under the respective organisation's direction and authority.   |
| <b>Vulnerability</b>                               | The conditions determined by physical, social, economic and environmental factors or processes which increase the susceptibility of an individual, a community, assets or systems to the impacts of hazards. (Department of Home Affairs, 2018, <i>Profiling Australia's Vulnerability: the interconnected causes and cascading effects of systemic disaster risk</i> )  |

## Appendix C Engagement

| WHAT                         | WHOM  |
|------------------------------|---|
| Commonwealth Agencies        | Australian Defence Force  |
|                              | Bureau of Meteorology   |
|                              | Emergency Management Australia  |
| State Entities               | Department of Aboriginal and Torres Strait Islander Partnerships            |
|                              | Department of Agriculture and Fisheries                                     |
|                              | Department of Communities, Disability Services and Seniors                  |
|                              | Department of Education   |
|                              | Department of Environment and Science                                       |
|                              | Department of Housing and Public Works                                      |
|                              | Department of Local Government, Racing and Multicultural Affairs            |
|                              | Department of Natural Resources, Mines and Energy                           |
|                              | Department of State Development, Manufacturing, Infrastructure and Planning |
|                              | Department of the Premier and Cabinet                                       |
|                              | Department of Transport and Main Roads                                      |
|                              | Energy Queensland   |
|                              | Queensland Ambulance Service  |
|                              | Queensland Fire and Emergency Services                                      |
|                              | Queensland Health   |
|                              | Queensland Police Service   |
|                              | Queensland Rail   |
|                              | Queensland Reconstruction Authority   |
|                              | Queensland Treasury   |
|                              | SunWater Limited  |
| Disaster Districts           | Far Northern  |
|                              | Innisfail   |
|                              | Longreach   |
|                              | Mackay  |
|                              | Mount Isa   |
|                              | Townsville  |
| Local Government Authorities | <i>see next page</i>  |



| WHAT                                | WHOM                                     |
|-------------------------------------|--|
| <b>Local Government Authorities</b> | Aurukun Shire Council                    |
|                                     | Barcoo Shire Council                     |
|                                     | Boulia Shire Council                     |
|                                     | Burdekin Shire Council                   |
|                                     | Burke Shire Council                      |
|                                     | Cairns Regional Council                  |
|                                     | Carpentaria Shire Council                |
|                                     | Cassowary Coast Regional Council         |
|                                     | Charters Towers Regional Council         |
|                                     | Cloncurry Shire Council                  |
|                                     | Cook Shire Council                       |
|                                     | Croydon Shire Council                    |
|                                     | Diamantina Shire Council                 |
|                                     | Douglas Shire Council                    |
|                                     | Etheridge Shire Council                  |
|                                     | Flinders Shire Council                   |
|                                     | Hinchinbrook Shire Council               |
|                                     | Hope Vale Aboriginal Shire Council       |
|                                     | Kowanyama Aboriginal Shire Council       |
|                                     | Lockhart River Aboriginal Shire Council  |
|                                     | Longreach Regional Council               |
|                                     | Mackay Regional Council                  |
|                                     | Mapoon Aboriginal Shire Council          |
|                                     | Mareeba Shire Council                    |
|                                     | McKinlay Shire Council                   |
|                                     | Mornington Shire Council                 |
|                                     | Mount Isa City Council                   |
|                                     | Napranum Aboriginal Shire Council        |
|                                     | Northern Peninsula Area Regional Council |
|                                     | Palm Island Aboriginal Shire Council     |
|                                     | Porpuraaw Aboriginal Shire Council       |
|                                     | Richmond Shire Council                   |
|                                     | Torres Shire Council                     |
|                                     | Torres Strait Island Regional Council    |
|                                     | Townsville City Council                  |
|                                     | Whitsunday Regional Council              |
|                                     | Winton Shire Council                     |
|                                     | Wujal Wujal Aboriginal Shire Council     |
|                                     | Yarrabah Aboriginal Shire Council        |
| <i>Non-Government Organisations</i> | <i>see next page</i>                     |

| WHAT                         | WHOM                                       |
|------------------------------|--|
| Non-Government Organisations | Australian Red Cross                       |
|                              | Diocese of Townsville Catholic Education   |
|                              | GIVIT Listed Ltd                           |
|                              | Insurance Council Australia                |
|                              | Local Government Association of Queensland |
|                              | Optus                                      |
|                              | RSPCA                                      |
|                              | Telstra                                    |
|                              | The Salvation Army                         |
|                              | Volunteering Queensland                    |



