



Townsville City Council

Submission to the Office of the Inspector-General Emergency Management

The 2019 Monsoon Trough Rainfall and Flood Review

31 March 2019

Contents

- 1. Introduction2
- 2. Submission Summary3
- 3. Context8
- 4. Preparation and planning..... 11
- 5. The Response to the Weather Event.....23
- 6. Dam Operations36
- 7. Resourcing, Overall Coordination and Deployment of Personnel and Equipment.....43
- 8. Land Use Planning and Building Codes.....46
- Schedule 1 - List of Abbreviations61
- Annexure A - Summary of Key Announcements62
- Annexure B - Summary of Emergency Alerts delivered.....68

1. Introduction

- 1.1 Townsville City Council (**TCC**) appreciates the opportunity to make this submission. The submission provides information to assist the Office of the Inspector-General Emergency Management (**IGEM**) in its assessment of the following terms of reference with respect to the monsoon trough rainfall and flooding event in January and February 2019:
- (a) the preparation and planning by the State and local governments and the community;
 - (b) the response to the weather event, including measures taken to:
 - (i) inform the community;
 - (ii) protect life and private and public property; and
 - (iii) manage the supply of essential services;
 - (c) dam operations, in particular for the Ross River Dam (**RRD**), and associated emergency procedures;
 - (d) resourcing, overall coordination and deployment of personnel and equipment; and
 - (e) land use planning and building codes.
- 1.2 In this submission, TCC has:
- (a) highlighted the key aspects of planning, preparation, response and recovery undertaken by TCC in relation to the 2019 weather event;
 - (b) set out the facts which have been collated and preliminary analysis which has been undertaken by TCC to provide the IGEM with the relevant context to assist in understating how the events unfolded, including the resulting flooding in the City of Townsville;
 - (c) set out information which informs the IGEM about the key steps undertaken by TCC in connection with the flood, including in relation to the operation of the RRD; and
 - (d) summarised the relevant land use planning and building codes.
- 1.3 In addition to this submission, TCC has engaged a number of independent consultants to review its response to the 2019 weather event, and has prepared an Emergency Event Report for the Department of Natural Resources, Mines, and Energy (**DNRME**) as the RRD regulator.
- 1.4 This submission will be released publicly so that nature and scale of the unprecedented weather event and TCC's response to it can be better understood by the community.

2. Submission Summary

The Weather Event

- 2.1 In late January and early February 2019, the Townsville local government area experienced an unprecedented weather event (**2019 weather event**).
- 2.2 The 2019 weather event was the largest rainfall event to have occurred over the Townsville catchment in the last 120 years. To put this into perspective, over the course of the 2019 weather event, the RRD received 850,000 megalitres of rainfall, which is 3.8 times the RRD's capacity (at its full supply level of 38.55m).
- 2.3 Based on hydrological analysis that has subsequently been conducted in the time available, the RRD experienced rainfalls and flood volumes over a 7 day period (from 29 January 2019 to 5 February 2019) which exceeded a "1,000 year" event. That is, the likelihood that events of this magnitude would occur in any one year is less than 1:1,000.¹ This hydrological analysis has also indicated that the 2019 weather event may have been as rare as a 1:10,000 event.
- 2.4 Furthermore, the 2019 weather event resulted in the RRD's water levels being over 2 metres higher (at the peak) than the existing flood of record which was 40.73m. The peak outflow from the RRD during the 2019 weather event is estimated to be well in excess of a 1:100 event and most likely this was in the order of a 1:300 to 1:500 event.

Terms of Reference

- 2.5 TCC is pleased to provide the information contained within this submission to assist the IGEM. TCC's response to each of the IGEM's terms of reference in relation to the 2019 weather event is summarised below.

Preparation and planning

- 2.6 Despite its unprecedented nature, TCC was well prepared to deal with the 2019 weather event as a result of the significant planning and activities it had undertaken over a number of preceding years.
- 2.7 TCC's planning and preparation included:
- (a) the development of an Emergency Action Plan for the RRD (**EAP**) and a Local Disaster Management Plan as required by legislation;
 - (b) the development of a number of additional and detailed sub-plans, including relevantly the:
 - (i) *Evacuation & Transport Sub Plan*;
 - (ii) *Shelters and Evacuation Centre Sub Plan*;
 - (iii) *Community Information and Warnings Sub Plan*;
 - (iv) *Impact Assessment Sub Plan*; and
 - (v) *Recovery & Resilience Sub Plan*.
 - (c) the appointment of SunWater as an expert dam operator for RRD;

¹ An event with a 1:1,000 chance of being exceeded in any one year is also referred to as an event with an "average recurrence interval (ARI)" of 1,000 years, or 0.1% annual exceedance probability (AEP).

- (d) the construction of a state of the art, purpose-built Local Disaster Coordination Centre (**LDCC**) in Garbutt, which was opened in December 2018 and at which crucial operations were conducted during the 2019 weather event;
- (e) the appointment of a permanent, full time highly-qualified and experienced Local Disaster Coordinator (**LDC**);
- (f) undertaking historic flood studies and modelling, including identifying targeted Evacuation Zones;
- (g) the establishment of six flood-appropriate evacuation centres;
- (h) undertaking various simulated disaster management exercises and trainings (including specifically *Operation Dam You Huey* in October 2016, which simulated a number of flooding and dam release scenarios); and
- (i) adopting appropriate land use planning controls, including minimum habitable floor level requirements, which contributed to the flood models, and allowed valuable evacuation time where required.

Response to the 2019 weather event

- 2.8 TCC's response to the 2019 weather event was very well coordinated with other agencies through the Townsville Local Disaster Management Group (**TLDMG**) and was effective in keeping the community informed, protecting life and property and managing the supply of essential services.
- 2.9 In responding to the unprecedented 2019 weather event, TCC and its representatives were an integral part of the coordinated efforts of the TLDMG in preparing the City of Townsville.
- 2.10 Measures overseen by the TLDMG to protect life and private and public property included:
- (a) the coordination by the LDC of a multi-agency response to the 2019 weather event, including the Australian Defence Force (**ADF**), State Emergency Services (**SES**), Queensland Police Service (**QPS**), Queensland Ambulance Service (**QAS**) and Queensland Fire and Emergency Services (**QFES**). Of particular note is the ADF which has a significant presence in the City of Townsville and its community. During the 2019 weather event, there was significant cooperation between TCC and the ADF. For example, on 5 February 2019 there were some 400-500 ADF personnel on the ground assisting and many were involved in the important door knocking process where residents were warned of the developing weather and flooding risk. In addition, the ADF provided multiple vehicle types to assist including Bushmasters, light armoured vehicles and G wagons. ADF personnel manned evacuation centres that were established and the Lavarack barracks was also utilised as an evacuation centre.
 - (b) the use of flood modelling by a number of hydraulic and hydrological consultants engaged to identify the likely downstream impact of releases from the RRD and working with SunWater (as the contractor responsible for operating the RRD) in relation to the timing and size of those releases;
 - (c) informing the community by issuing:
 - (i) 50 emergency alerts;
 - (ii) over 200 traditional communications (i.e. media releases and radio and television interviews);
 - (iii) over 3,600 social media communications;

- (iv) approximately 40 radio advertisements per day across local radio stations for a period of; and
 - (v) approximately 15 radio live reads per day across local radio stations for a period of;
- (b) the establishment of the 'Townsville Disaster Information' Facebook page which provided the community with 'real-time' updates and a channel for two-way communication;
 - (c) the establishment of the emergency management dashboard which provided the community with a central location for 'real-time' updates;
 - (d) the provision of 143,000 sandbags and 9,000 tons of sand to residents and businesses;
 - (e) the opening of six evacuation centres that provided temporary accommodation which at its peak accommodated over 800 people on 3 February 2019 and remained open until 10 February 2019;
 - (f) the deployment through TCC of more than 80 trucks and 52 council crews to support the community during the floods, including one TCC truck used to facilitate flood evacuations of residents under QPS direction; and
 - (g) the mobilisation of resources to assist with bulk waste collection and the removal of debris, other damaged items and rubbish following the 2019 weather event. In this respect, the ADF collected 5,840 tons and TCC collected over 19,000 tons of bulk waste.
- 2.11 TCC's response also included a significant contribution of its own assets and resources to the maintenance and repair of essential services such as local roads, water, sewerage and waste collection.
- 2.12 The clean-up effort coordinated by TCC in the immediate aftermath of the event was enormous, including over 700 jobs conducted by not-for-profit entities such as Team Rubicon, Combined Churches and Samaritan's Purse (to assist those without insurance) and over 400 washouts conducted by the SES.
- 2.13 In addition, TCC's Local Recovery and Resilience Group (**LRRG**) is actively involved in driving the City of Townsville's recovery from the damage caused by this unprecedented weather event. The LRRG's Recovery Plan has been and is being drafted and endorsed by the TLDMG and implemented across the local government area (**LGA**). It is anticipated that this recovery strategy and efforts will continue for the next 18 to 24 months.
- 2.14 Importantly, given the size and scale of the 2019 weather event, the TLDMG set a benchmark that there would be no loss of life. Whilst all swift water operations and evacuations of flood affected residents were carried out successfully under the direction of QPS and other agencies and without any injury or loss of life, regrettably, despite these efforts and the repeated communication warnings, there were the unfortunate deaths of two people who failed to heed warnings about entering flood waters.

Dam Operations

- 2.15 During the 2019 weather event, TCC (as owners of the RRD) gave directions to SunWater (as operators of the RRD) to manually operate the RRD spillway gates in an endeavour to reduce the anticipated peak of the downstream flooding.
- 2.16 Based on the hydraulic and hydrological analysis that has been subsequently conducted to date, given the scale of the event, the forecasting information available and the agreed operational principles under the EAP there was nothing TCC could have done to prevent, and very little it could have done to reduce, the inundation of the City of Townsville that occurred.

- 2.17 Despite this, based on the analysis, it is understood that the RRD transformed an exceedingly large inflow event (rarer than 1:1,000) into a much smaller outflow event (1:300 to 1:500).

Resourcing, overall coordination and deployment of personnel and equipment

- 2.18 The response by TCC to the 2019 weather event was managed by the TLDMG and coordinated by the LDC. TCC deployed significant resources to the TLDMG. The resourcing, coordination and deployment of personnel and equipment was efficiently managed between agencies. In particular, TCC, through the TLDMG, was particularly effective in engaging with the ADF and coordinating the support of its locally based equipment and personnel in responding to the 2019 weather event.
- 2.19 In addition to taking responsibility for chairing the TLDMG, TCC also played key roles with respect to:
- (a) coordinating the content and strategy for TCC's communications regarding the 2019 weather event. The provision of critical information to the community is a key element of TCC's disaster response and this was successfully undertaken through a number of media types. To achieve this, the broader TCC communications team operated from the LDCC and approximately 28 employees worked during the period from 31 January 2019 until 9 February 2019 on a 24-hour basis and the TCC call centre operated throughout this period with a team of 30 TCC employees again working on a 24-hour basis;
 - (b) providing significant contributions of its assets and resources:
 - (i) in particular, over 800 staff members worked on 24-hour rosters to ensure that the Townsville community was able to rely on essential services such as water, sewage treatment, waste facilities and safe roads, as well as access disaster related services like evacuation centres, shelters and the provision of sandbags;
 - (ii) more than 80 TCC trucks and 52 crews were deployed to support the community during the floods, including one Council truck used to facilitate flood evacuations of residents under QPS direction; and
 - (iii) mobilising TCC's resources and those of the ADF to assist with bulk waste collection and removal of debris and other damaged items and rubbish following the floods, with 5840 tons collected by the ADF, and over 19,000 tons of bulk waste collected by the TCC.

Land Use Planning and Building Codes

- 2.20 Development standards in Townsville require that habitable floor levels accommodate a 1 in 100 year ARI flood event plus a minimum 300mm freeboard. This is the currently accepted regulatory standard in Queensland. Preliminary analysis indicates that the magnitude of the 2019 weather event greatly exceeded the 100 year ARI flood event and was most likely in the order of 1:300 to 1:500. Accordingly, the 2019 weather event significantly exceeded the minimum habitable floor level standards.
- 2.21 The City of Townsville is located on the floodplain of the Ross River. Land planning and building controls must therefore strike a balance between land supply, affordability of housing and flood risk along with other natural hazards, including coastal hazards. Compliance with the flood standards does not guarantee that a property will never experience flooding. Comprehensive maps of flood risk produced by TCC indicate which properties might be subject to flooding in events that are rarer than 1:100. As discussed above, the 2019 weather event and the subsequent flooding that occurred exceeded the 1:100 flood event level and the likely upper limit of possible flood magnitude (Probable Maximum Flood).
- 2.22 TCC also makes individual property level flooding information available on its website at no charge, allowing property owners and occupants to make an assessment of their level of flood

risk. This information is based on the various flood modellings studies that have been carried out by or on behalf of TCC, and has been available on the website since at least 2014. Prior to that time, property search services were available through TCC.

Detailed Submissions

- 2.23 TCC's detailed response to the terms of reference in the context of the response of TCC and TLDMG to the 2019 weather event is set out in sections 3 to 8 of this Submission.

3. Context

- 3.1 The City of Townsville, located as it is in tropical north Queensland, has throughout its history been the subject of intense seasonal weather events. It is not uncommon for Townsville to receive multiple severe weather warnings from the Bureau of Meteorology (**BOM**) throughout the summer months and for the areas around the city to experience an extended storm season (including tropical cyclones).
- 3.2 Despite the above, the City of Townsville itself has a reputation for being dry. As noted by the IGEM in 2016,² most of the Townsville community perceived there to be little to no risks associated with flooding as a result of releases from the RRD. In particular, the Townsville community identified that:
- (a) the low level of the RRD and Townsville's persistent drought conditions reduce the risk of flooding; and
 - (b) localised flooding due to rain (as opposed to that from releases from the RRD) is considered commonplace given the level of service of stormwater drainage attached to older established properties in some areas.
- 3.3 In the lead up to the 2019 weather event, Townsville and the RRD catchment area experienced extended periods of drought, which required TCC to implement a number of significant water restrictions. On 8 August 2016, Level 3 water restrictions were implemented before slightly easing to Level 2 on 17 March 2018 following a rainfall event.
- 3.4 Against this backdrop, the 2019 weather event was unprecedented. Throughout the event, rainfalls were measured at historic highs³ and the level of water in the RRD exceeded the greatest flood on record⁴ peaking at 43.00m and a capacity of 247%. Based on the hydrological analysis that has been subsequently conducted in the time available, the RRD experienced rainfalls and flood volumes over a 7 day period (from 29 January 2019 to 5 February 2019) that exceeded a "1,000 year" event. That is, the likelihood that events of this magnitude would occur in any one year is less than 1:1,000.⁵ This hydrological analysis has also indicated that the 2019 weather event may have been as rare as a 1:10,000 event.
- 3.5 Furthermore the 2019 weather event resulted in water levels in the RRD being over 2 metres higher (at the peak) than the previous flood record being 40.73m. The peak outflow from the RRD during the 2019 weather event occurred at approximately 10:30pm on 3 February 2019 and is estimated to be well in excess of a 1:100 event and most likely was in the order of a 1:300 to 1:500 event.
- 3.6 Given the volume of water inflow into the RRD,⁶ subsequent releases of water from the dam spillway gates were unavoidable. Unfortunately, despite the mitigation of the RRD, there was downstream flooding. When coupled with localised flooding in areas surrounding the City of

² Inspector-General Emergency Management Report 1: 2015-16, *Review of Seqwater and SunWater Warnings Communications*.