## Appendix D 2010–2011 Queensland Floods Commission of Inquiry Recommendations

| Report         | Recommendation   | Rec. No. |
|----------------|--|----------|
| Final Report   | <b>Land use planning – defined flood level:</b> Flood maps, and property specific flooding information intended for use by the general public, should be readily interpretable and should, where necessary, be accompanied by a comprehensible explanatory note.   | 2.17     |
| Interim Report | <p><b>Land use planning – defined flood level:</b> Councils should ensure that residents and businesses can clearly understand the impact of predicted flood levels on their property. This may include one or more of the following methods:</p> <ul style="list-style-type: none"> <li>• information on rates notices about flooding at individual properties</li> <li>• geospatial mapping, available to the public, that depicts inundation at certain river heights</li> <li>• flood markers</li> <li>• flood flag maps and floodwise property reports</li> <li>• colour-coded maps</li> <li>• information that relates gauge heights with the level of flooding to be expected at a property.</li> </ul>   | 4.13     |
| Final Report   | <p><b>Disaster management plans:</b> The Department of Environment and Resource Management should prepare formal work procedures for the review of flood event reports created under emergency action plans and flood mitigation manuals. These should include procedures for:</p> <ul style="list-style-type: none"> <li>• making enquiries with the owners of referable dams that have catchments that have been subject to heavy rainfall (or where there is other reason to believe the emergency action plan has been triggered) as to whether the emergency action plans have been triggered</li> <li>• reminding owners of referable dams that have had emergency action plans triggered of their obligation to submit a flood event report</li> <li>• upon receipt of a flood event report, reviewing it, identifying any dam safety or other issues or areas where insufficient detail has been provided, raising those matters with the dam owner or other affected party and identifying appropriate remedial steps</li> <li>• raising any issues identified in the report that are beyond the expertise of the Department of Environment and Resource Management, or are likely to be of particular interest to another body, with the appropriate body</li> <li>• keeping a record of the process and results of the review of the flood event report</li> <li>• fixing an appropriate timeline for the completion of each of the above steps: the time required may depend on specific circumstances, but must allow for any potential safety issues to be identified and remedied efficiently.</li> </ul> | 17.14    |
| Final Report   | <b>Dams in Queensland:</b> The Queensland Government should legislate to oblige each owner of a referable dam to have an emergency action plan approved by the appropriate Queensland Government agency. Such plans should be reviewed periodically.   | 17.31    |
| Final Report   | <b>Dams in Queensland:</b> The Queensland Government should, in consultation with the Department of Environment and Resource Management and Emergency Management Queensland, determine which agency is appropriate to review and approve emergency action plans for referable dams.  | 17.32    |
| Final Report   | <b>Dams in Queensland:</b> Prior to each wet season, the Department of Environment and Resource Management should audit the compliance of each owner of a referable dam with the obligation to have an emergency action plan approved by the Queensland Government.  | 17.33    |
| Final Report   | <b>Dams in Queensland:</b> The Department of Environment and Resource Management and Emergency Management Queensland should ensure that each has copies of current emergency action plans for all dams in Queensland.  | 17.35    |

## Appendix E Commissioned Reports

The following reports were commissioned by the Office of the Inspector-General Emergency Management to inform and provide supporting evidence for this review.