³ For example, at 2:00pm on 3 February 2019, BOM reported that 1,012mm of rain had fallen in Townsville over the previous seven days. This eclipsed the previous 7-day rainfall record for Townsville of 886.2mm in 1998.

⁴ Previously 40.73m in 2012.

⁵ An event with a 1:1,000 chance of being exceeded in any one year is also referred to as an event with an "average recurrence interval (ARI)" of 1,000 years, or 0.1% annual exceedance probability (AEP).

⁶ The total inflow volume into the RRD was 850,000 megalitres being 3.8 times the capacity of the RRD at its full supply level of 38.55m.

Townsville, as at 18 March 2019, over 25,500 insurance claims have been lodged by residents and businesses with the claims totalling in excess of \$1 billion.⁷

3.7 In addition, localised flash flooding (not connected with the RRD releases) was experienced at Bluewater Creek, Black River, Alligator Creek, Stoney Creek, Saunders Creek, Bohle River, Horseshoe Bay, Magnetic Island, Wulguru and Rollingstone Creek.

3.8 In responding to the unprecedented 2019 weather event, TCC and its representatives were an integral part of the coordinated efforts of the TLDMG in preparing the City of Townsville. Measures overseen by the TLDMG to protect life and private and public property included:

- (a) the coordination by the LDC of a multi-agency response to the 2019 weather event, including the ADF, SES, QPS, QAS and QFES;
- (b) the use of flood modelling by a number of hydraulic and hydrological consultants engaged to identify the likely downstream impact of releases from the RRD and working with SunWater (as the contractor responsible for operating the RRD) in relation to the timing and size of those releases;
- (c) issuing to the community:
 - (i) 50 emergency alerts;
 - (ii) over 200 traditional communications (i.e. media releases and radio and television interviews);
 - (iii) over 3,600 social media communications;
 - (iv) approximately 40 radio advertisements per day across local radio stations for a period of; and
 - (v) approximately 15 radio live reads per day across local radio stations for a period of;
- (d) the establishment of the 'Townsville Disaster Information' Facebook page which provided the community with 'real-time' updates and a channel for two-way communication;
- (e) the establishment of the emergency management dashboard which provided the community a central location for 'real-time' updates;
- (f) the provision of 143,000 sandbags and 9,000 tons of sand;
- (g) the provision of six evacuation centres that provided temporary accommodation which at its peak accommodated over 800 people on 3 February 2019 and remained open until 10 February 2019;
- (h) the deployment of more than 80 TCC trucks and 52 crews to support the community during the floods, including one TCC truck used to facilitate flood evacuations of residents under QPS direction;
- (i) the overseeing of over 700 jobs conducted by not-for-profit entities such as Team Rubicon, Combined Churches and Samaritan's Purse to assist those without insurance and over 400 washouts conducted by the SES; and
- (j) the mobilisation of resources to assist with bulk waste collection and the removal of debris, other damaged items and rubbish following the 2019 weather event. In this

⁷ Insurance Council of Australia, FNQ Monsoon Event Statistics, March 2019.

respect, the ADF collected 5,840 tons and TCC collected over 19,000 tons of bulk waste.

- 3.9 Importantly, given the size and scale of the 2019 weather event, the TLDMG set a benchmark that there would be no loss of life. Whilst all swift water operations and evacuations of flood affected residents were carried out successfully under the direction of QPS and other agencies and without any injury or loss of life, regrettably, despite these efforts and the repeated communication warnings, there were the unfortunate deaths of two people who failed to heed warnings about entering flood waters.
- 3.10 The 2019 weather event has required an enormous recovery effort by the Townsville community which is ongoing. The LRRG moved to 'Stand Up' on 4 February 2019 and has been chaired and coordinated by TCC representatives since that time. A detailed Recovery Plan has been drafted and endorsed by the TLDMG and it is anticipated that the TCC recovery phase will continue over the next 18 to 24 months.

4. Preparation and planning

- 4.1 Despite its unprecedented nature, TCC was well prepared to deal with the 2019 weather event as a result of the significant planning and activities it had undertaken over a number of preceding years.
- 4.2 TCC's planning and preparation included:
- (a) the development of an Emergency Action Plan for the RRD and a Local Disaster Management Plan as required by legislation;
 - (b) the development of a number of additional sub plans, including relevantly the:
 - (i) *Evacuation & Transport Sub Plan;*
 - (ii) *Shelters and Evacuation Centre Sub Plan;*
 - (iii) *Community Information and Warnings Sub Plan;*
 - (iv) *Impact Assessment Sub Plan; and*
 - (v) *Recovery & Resilience Sub Plan.*
 - (c) the appointment of SunWater as an expert dam operator for RRD;
 - (d) the construction of a purpose-built LDCC, headed by a highly-qualified and experienced Local Disaster Coordinator;
 - (e) historic flood studies and modelling, including the development of targeted Evacuation Zones;
 - (f) the identification of six flood-appropriate evacuation centres;
 - (g) undertaking simulated disaster management exercises and trainings, including in relation to a number of dam release scenarios; and
 - (h) adopting appropriate land use planning controls, including minimum habitable floor level requirements, which contributed to the flood models, and allowed valuable evacuation time where required.

Statutory Plans

Ross River Dam Emergency Action Plan

- 4.3 The obligations of TCC as owners of the RRD are mandated by the *Water Supply (Safety and Reliability) Act 2008 (WSSR Act)*. The WSSR Act is administered by the DNRME, with the chief executive being the "regulator" pursuant to section 10 of the WSSR Act.
- 4.4 Chapter 4 of the WSSR Act sets out the regulatory framework for "referable dams and flood and drought mitigation". While RRD is a referable dam for the purposes of the WSSR Act, the *Water Supply (Safety and Reliability) Regulation 2011* does not list the RRD as being a dam requiring a specific flood mitigation manual. Section 371A(2) of the WSSR Act provides that a referable dam may be prescribed in the Regulations as requiring a flood mitigation manual only where the chief executive considers the dam requires one having regard to:
- (a) whether the dam has significant water storage capacity exceeding the full supply level of the dam; and
 - (b) whether the dam can be safely and effectively operated under a flood mitigation manual to:

- (i) moderate the rate of outflow from the dam; and
- (ii) avoid significant damage to property caused by outflow from the dam.

4.5 Accordingly, in the absence of a requirement to hold a flood mitigation manual, the central document required to be held by the RRD as a referable dam under the WSSR Act is an Emergency Action Plan.

4.6 Section 352H of the WSSR Act relevantly requires each EAP to:

- (a) identify each dam hazard for the dam; and
- (b) for each dam hazard:
 - (i) identify the area likely to be affected by a dam hazard event or emergency event arising from the dam hazard, including, for example, by attaching to the plan maps showing areas vulnerable to flooding if the event were to happen;
 - (ii) identify each circumstance that indicates a material increase in the likelihood of the dam event or emergency event happening;
 - (iii) state when and how the owner of the dam plans to warn persons who may be harmed, or whose property may be harmed, by the dam hazard event or emergency event, if a circumstance mentioned in subparagraph (ii) arises or the dam hazard event or emergency event happens, including the order of priority in which the persons or categories of persons are to be warned;
 - (iv) state when and how the owner plans to notify the relevant entities for the dam if a circumstance mentioned in subparagraph (ii) arises or the dam, hazard event or emergency event happens, including the order of priority in which the relevant entities are to be notified; and
 - (v) state the actions the owner plans to take in response to the dam hazard event or emergency event.

4.7 For the purposes of section 352H of the WSSR Act, 'Dam hazard' is defined to mean a reasonably foreseeable situation or condition that may:

- (a) cause or contribute to the failure of the dam, if the failure may cause harm to persons or property; or
- (b) require an automatic or controlled release of water from the dam, if the release of the water may cause harm to persons or property.

4.8 The current version of the RRD's EAP is available on the DNRME website.

Local Disaster Management Plan

4.9 As a local government, TCC also has certain obligations under the *Disaster Management Act 2003 (Disaster Management Act)*.

4.10 The Disaster Management Act seeks to assist communities in mitigating, preparing for and responding effectively to disasters and emergency situations and provide for effective disaster management for the State.

4.11 Pursuant to section 4 of the Disaster Management Act, these objects are sought to be achieved by:

- (a) establishing disaster management groups for the State, disaster districts and local government areas;
 - (b) preparing disaster management plans and guidelines;
 - (c) ensuring communities receive appropriate information about preparing for, responding to and recovering from a disaster;
 - (d) declaring a disaster situation; and
 - (e) establishing the Office of the Inspector-General of Emergency Management (under Part 1A of the Disaster Management Act).
- 4.12 Part 2, Division 3 of the Disaster Management Act requires a local government to establish a Local Disaster Management Group for the LGA.
- 4.13 The functions of a Local Disaster Management Group are outlined in section 30 as follows:
- (a) to ensure that disaster management and disaster operations in the area are consistent with the State group's strategic policy framework for disaster management for the State;
 - (b) to develop effective disaster management, and regularly review and assess the disaster management;
 - (c) to help the local government for its area to prepare a local disaster management plan;
 - (d) to identify, and provide advice to the relevant district group about, support services required by the local group to facilitate disaster management and disaster operations in the area;
 - (e) to ensure the community is aware of ways of mitigating the adverse effects of an event, and preparing for, responding to and recovering from a disaster;
 - (f) to manage disaster operations in the area under policies and procedures decided by the State group;
 - (g) to provide reports and make recommendations to the relevant district group about matters relating to disaster operations;
 - (h) to identify, and coordinate the use of, resources that may be used for disaster operations in the area;
 - (i) to establish and review communications systems in the group, and with the relevant district group and other local groups in the disaster district of the relevant district group, for use when a disaster happens;
 - (j) to ensure information about a disaster in the area is promptly given to the relevant district group;
 - (k) to perform other functions given to the group under the Disaster Management Act; and
 - (l) to perform a function incidental to a function mentioned in paragraphs (a) to (k).
- 4.14 Part 3, Divisions 2 and 3 of the Disaster Management Act require district groups and local governments, respectively, to prepare disaster management plans that are consistent with the disaster management standards and disaster management guidelines, and include:

- (a) the Queensland Disaster Management 2016 Strategic Policy Statement, and the local government's policies for disaster management;
- (b) the roles and responsibilities of entities involved in disaster operations and disaster management in the area;
- (c) the coordination of disaster operations and activities relating to disaster management performed by the entities mentioned in paragraph (b);
- (d) events that are likely to happen in the area;
- (e) strategies and priorities for disaster management for the area;
- (f) the matters stated in the disaster management guidelines as matters to be included in the plan; and
- (g) other matters about disaster management in the area the group considers appropriate.

4.15 The current version of the Townsville Local Disaster Management Plan (**TLDMP**) was endorsed on 13 March 2018, with the next periodic review to be conducted by the TLDMG in April 2019. Further details on the operation of the TLDMG, including how the TLDMP was implemented during the 2019 weather event, is contained in section 5 below.

Flooding Analysis Initiatives

- 4.16 Given the regular threat of cyclones, storm water surges and rain events experienced by the City of Townsville, TCC has proactively undertaken a number of studies in relation to river flooding, creek flooding, coastal hazards and storm surges. The results of those studies have informed land use planning in Townsville, have been used to educate property owners about their flooding risk through flood mapping services, and have been used to inform disaster management strategies. In addition, as owner of the RRD, TCC has methodically planned and prepared for the impact of weather events on the operation of the RRD.
- 4.17 TCC commenced upgrading its flood studies in at least 2010. Further, in the period following the significant flood event which impacted Brisbane in January 2011, TCC has participated in, commissioned, and/or been the subject of a number of significant studies and initiatives to address flooding, particularly in relation to outflows from the RRD.
- 4.18 TCC continues to update its flood studies to reflect the latest available flood estimation data and procedures resulting from the revision of Australia's National Flood Estimation Guideline (Australian Rainfall and Runoff) in 2016.

Ross River Dam: 2010 - 2011 Flood Events

- 4.19 For four months between mid-December 2010 and early April 2011, the City of Townsville was subject to several separate, but virtually continual, flood events including as a result of Tropical Cyclone Yasi. A review of these flood events indicated that the highest storage level in the RRD was 40.058m, the peak inflow into the dam was 1,167m³, and the peak outflow through the spillway gates was 235m³/second.
- 4.20 In the lead up to Tropical Cyclone Yasi, TCC directed SunWater to lower the dam capacity from 101.2% to 90%. In reviewing this action, it was noted that the pre-release delayed the peak outflow by six hours but had little effect on flood levels downstream of the dam.

Draft Ross River Flood Study (2011)

- 4.21 The Draft Ross River Flood Study was undertaken in 2011 as part of TCC's City Wide Flood Constraints project. The study developed a hydrological⁸ and hydraulic model⁹ for downstream of the dam. The modelling used historic outflow events from the RRD to determine the downstream effects on the City of Townsville.
- 4.22 The results of the modelling showed a significant increase in the number of properties impacted in the 100 Year Average Recurrence Interval (**ARI**) flood compared to the 50 Year ARI flood.¹⁰ This significant increase in the number of affected properties was identified as being a result of the large increase in dam outflows between the 50 and 100 Year ARI events associated with triggering a full opening of the RRD gates.