The full reports are published on the Office's public-facing website:

<https://www.igem.qld.gov.au>

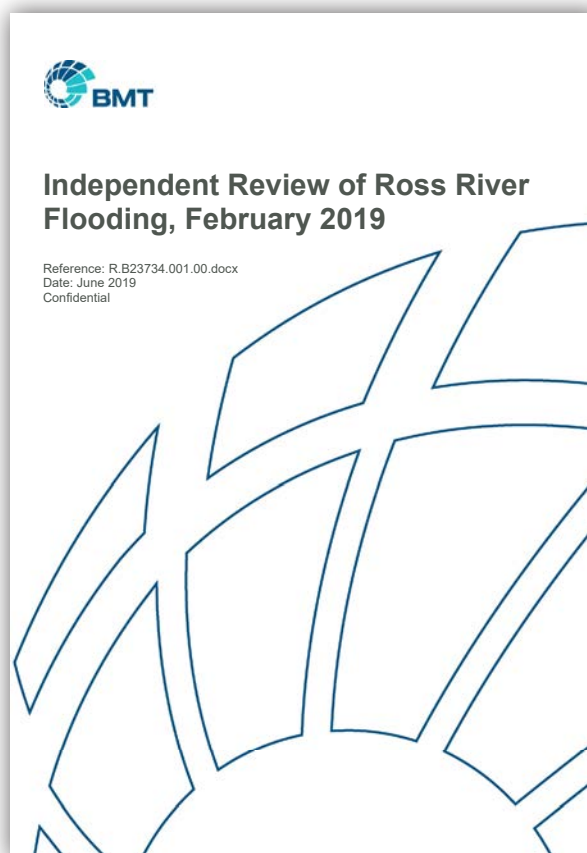
**2019 Monsoon Trough Rainfall and Flood Review:  
Research with Community Members Report.**

Market and Communications Research, 2019



**Independent Review of Ross River Flooding,  
February 2019.**

BMT





## Appendix F Townsville land use planning history

The following table provides a summary of the Townsville and Thuringowa planning scheme provisions relating to flooding over time.

| TIMEFRAME     | PROVISIONS  |
|---------------|---|
| 1970s / 1980s | <p>In the <i>Town Planning Scheme for the City of Townsville 1982</i> and the <i>Town Planning Scheme for the Shire of Thuringowa 1977</i>, no specific provisions made reference to flooding considerations.</p> <p>However, the By-laws for each of these instruments included requirements for the council, in considering an application, to have regard to “<i>any drainage or flooding problem associated with the land</i>” (By-law 2(xii) for Townsville) or “<i>whether the land is low-lying and subject to flooding</i>” (By-law 11(l) for Thuringowa).</p>  |
| 1990s         | <p>Further provisions with respect to flood mitigation measures were included in the <i>Townsville Planning Scheme 1994</i> and <i>Thuringowa Town Planning Scheme 1996</i>.</p> <p>These instruments each included aims within the Strategic Plans related to retaining flood prone land for broad-acre use, and requiring “<i>new buildings to be designed and sited to minimise interference with flood flows and to provide safety during periods of flooding or other natural disaster</i>” (section 2.8.4 of both planning schemes).</p> <p>The planning scheme provisions for the <i>Townsville Planning Scheme 1994</i> included in the General Requirements chapter a requirement that the “<i>Council in respect of any application for the erection of any premises in any zone shall require a minimum floor level of 3.25 metres AHD</i>” (section 17.2.10). It also included a requirement with respect to subdivision of land, stating that “<i>land shall not be approved for subdivision for any residential use...unless the minimum level of the surface of the land whereupon any dwelling units may be erected is more than 0.5 metres above the highest recorded flood level or the designated flood or storm surge levels adopted by the Council in the area in which the land is situated</i>” (section 18.18.1).</p> <p>The <i>Thuringowa Town Planning Scheme 1996</i> included more detailed provisions, introducing a reference to the 50 year ARI flood level (Q50) at, for example, section 15.2.10 which stated that “<i>the Council in respect of any application for the erection of any premises in any zone shall require a minimum floor level of 3.9 metres AHD to account for tidal and cyclonic storm surge, provided that the floor level is not less than 450mm above the 50 year ARI flood level</i>”.</p> <p>Section 19.19.3 states that for non-rural zones (other than the Park Residential 2 zone) “<i>adjacent to any watercourse, no residential development shall extend beyond the Development Line adopted by Council unless express approval from the Council is given to extend down below the Development Line, with corresponding filling of such land to the 50 year ARI level. Such approval would only be given by Council after a flood study has been produced by the applicant demonstrating that such intrusion beyond the development line for the development and all other similar land uses identified by the Strategic Plan along the watercourse shall have no adverse impact on other lands along the watercourse.</i>” The Development Line was defined as the ARI 20 year flood (which is the equivalent of a 5% annual exceedance probability (AEP) flood, or the Q20).</p> |
| 2000s         | continued next page   |