'A Review of Ross River Dam Gate Operations to Improve Downstream Flood Immunity'

- 4.23 As a result of the 2011 flood modelling, TCC identified that the review of the RRD gate operations provided an opportunity for reducing the flooding impact in a 100 Year ARI flood. 'A Review of Ross River Dam Gate Operations to Improve Downstream Flood Immunity' was conducted to understand whether gate operations could be used as a potential measure for reducing the extent of downstream flooding.
- 4.24 This review of dam operations demonstrated that by throttling the dam outflows to a higher water level in the dam, a reduction in downstream flooding could be achieved with minimal adverse impacts. The change in operations meant that up to 90% of properties previously identified as flood impacted would no longer be impacted by the 100 Year ARI flood.
- 4.25 Subsequently, the RRD's EAP was updated to include new gate operations. A table comparing the downstream flooding impact of the previous operations to the revised operations is contained at Appendix B1 to the EAP.

Ross River Dam: March 2012 Flood Event

- 4.26 In March 2012, Townsville experienced a flood event which lasted for 12 days, with the RRD peaking at 40.73m, resulting in all three gates opening to 2m allowing for discharges of 471m³/second. A review of this flood event indicated that there was an issue in interpreting the EAP's gate sequences when the flood was in recession.
- 4.27 As a result, the EAP was subsequently updated to include Table C9 which provides detailed information on gate operations when flood waters are both rising and receding.

Ross River Flood Study - Baseline Flooding Assessment (January 2013).

- 4.28 In January 2013, an amended final RRD Flood Study was prepared as part of TCC's City Wide Flood Constraints project. Like the 2011 draft study, the final study developed a hydrological¹¹ and hydraulic model¹² for downstream of the dam.
- 4.29 The final modelling took into account the change in the RRD gate operations (as noted at 4.25 above), which reduced outflows for events up to the 200 Year ARI flood, but increased outflows for events greater than 500 Year ARI. During the 2019 weather event, TCC used a

⁸ Represented using XP-RAFTS.

⁹ Using a MIKE FLOOD model.

¹⁰ 85 properties up to 960 properties.

¹¹ Represented using XP-RAFTS.

¹² Using a MIKE FLOOD model.

summary of the model (in addition to assessments from hydrological consultants and ahead of revised flood forecasting) as a means of quickly assessing the likely downstream impacts that would be experienced as a result of TCC's instructions to SunWater to manually operate the RRD gates.

IGEM Report 1: 2015-16 - Review of Seqwater and SunWater Warnings Communications

- 4.30 In 2015-2016, the IGEM conducted a review into Seqwater and SunWater's warning communications as they had previously been criticised by downstream residents across Queensland for their perceived and untimely warnings and notifications. In conducting its review, the IGEM focused in particular on interactions with local councils and disaster management groups.
- 4.31 As noted at 3.2 above, according to the IGEM review, most of the Townsville community perceived there to be little or no risks associated with flooding from releases from the RRD. In particular, the Townsville community identified that:
- (a) the low level of the RRD and drought conditions reduced the risk of flooding; and
 - (b) localised flooding due to rain (as opposed to that from the RRD) is considered commonplace given the level of service of stormwater drainage attached to older established properties in some areas.
- 4.32 Whilst the Townsville community perceived there to be little or no risk associated with flooding from the RRD, in the past they had been critical of communications, both from SunWater and TCC in relation to flooding from the RRD. According to the IGEM's review, in the past some residents had not received any flood warnings, some residents had received text messages from TCC regarding weather issues, however otherwise residents were required to rely on radio and television for information.
- 4.33 As a result of the IGEM review, the TLDMG revised its *Community Information and Warnings Sub Plan*, to include a template of key community messages that may be issued both before, during and after events, such as the 2019 weather event. In addition, the TLDMG generally reviews each of its plans annually. Annexure A is a summary table of the key announcements TCC, as part of the TLDMG, issued to the community throughout the 2019 weather event.

IGEM Report 2: 2017-2018 - Review of capability at a district and local level Townsville disaster district

- 4.34 In 2017-2018 the IGEM conducted a review of the Townsville disaster district's capability to deliver acceptable disaster management outcomes. The capabilities of the Local Disaster Management Groups of Townsville, Burdekin, Hinchinbrook, Palm Island, Charters Towers, Flinders and Richmond were assessed with respect to:
- (a) hazard identification and risk assessment;
 - (b) hazard mitigation and risk reduction;
 - (c) preparedness and planning;
 - (d) emergency communications;
 - (e) response; and
 - (f) relief and recovery.
- 4.35 Across each of these Local Disaster Management Groups, the TLDMG performed the best, receiving "strong" ratings for hazard mitigation and risk reduction, preparedness and planning

and emergency communications,¹³ and "well placed" ratings for hazard identification and risk assessment, response and relief and recovery.¹⁴

4.36 With respect to each of the above criteria, the IGEM specifically noted the following with respect of the TLDMG's operations:

- (a) in identifying hazards and assessing risks, the TLDMG:
 - (i) used evidence-based information from a board range of sources;
 - (ii) was informed by valid data;
 - (iii) drew on lessons identified through extensive exercises and previous activations; and
 - (iv) ensured its stakeholders have a shared understanding of, and access to, risk information for all types of events through their TLDMP and supporting documents;
- (b) the TLDMG mitigated hazards and reduces risks by:
 - (i) working with TCC's planning team to ensure risk and mitigation information informed land use planning;
 - (ii) developing strategies in partnership with relevant stakeholders which were reviewed regularly by individuals or entities skilled in the processes; and
 - (iii) conducting simulations of disaster events to engage in and review disaster management activities;
- (c) the TLDMG planned and is prepared for disaster events as:
 - (i) it had in place a TLDMP which undertook an annual review, including testing the communication systems, desktop and operational exercises and debriefing following any actual events;
 - (ii) the TLDMP had a comprehensive suite of sub plans which included evacuation, resupply, environmental health and local recovery and reconstruction; and
 - (iii) had established eight working groups to support the planning and implementation of the TLDMP and its sub plans;
- (d) in communicating disaster events to the community, the TLDMG was well-equipped as it:
 - (i) had, in one place, an emergency management dashboard which contained information about power outages, emergency contacts, evacuation centres, road conditions including closures;
 - (ii) used a state-of-the-art "Guardian" system as its primary disaster management information and communication platform;

¹³ A "strong" rating meant that the Local Disaster Management Group exhibited "*outstanding capability supported by evidence of good practice and capacity to sustain*".

¹⁴ A "well placed" rating meant that the Local Disaster Management Group had "*capability gaps... identified and practical improvements are planned or underway, with capacity to achieve outcomes*".

- (iii) surveyed the Townsville community and had comprehensive profiles on areas to identify population size, hazardous and critical infrastructure and vulnerable features;
- (e) in responding to disaster events, the TLDMG was well-placed as it:
 - (i) had strong rapport between member agencies which had been developed outside of periods of activation to ensure trusted working relationships were established and could be relied upon in times of emergency;
 - (ii) used meeting minutes to articulate and disseminate command decisions with agency action items and return dates; and
 - (iii) utilised its staff members and external partners to inform command decision making with timely and accurate data. Here, particular reference was made to the TLDMG's decision during Tropical Cyclone Debbie in 2017 to use storm tide modelling layered over Evacuation Zones to support decisions about risks to the community; and
- (f) the TLDMG provided community relief and recovery assistance by:
 - (i) working in conjunction with QFES to assess the impact of disasters on the community;
 - (ii) identifying special interest groups whose needs may be prioritised; and
 - (iii) establishing partnerships with key relief and recovery stakeholders, like Team Rubicon (ADF veterans) and St Johns Ambulance Service.