| TIMEFRAME | PROVISIONS  |
|-----------|---|
| 2000s     | <p>The <i>Townsville City Plan 2005</i> introduced reference to Q50 (which is the equivalent of a two per cent AEP flood) within the Works Code, stating “people and habitable buildings to be provided with an acceptable level of flood immunity in the event of a 1 in 50 year flood” (Specific Outcome SO7), with access to the site to be “no less than 0.5m above the 1 in 50 year flood” or habitable floor level of any building to be “300mm above the Q50 level” (Probable Solutions PS7.1 and PS7.2).</p> <p>The <i>Thuringowa Planning Scheme 2003</i> introduced a Natural Hazards Overlay, which required habitable areas of buildings to be located above a “Defined Flood Event” (in Performance Criteria P2), with “all floor levels of habitable areas in buildings to be at least 450mm above the Defined Flood Event” (being the 50 year ARI for a locality, as identified on a flooding map) (Acceptable Solution A2).</p>   |
| Current   | <p>The current <i>City Plan 2014</i> replaced the former <i>Townsville City Plan 2005</i> and former <i>Thuringowa Planning Scheme 2003</i>. The Flood Hazard Overlay Code states that:</p> <p><i>“Development does not intensify use in high hazard areas, in order to avoid risks to people and property”</i> (Performance outcome PO3) by, for example, ensuring new buildings are <i>“located outside high hazard areas identified on overlay map OM-06.1 or 06.2”</i> (Acceptable outcome AO3.1).</p> <p><i>“Siting and layout of development maintains the safety of people and property in medium hazard areas”</i> (PO4) by, for existing lots, for example, requiring floor levels for residential buildings to be 300mm above the defined flood level (Acceptable outcome AO4.1), which is the one per cent AEP flood, or the Q100.</p> <p>The overlay code further specifies varying levels of flood immunity for particular types of development at Table 8.2.6.3(b) – Flood immunity for community services and facilities. For example, the 0.2% AEP flood event applies for development involving emergency services, hospitals and major electricity infrastructure, while the 0.5% AEP flood event applies for development including emergency evacuation, telecommunications facilities, substations, retirement facilities and residential care facilities.</p> <p>The flood hazard planning scheme policy specifies at SC6.7.2.2.3 that <i>“within areas identified as medium Flood hazard – further investigation, assessable development is likely to require further detailed flooding investigation...”</i>.</p> <p>In terms of State controls, the current City Plan confirms at Part 2.1 that <i>“the Minister has identified that the State planning policy July 2014 is integrated in the planning scheme in the following ways:</i></p> <p style="padding-left: 40px;"><i>State interests in the State planning policy appropriately integrated</i><br/> <i>All</i></p> <p style="padding-left: 40px;"><i>State interests in the State planning policy not integrated</i><br/> <i>None</i></p> <p style="padding-left: 40px;"><i>State interests in the State planning policy not relevant to Townsville City Council</i><br/> <i>None”</i></p> <p>Part 2.2 of the current <i>City Plan</i> states that <i>“there was no regional plan relevant to the planning scheme area on commencement of the planning scheme.”</i></p> |



## Appendix G Land use planning framework for Townsville City Council

Further details of the State and local planning instruments through the *Planning Act 2016* that apply to Townsville City Council are detailed below.

The *Planning Act 2016* is the key legislation for regulating development in Queensland and is administered by the Department of State Development, Manufacturing Infrastructure and Planning.

The purpose of the *Planning Act 2016* is to 'establish an efficient, effective, transparent, integrated, coordinated and accountable system of land use planning ... development assessment and related matters that facilitates the achievement of ecological sustainability'.<sup>187</sup>

The *Planning Act 2016* achieves its purposes in part through:

- the making and amending of State planning policies and regional plans
- the making and amending of local planning schemes
- development assessment requirements and processes.

The Minister's *Guideline's and Rules July 2017* and the *Development Assessment Rules Version 1.1* support these processes through:

- providing instructions for local governments in developing their planning schemes and assessing and deciding development applications including against the planning scheme.
- outlining steps, criteria and timeframes to deliver local planning instruments and development decisions.

The *State Planning Policy* is a State planning instrument made under the *Planning Act 2016* and sets out State interests that should be given effect to through the planning scheme. The current State Planning Policy commenced on 3 July 2017.

### Changes to the State Planning Policy as a result of the Queensland Floods Commission of Inquiry

The Queensland Floods Commission of Inquiry was established to consider matters arising out of the 2010/2011 Queensland floods. Post-inquiry, the then Department of State Development, Infrastructure and Planning reviewed the State interest for natural hazards contained within the *State Planning Policy* and its associated guidelines and implementation processes. This guided the development of the new *State Planning Policy 2013*.

The current *State Planning Policy 2017* continues to include a chapter on natural hazards management. In addition, the guidance material for natural hazards includes example planning scheme provisions which local governments may adopt or adapt. The guidance material also provides suggestions for how local governments may use different elements within the planning scheme to appropriately treat flood hazard risk.

The current *State Planning Policy Interactive Mapping System* which is available to the public at <https://planning.dsdmip.qld.gov.au/maps> has been adjusted to take into account the 2010/2011 flood line which is applicable to the whole of Queensland. The flood extent for the 2010/2011 was generated from aerial photography. A local government is required to locally verify and either confirm or adjust if required, prior to incorporating the statewide mapping in a planning scheme.

The *State Planning Policy* natural hazards state interest and its various assessment benchmarks (as updated in the 2017 version) are relatively unchanged. The *State Planning Policy* benchmarks for development in a flood hazard area include that development must:

- avoid natural hazard areas, or where not possible, to mitigate the risk to people and property to an acceptable or tolerable level
- support and not unduly burden disaster management or recovery capacity and capabilities
- directly, indirectly and cumulatively avoid an increase in the severity of the natural hazard and the potential for damage on the site or to other properties
- avoid risks to public safety and the environment from the location of hazardous materials and the release of these materials as a result of a natural hazard
- maintain or enhance the natural processes and protective function of landforms and the vegetation that can mitigate risks associated with the natural hazard
- facilitate the location and design of community infrastructure to maintain the required level of functionality during and immediately after a natural hazard event
- be planned for in relation to development involving the storage of hazardous chemicals that exceed a hazardous chemicals flood hazard threshold in a flood hazard area, to minimise the likelihood of inundation of flood waters from creeks, rivers, lakes or estuaries on storage areas.

### Townsville City Plan 2014

The *Townsville City Plan* regulates development in Townsville by categorising development as either accepted development, which does not require a development approval or assessable development, which requires a development approval.

Assessable development may be either code assessable against the assessment benchmarks in City Plan.

Alternatively, it may be impact assessable against the benchmarks in City Plan and also be subject to public notification and third-party appeal rights. Development may also be prohibited development.

There is also a range of areas for which development is not regulated under City Plan, but rather under other special legislation such as priority development areas under the *Economic Development Act 2012* and State development areas under the *State Development and Public Works Organisation Act 1971*, etc.

The City Plan identifies flood hazard areas through the Flood Hazard Overlay and includes a Flood Hazard Overlay Code which sets the assessment benchmarks for development in the Flood Hazard Overlay.

The Flood Hazard Overlay assessment benchmarks provide minimum development standards relative to the flood event or the defined flood level. The overlay can change the level of assessment for premises identified on the flood hazard overlay maps. It identifies four flood hazard areas from a high hazard area, medium hazard area, low hazard area, to a medium hazard – further investigation area.