4.37 Whilst it was identified by the IGEM that there were areas for improvement, the IGEM found that the Townsville district's disaster capability was highly effective, sophisticated and capitalised on the expertise and local knowledge of its team members.

Publicly Available Flooding Information

- 4.38 In relation to current development controls that apply to the TCC LGA, TCC:
- (a) publishes a range of publicly available engineering reports on TCC's website;
 - (b) publishes interactive EPlanning mapping which allows a person to identify whether the Flood Hazard Overlay Maps affects premises; and
 - (c) since October 2014, permits access free of charge to property-level flood reports.¹⁵
- 4.39 Further information in relation to the publically available flooding information is explained in further detail in section 8 below.

Council's Actions to Mitigate Flood Risk

Local Disaster Coordination Centre

4.40 To mitigate disaster risk generally for the City of Townsville, TCC completed the construction of a purpose-built LDCC in Garbutt in December 2018. The LDCC has a number of design features that make it a crucial operations hub in times of disaster. These include:

¹⁵ This service commenced in October 2014.

- (a) dedicated rooms and work spaces for Communications, Intelligence & Planning, external agencies, and a Board Room for TLDMG operational meetings;
- (b) an audio-visual system that provides the ability to stream multicast video;
- (c) interactive projectors and an Operations TV Wall Panel (six panels) to allow viewing in multiple formats;
- (d) a task management and communication software program known as "Guardian" which is commonly used across the local government sector;
- (e) kitchen, bathroom and sleeping facilities;
- (f) self-sufficient electricity generators;
- (g) a dedicated fuel storage;
- (h) a potable water supply with its own pump, filtration and sterilisation system; and
- (i) a sewer pump with 48 hours storage capacity.

4.41 In times of disaster, the LDCC has the capacity to operate with over 100 people within the centre.

4.42 On 20 March 2017, TCC employed Mr Wayne Preedy as its Manager of Emergency Management. As part of his role under the TLDMG, Mr Preedy is the Local Disaster Coordinator and has primary responsibility for the operation of the LDCC. Mr Preedy is extremely experienced and highly trained in disaster management, having held specialised roles in the ADF, the State Counter Disaster Organisation, and QFES.

Flood modelling and Evacuation Zones

4.43 The TLDMG's *Evacuation & Transport Sub Plan* contains a number of pre-determined Evacuation Zone maps referable to flooding occurring from storm tide, tsunami and riverine flooding associated with releases from the RRD. These maps have been developed through the use of sophisticated flood modelling software and are used to inform decision-making as to which areas require evacuation in a particular disaster situation.

4.44 Annexure C3 of the RRD's EAP contains four Evacuation Zones for flooding associated with releases from the RRD:

- (a) **Black Zone** - The Black Zone represents the areas of Townsville first impacted by flows within Ross River. The Black Zone depicts areas with flood emergency issues for flows of 570m³/second from RRD, which equates to a dam water level of 41.1m Australian Height Datum (**AHD**) when operated in accordance with the EAP procedures. Areas within the Black Zone include parts of Rosslea and parts of Railway Estate which may also be impacted when tidal levels are elevated. With standard operating conditions under the EAP for the dam gates, the probability of this event is 5% in any given year (being a 1:20 event). Rainfall downstream of RRD will also influence flooding, potentially beyond the Black Zone depicted;
- (b) **Brown Zone** - The Brown Zone represents the areas of Townsville impacted by flows at the upper limit of the gate operations for RRD. The Brown Zone depicts areas with flood emergency issues for flows of 960m³/second from RRD, which equates to a dam water level of 42.5m AHD under standard operating conditions. As dam water levels rise above this level, the gates will fully open as part of the standard operating conditions under the EAP procedures required by the dam safety regulator. Areas within the Brown Zone include parts Rosslea, Railway Estate, Oonoonba and Idalia. With standard operating conditions for the dam gates, the probability of this event is 0.5% in any given year (being a 1:200 event). Rainfall

downstream of RRD will also influence flooding, potentially beyond the Brown Zone depicted;

- (c) Pink Zone - The Pink Zone represents the areas of Townsville impacted by large flows from RRD once the gates are no longer able to control the releases downstream. The Pink Zone depicts areas with flood emergency issues for flows of 2,100m³/second from RRD, which equates to a dam water level of 43.8m AHD under standard operating conditions under the EAP. Areas within the Pink Zone include parts of Rosslea, Railway Estate, Oonoonba, Idalia, Hermit Park, Hyde Park, Pimlico, Currajong, West End, Mundingburra, Aitkenvale, Annandale, Douglas, Kirwan, and South Townsville. With standard operating conditions under the EAP for the dam gates, the probability of this event is 0.05% in any given year (being the 1:2,000 event). Rainfall downstream of RRD will also influence flooding, potentially beyond the Pink Zone depicted; and
- (d) Green Zone - The Green Zone represents the areas impacted by flows in the event of a failure of the RRD. The Green Zone depicts areas with flood emergency issues for a collapse of the dam embankment followed by a massive outflow from the RRD. Much of the urban area of Townsville around and to the east of the Bohle River is within the Green Zone, other than higher ground around Mount Louisa, Castle Hill and Mount Stuart (Annandale/Douglas). The probability of the dam failure is difficult to quantify, however it would be an extremely rare event, with a probability far lower than that for the Pink Zone event.

4.45 It should be noted that during the peak of the 2019 weather event, the Black Zone, Brown Zone and the Pink Zone were essentially merged so that only the Pink Zone was referenced by the TLDMG. This is because the Zones are considered cumulatively.

Evacuation Centres

- 4.46 The TLDMG's *Shelters and Evacuation Centre Sub Plan* contains details on cyclone shelters, places of refuge and evacuation centres. Specific to flooding events, the evacuation centres have been established to provide emergency accommodation for evacuees following a disaster event which has caused significant damage or flooding of their usual place of residence. TCC has a MoU with Red Cross to manage the evacuation centres in the event of an emergency.¹⁶
- 4.47 Pre-determined evacuation centres were identified due to their location outside of flood-prone areas and their capability to provide sufficient services to ensure evacuees are comfortable including space for sleeping, kitchen facilities, toilets, showers, waste facilities, storage and recreational areas. Basic human necessities such as accommodation, toilet and hand washing facilities are provided at evacuation centres in addition to food, clothing and bedding supplies, welfare and recovery services and general comforts where possible. The evacuation centres provided temporary accommodation which at its peak accommodated over 800 people on 3 February 2019 and remained open until 10 February 2019.
- 4.48 The evacuation centres that were open during the 2019 weather event were:
 - (a) Heatley;
 - (b) North Shore;
 - (c) Alligator Creek
 - (d) Ignatius Park;
 - (e) Bluewater;

¹⁶ The SES are to manage the evacuation centres where Red Cross are unable to.

- (f) YWAM; and
- (g) a supplementary evacuation centre was established by the ADF at the Lavarack Barracks gym.