City Plan changes the level of assessment for certain development within the flood hazard overlay. See the table for a further description of the flood hazard areas and what the Flood Hazard Code means for development.

| Flood Hazard Area                                  | Description  | What does the hazard code mean for development?   |
|--|--|---|
| <b>High hazard area</b>                            | High hazard area represents the 1% Annual exceedance probability (AEP) event. This is the Defined Flood Event and the Defined Flood Level for Townsville City.<br>Flooding may involve fast-flowing and/or deeper flood floodwaters.   | New development within these areas should be avoided.<br>Any new development would be subject to the highest development assessment requirements.                                   |
| <b>Medium hazard area</b>                          | Medium hazard area represents the 1% AEP event. This is the Defined Flood Event and the Defined Flood Level for Townsville City.<br>Flooding exists but less likely to be deep and/or fast-moving water.   | New residential development subject to building requirements such as minimum floor heights for habitable areas.   |
| <b>Low hazard area</b>                             | Areas of the floodplain outside the 1% AEP flood extent are still susceptible to flooding in rarer, more extreme flood events.<br>The low flood hazard area represents inundation by the probable maximum flood (PMF) outside the combined extent of the high and medium flood hazard areas. | No flood hazard overlay code requirements apply to dwelling houses.<br>New development with a role in community resilience may be built in these areas subject to higher standards. |
| <b>Medium hazard – further investigation areas</b> | Areas outside the extent of the flood modelling studies. Limited information is available about flood depths, levels or velocities in these areas.   | High intensity development is likely to require further detailed flooding investigation   |



**Appendix G continued****Flood hazard planning scheme policy**

The *Flood Hazard Planning Scheme Policy (PSP)* was adopted by Townsville City Council on 13 October 2014. The purpose of the Flood Hazard PSP is to:

- provide background information on the development of the flood hazard overlay
- provide applicants with additional information and guidance in meeting the requirements of the flood hazard overlay code.

The Flood Hazard PSP specifically relates to the assessment of the Flood Hazard Overlay Code.

The Flood Hazard PSP recognises that several flood modelling studies have contributed to the flood overlay maps. The flooding modelling studies are under constant development as they are responsive to the construction of infrastructure and new data. The flood hazard overlay maps have been derived from numerous sources, including:

- detailed flood modelling studies identified in the Flood Hazard PSP
- interim flood assessment overlay mapping completed by the Queensland Reconstruction Authority and amended for local constraints by Townsville City Council.

**Development assessment under City Plan**

Development that is assessable development or accepted development subject to requirements, is assessed against the assessment benchmarks in the Flood Hazard Overlay Code.

The assessment benchmarks provide minimum development standards relative to the defined flood event or defined flood level. The minimum habitable floor levels are generally identified as an acceptable solution in the flood hazard overlay and vary depending on the type of development and the flood hazard area. The acceptable solutions for various types of development in the Flood Hazard Overlay Code are detailed in the table on the following page.

The Flood Hazard Overlay Code notes that *“Applicants must be aware that in some areas storm tide hazard areas will also co-exist with flood hazard areas. In these instances, the floor levels and other design responses will need to be enough to comply with this code, the Coastal Environmental Overlay Code and the Building Regulation 2006.”*

Therefore, in some instances, the acceptable solution may be higher than that stated in the Flood Hazard Overlay Code.