Operation Dam You Huey

- 4.49 In October 2016, the TLDMG participated in an emergency management discussion exercise entitled *Operation Dam You Huey*. This exercise was designed to simulate an extreme rain event involving significant outflows from the RRD, including at levels that triggered the EAP and associated support plans of the TLDMP.
- 4.50 The training exercise was run by Mr Wayne Preedy (the then Emergency Management Coordinator for the Northern Region of QFES) and modelled the following scenarios (including the use of the Black/Brown/Pink/Green Evacuation Zones):
- (a) *Script 1 - the RRD at 100% with 400mm of rain expected in the next 24 hours - with normal gate operations, flows in Ross River downstream of the dam are likely to peak at 750m³/second;*
 - (b) *Script 2 - the RRD at 100% with BOM advice that localised falls within the dam catchment have already exceeded 400mm and a further 200mm is still likely to fall within the next 24 hours. SunWater advises that RRD gate operations commenced at 0700hrs this morning and gates have been opening in-line with the operating rules of the dam. All three gates are presently 0.5m open with outflows at 120m³/second. SunWater has estimated that based on the revised meteorological forecast, dam operating rules will require the gates to fully open around 0600 tomorrow morning. Flows in Ross River downstream of the dam are likely to peak around 0900hrs at 1,800m³/second; and*
 - (c) *Script 3 - a catastrophic mechanical failure of the RRD gates means that the gates are fixed open at 1.5m open and cannot currently open any further to respond to rising water levels in the dam. While flows from the dam hover around 400m³/second, the water level has already reached the flood of record height within the dam. Inflows to the dam continue and SunWater estimates that with the current gate issues, water levels in the dam are likely to peak at 3m above the flood of record height around 0600 tomorrow morning. The dam embankment is untested at this water level, and pressure sensors within the embankment around chainage 2000 have increased beyond previously observed levels. Furthermore, if the current gate issues are unresolved, there will be between 1.5 to 2 metres of water flowing over the top of the gates. There is a very real chance of dam failure due to either embankment piping or structural gate failure and dislodgement.*
- 4.51 The exercise had as its objectives to:
- (a) test the activation of the following subgroups of the TLDMG:
 - (i) Evacuation;
 - (ii) Transport;
 - (iii) Warnings and Alerts;
 - (iv) Evacuation Centres and Shelters;
 - (b) evaluate the current membership of subgroups and structures;
 - (c) evaluate the effectiveness of warning mechanisms used; and
 - (d) evaluate the effectiveness/workability of Incident Action Plans/processes that had been developed for endorsement by the TLDMG.

4.52 An official evaluator was present throughout *Operation Dam You Huey* and reported that:

"the processes of coordination, information management (including media communications), the development of EAs and the work of the evacuation planning group were successfully conducted.

And

"The exercise also demonstrated the need for the LDMG to reconsider the makeup and membership of the various sub-groups because it became very evident that many persons had membership on a number of sub-groups and consequently could not contribute to more than one sub-group. In some cases the chair of many sub-groups was the same person. This cannot be achieved in an operational environment."

4.53 In response to the feedback received following *Operation Dam You Huey*, a review of the TLDMG subgroups was conducted which resulted in the memberships of these subgroups being more appropriately constituted to address this feedback.

5. The Response to the Weather Event

Scale of Weather Event

- 5.1 As stated above, the 2019 weather event was unprecedented. Throughout the event, rainfalls were measured at historic highs and the level of water in the RRD exceeded the greatest flood on record peaking at 43.00m and a capacity of 247%.
- 5.2 As discussed earlier based on the hydrological analysis that has been subsequently conducted in the time available, RRD experienced rainfalls and flood volumes over a 7 day period (29 January 2019 to 5 February 2019) that exceeded a "1,000 year" event and may have been as rare as a 1:10,000 event.
- 5.3 Furthermore the 2019 weather event, resulted in water levels in RRD being over 2 metres higher (at the peak) than the existing flood of record being 40.73m. The peak outflow from the RRD during the 2019 weather event is estimated to be well in excess of a 1 in 100 event and most likely this was in the order of a 1:300 to 1:500 event.

Summary of the Response

- 5.4 The 2019 weather event escalated very quickly in the critical period between 30 January 2019 and 7 February 2019.
- 5.5 It is against this background that the response of the TLDMG and TCC must be considered.
- 5.6 On 30 January 2019, TCC fully activated its LDCC and operational meetings of the TLDMG were convened twice daily. These meetings provided the forum for the assessment of:
- (a) updated intelligence and information regarding the existing and predicted weather; and
 - (b) the status of essential services, to facilitate the coordination of the disaster management response by TCC, and including its stakeholders being both core and advisory members of the TLDMG.
- 5.7 The large scale response in managing the 2019 weather event, including the resulting recovery strategy and implementation, was coordinated by the TCC through the TLDMG and involved significant resources being deployed by TCC in conjunction with the QPS and the ADF.
- 5.8 As result of the coordinated response, essential services such as power, water and sewerage were largely maintained and restored (as was required from time to time), local and State roads were cleared, residents were doorknocked and evacuated as required, waste disposal and collection was resumed promptly and evacuation centres and shelters were utilised.
- 5.9 During this period, TCC used a variety of media for communicating with the Townsville community. The primary channel for distribution was TCC's emergency management dashboard which, for example, during the course of 2 February 2019 received in the order of 297,803 views and across the entire 2019 weather event received 3,747,716 views. Other media included emergency alerts via SMS and voice messages, six digital billboards located around Townsville, Twitter, Facebook, media releases, media alerts, radio interviews, advertisements and live reads as well as television interviews.

Weather Response

Townsville Local Disaster Management Group

- 5.10 The response by TCC to the extreme weather changes during the course of the 2019 weather event was managed by the TLDMG and coordinated by the LDC in accordance with the TLDMP.

- 5.11 This process accords with section 4A(c) of the Disaster Management Act which provides that TCC through the TLDMG retains primary responsibility for managing disaster events contained within the LGA.
- 5.12 As set out in the Disaster Management Act, the role of the LDC is crucial being the person responsible for the coordination of the disaster operations of the TLDMG. As stated, this role was held by Mr Wayne Preedy.¹⁷
- 5.13 The TLDMG operated from the purpose built LDCC in Garbutt, Townsville. As set out below the LDCC provided the central meeting and control point for information flow and decisions by key stakeholders during the 2019 weather event.
- 5.14 On 30 January 2019 at 4.30pm, the TLDMG issued the Event Action Plan for the period 30 January 2019 to 6 February 2019 to provide the template for the TLDMG "*To respond and minimise impact to the community from the predicted rainfall and flooding associated with the Monsoonal trough impacting Townsville over late January and early February 2019*". The objectives set out in the Event Action Plan were:
- (a) make the best use of forecast information to inform the event response;
 - (b) deliver clear and effective communication to the community to support event response; and
 - (c) coordinate appropriate response agencies to achieve correct level of capacity and capability in dealing with request for assistance.
- 5.15 In the period from 30 January 2019 until 6 February 2019, the TLDMG issued 11 Situation Reports¹⁸ (**SITREPs**). Operational meetings of the TLDMG commenced on 31 January 2019 and occurred twice each day until 11 February 2019.
- 5.16 In compliance with the section 5.4.1 of the TLDMP, the SITREPs were widely distributed to the TLDMG, the Townsville District Disaster Management Group, the State Disaster Control Centre (**SDCC**) as well as TCC councillors, and State members.
- 5.17 The core members of the TLDMG included key stakeholders within TCC as well as Ergon Energy (**Ergon**), QAS, QPS, QFES, SES and the Townsville Hospital & Health Service (**THHS**). In addition, the following important stakeholder groups were represented at the operational meetings as advisory members:
- (a) ADF;
 - (b) AirServices Australia;
 - (c) Australian Red Cross;
 - (d) BOM;
 - (e) Department of Communities, Disability Services and Seniors;
 - (f) Department of Transport and Main Roads (**TMR**);
 - (g) NBN;
 - (h) Optus;

¹⁷ Mr Preedy's experience for the role is set out in paragraph 4.42 above.