| Development type  | Acceptable solution   |
|---|---|
| <b>New buildings</b>  | Located outside of high hazard areas  |
| <b>Habitable Rooms</b>  | Floor levels are a minimum of 300mm above the DFL (the flood level relative to the AHD of the 1% AEP flood)   |
| <b>Non-habitable Rooms</b>  | Floor levels are above the DFE(the 1% AEP flood event)  |
| <b>Underground Parking</b>  | Designed to prevent the intrusion of flood waters by the incorporation of a bund or similar barrier with a minimum height of 300mm above the DFL  |
| <b>New lots or roads</b>  | New lots or roads are not created within high hazard areas  |
| <b>New lots</b>   | New lots contain designated building envelopes (whether or not for residential purposes) outside the medium hazard areas and those building envelopes are of a sufficient size to accommodate buildings associated with the development |
| <b>New subdivisions – roads</b>   | Arterial, sub-arterial or major collector roads are located above the 2% AEP flood level  |
| <b>Cul-de-sacs or dead end streets</b>  | Located outside of medium hazard areas  |
| <b>Manufacture or storage of hazardous materials</b>  | Does not occur within the high hazard area  |
| <b>Structures used for the manufacture or storage of hazardous materials in bulk</b>                      | Structures designed to prevent the intrusion of flood waters up to at least a 0.2% AEP where located within the low or medium hazard area   |
| <b>Emergency services</b>   |   |
| <b>Hospitals and associated facilities</b>  | 0.2% AEP  |
| <b>Major electricity infrastructure</b>   |   |
| <b>Emergency/evacuation shelters</b>  |   |
| <b>Storage of valuable records or items of historic/cultural significance (e.g. libraries, galleries)</b> |   |
| <b>Aeronautical facilities</b>  |   |
| <b>Telecommunication facilities</b>   |   |
| <b>Substations</b>  | 0.5% AEP  |
| <b>Water treatment plants</b>   |   |
| <b>Regional fuel storage</b>  |   |
| <b>Food storage warehouse</b>   |   |
| <b>Retirement facility and residential care facility</b>  |   |
| <b>Sewage treatment plants (requiring licensing as an environmentally relevant activity)</b>              | 1% AEP  |



## Appendix H Dams in the vicinity of the Monsoon Trough event

The listing below is broadly arranged north-to-south geographically, by Local Government Area (LGA).

| Dam                            | LGA                              | Owner  | Disaster District      | EAP activated Y/N | Report lodged Y/N | Date activated | Full storage level | Maximum flood level recorded | Opportunities for improvement identified? |
|--------------------------------|----------------------------------|--|------------------------|-------------------|-------------------|----------------|--------------------|------------------------------|---|
| Moody Creek Detention Basin 1  | Cairns Regional Council          | Cairns Regional Council                      | Far Northern (Cairns)  | No                |                   |                | 28.85m             |                              |   |
| Moody Creek Detention Basin 1A | Cairns Regional Council          | Cairns Regional Council                      | Far Northern (Cairns)  | No                |                   |                | 24.5m              |                              |   |
| Copperlode Falls Dam           | Cairns Regional Council          | Cairns Regional Council                      | Far Northern (Cairns)  | Yes               | No                | 27-Jan-19      | 397.73m            | 0.46m above spillway         |   |
| McKinnon Creek Flood Detention | Cairns Regional Council          | Cairns Regional Council                      | Far Northern (Cairns)  | No                |                   |                | 43.1m              |                              |   |
| Lake Mitchell Dam              | Mareeba Shire Council            | Southedge Daintree Pastoral Company Pty Ltd  | Far Northern (Mareeba) | Unknown*          | No                |                |                    |                              |   |
| Tinaroo Falls Dam              | Tablelands Regional Council      | SunWater Ltd                                 | Far Northern (Mareeba) | Yes               | No                | 03-Feb-19      | 670.42             | 670.88                       | SunWater advises EER not required         |
| Wild River Dam                 | Tablelands Regional Council      | Tablelands Regional Council                  | Far Northern (Mareeba) | Unknown*          | No                |                |                    |                              |   |
| Ibis Dam                       | Mareeba Shire Council            | Mareeba Shire Council                        | Far Northern (Mareeba) | Unknown*          | No                |                |                    |                              |   |
| Crooks Dam                     | Tablelands Regional Council      | DNRME  | Far Northern (Mareeba) | No                |                   |                | 691.3m             | 0.57m above spillway         |   |
| Koom-booloomba Dam             | Tablelands Regional Council      | Stanwell Corp                                | Far Northern (Mareeba) | No                |                   |                | 740.36m            | 68.50%                       |   |
| Copperfield River Gorge Dam    | Etheridge Shire Council          | DNRME  | Far Northern (Mareeba) | Yes               | No                | 02-Feb-19      | 586.0m             | 3.11m above spillway         |   |
| Paluma Dam                     | Charters Towers Regional Council | Townsville City Council                      | Townsville             | Yes               | Yes               | 30-Jan-19      | 894.35m AHD        | 0.575m over spillway         | EER received 22-Mar-19                    |
| Ross River Dam                 | Townsville City Council          | Townsville City Council Operated by SunWater | Townsville             | Yes               | Yes               | 30-Jan-19      | 38.65              | 43.03                        | EER received 29-Mar-19                    |
| Suhr's Creek Dam               | Carpentaria Gold Pty Ltd         | Charters Towers Regional Council             | Townsville             | No                |                   |                |                    |                              |   |
| Burdekin Falls Dam             | Charters Towers Regional Council | SunWater Limited                             | Townsville             | Yes               | No                | 31-Jan-19      | 154                | 160.46                       | SunWater advises EER not required         |

| Dam                                      | LGA                         | Owner                                    | Disaster District | EAP activated Y/N | Report lodged Y/N | Date activated | Full storage level | Maximum flood level recorded | Opportunities for improvement identified? |
|--|-----------------------------|--|-------------------|-------------------|-------------------|----------------|--------------------|------------------------------|---|
| Julius Dam                               | Mount Isa City Council      | SunWater Limited                         | Mount Isa         | Yes               | No                | 02-Feb-19      | 223.54             | 226.48                       | SunWater advises EER not required         |
| Leichhardt River Dam                     | Mount Isa City Council      | Xtrata Copper                            | Mount Isa         | No                |                   |                | 326.2m             | 71%                          |   |
| Chinaman Creek Dam                       | Cloncurry Shire Council     | Cloncurry Shire Council                  | Mount Isa         | No                |                   |                | 191.22             | 191.27                       |   |
| Corella Dam                              | Cloncurry Shire Council     | DNRME                                    | Mount Isa         | Yes               | No                | 02-Feb-19      | 297.9m             | 1.95m above spillway         |   |
| Rifle Creek Dam                          | Cloncurry Shire Council     | Xtrata Copper                            | Mount Isa         | No                |                   |                |                    | 68%                          |   |
| Peter Faust Dam                          | Whitsunday Regional Council | SunWater Limited                         | Mackay            | No                |                   |                |                    |                              |   |
| Private Dam (A. Deguara)                 | Mackay Regional Council     | Private Owner (A Deguara)                | Mackay            | Unknown*          | No                |                |                    |                              |   |
| Eungella Dam                             | Mackay Regional Council     | SunWater Limited                         | Mackay            | Yes               | No                | 30-Jan-19      | 562.71             | 563.8                        | SunWater advises EER not required         |
| Teemburra Dam                            | Mackay Regional Council     | SunWater Limited                         | Mackay            | Yes               | No                | 30-Jan-19      | 290                | 290.79                       | SunWater advises EER not required         |
| Kinchant Dam                             | Mackay Regional Council     | SunWater Limited                         | Mackay            | Yes               | No                | 30-Jan-19      | 57.21              | 57.26                        | SunWater advises EER not required         |
| Burton Gorge Dam                         | Isaac Regional Council      | Peabody Australia                        | Mackay            | No                |                   |                |                    |                              |   |
| Dalrymple Bay Coal Terminal - Quarry Dam | Mackay Regional Council     | Dalrymple Bay Coal Terminal - Quarry Dam | Mackay            | Unknown*          | No                |                |                    |                              |   |
| Middle Creek Dam                         | Mackay Regional Council     | Mackay Regional Council                  | Mackay            | No                |                   |                | 134.7m             |                              |   |

\* The dams listed as "unknown" in the EAP activated column are those where there was no contact between the dam owner and the dam safety regulator. These dams are unlikely to have experienced intense rainfall and flooding, so it is unlikely the EAPs were activated.



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