¹⁸ SITREP 11 was issued on Thursday 7 February but applied for the period from 12:00pm on 6 February until 12:00pm on 7 February 2019.

- (i) SunWater;
- (j) Telstra; and
- (k) Townsville Airport Pty Ltd.

5.18 The operational meetings convened by the TLDMG provided the forum for the core and advisory members of the TLDMG and the LDC to consider, review and discuss:

- (a) Emergency Management Reports issued by the SDCC;
- (b) the weather over each previous 24 hour period and the forecast provided by BOM. This information was critical to the decision making process;
- (c) rainfall data from BOM and observations provided on Torrent Rainfall and Distribution Information System (**TARDIS**). TARDIS displays rainfall and river level data from 2009 to present sourced from TCC's gauging network. The system allows TCC to view present and historical rainfall levels, enabling TCC to track water levels in flood prone areas;
- (d) RRD intelligence and advice from the SunWater Flood Operations centre;
- (e) the RRD operations including forward strategy;
- (f) flood prediction and hydrology advice;
- (g) updates from emergency service stakeholders such as QPS, QFES, QAS, SES;
- (h) updates from Ergon;
- (i) updates from THHS as to their current concerns and planned actions;
- (j) the activities being undertaken by TCC;
- (k) the status of essential transport services (road, rail, air and marine) and telecommunications (Telstra, Optus and NBN);
- (l) updates on communications delivered to the community as well as a report on what the community's concerns and messages were as they became aware by way of social media and the LDCC's call centre;
- (m) developments and planning with respect to TCC shelters and evacuations centres; and
- (n) updates from Government Departments (including but not limited to the ADF and the Department of Housing and Public Works).

Early stage (8 January - 28 January 2019)

5.19 On 8 January 2019, TCC were informed that 24 hour monitoring of the RRD had commenced. In the period from 8 January 2019 until 28 January 2019, the TLDMG (through its Chair - Mayor Jenny Hill), the LDCC (through the LDC) and the Townsville City Council Emergency Response Group (through Mr Mike Chiodo) monitored the weather and related intelligence from a variety of advice sources including:

- (a) RRD intelligence and advice from the SunWater Flood Operations centre;
- (b) SDCC notifications - Emergency Management Reports, Weather Briefings and Flood Watches; and

- (c) reports and forecasts from BOM regarding Tropical Cyclone Penny and associated flood watches.
- 5.20 Over this time the TLDMG maintained a careful watch with respect to the developing weather situation as the monsoon trough associated with Ex-Tropical Cyclone Penny extended across far North Queensland and heavy rainfall was predicted with the associated risk of potential flooding.
- 5.21 Notably, TCC were advised on 27 January 2019 that based on the predicted rainfall, outflows from the RRD remained unlikely.
- 5.22 Ultimately, the predicted heavy rainfall in the Townsville area over this early stage did not eventuate. Nonetheless, the TLDMG continued to monitor the situation.

Critical stage (29 January - 8 February 2019)

- 5.23 From 29 January 2019, the weather deteriorated rapidly with a resulting increases in both rainfall and flood related communications from advice sources.
- 5.24 Key actions undertaken by the TLDMG in this period were:
- (a) continued monitoring of BOM flood reports and warnings;
 - (b) continued monitoring of SDCC flood watches;
 - (c) continued monitoring of intelligence and advice from the SunWater Flood Operations centre;
 - (d) moving to 'Alert' on 30 January 2019 at 11:00am and then 'Stand Up' at 1:00pm;
 - (e) communicating with SunWater regarding the EAP and associated dam operations;
 - (f) issuing SITREPs from 30 January;¹⁹
 - (g) issuing an Event Action Plan which contained three objectives (as outlined at 5.14 above);
 - (h) increasing staffing and the hours of operation of the LDCC;
 - (i) communicating in 'real-time' with the public through social media, the emergency management dashboard and the LDCC's call centre;
 - (j) convening meetings of the TLDMG from 10:00am on 30 January 2019 and activating the convening of the Evacuation and Transport Working Group;
 - (k) considering emergency services updates from QPS, QFES, QAS, SES and Ergon;
 - (l) engaging GHD from 31 January 2019 for advice regarding potential impacts on the integrity of the RRD embankment from pre-emptive water releases;
 - (m) engaging Mr Chris MacGeorge from QIT Plus to provide specialist hydrology advice to assist with decisions regarding releases from RRD and assessment of potential flooding impacts;
 - (n) conferring with DNRME regarding manual operation of the RRD gates on 31 January 2019; and

¹⁹ SITREPs were issued by TLDMG on 30 and 31 January 2019 and 1-9 February 2019.

- (o) making determinations regarding pre-emptive water releases and the manual operation of the RRD gates. The operation of the RRD and associated emergency procedures is discussed in detail in section 6 below.
- 5.25 The coordination of the response was aided by the use of the bulk SMS messaging system first introduced during Tropical Cyclone Debbie to facilitate rapid communications between the TLDMG, LDCC and TCC councillors and staff.²⁰
- 5.26 Around 5 February 2019, TLDMG was also involved with meetings convened by subgroups focused on the recovery strategy and actions that would follow the critical phase and in response to the flooding and impacts on infrastructure. The recovery stage is discussed in further detail below at 5.28 below.
- 5.27 Other actions undertaken by TLDMG at this time included the preparation of a prioritisation matrix for evaluating emerging issues on 6 February 2019.

Recovery stage (4 February 2019 onwards)

- 5.28 The TLDMG incorporates a recovery strategy to be implemented following a disaster. The strategy involves a coordinated, multi-agency approach and is set out in the *Townsville District Community Recovery Plan*. The strategy has been developed to include all functions of recovery including human-social, infrastructure, economic and environmental.
- 5.29 Within the TLDMG, the LRRG exists which is chaired and coordinated by TCC representatives.²¹ In addition, the LRRG is comprised of members from:
- (a) Department of Communities, Child Safety and Disability Services;
 - (b) Department of Housing and Public Works;
 - (c) Department of Environment and Science;
 - (d) Department of State Development;
 - (e) Department of Transport and Main Roads;
 - (f) Australian Red Cross; and
 - (g) Queensland Health.
- 5.30 The LRRG operates in accordance with the *Local Recovery and Resilience Sub Plan* and incorporates the following key elements of recovery:
- (a) Recovery Coordination and Management;
 - (b) Community Recovery;
 - (c) Infrastructure Recovery;
 - (d) Environmental Recovery; and
 - (e) Economic Recovery.

²⁰ Inspector-General Emergency Management Report 2: 2017-18, *Review of capability at a district and local level Townsville disaster district*.

²¹ During the 2019 weather event, the LRRG was Chaired by the TCC Deputy Mayor and the Local Recovery Coordinator was the TCC Director, Planning & Community Engagement.

- 5.31 The LRRG also oversees four subgroups, each of which is chaired by a TCC Councillor:
- (a) Human/Social Subgroup - coordinates planning and implementation of recovery in the areas of safety and well-being, physical and psychological health;
 - (b) Economic Subgroup - coordinates planning and implementation of regional and economic recovery and resilience in the TCC;
 - (c) Built Environment Subgroup - coordinates planning and implementation of housing, commercial and industrial buildings and structures, physical infrastructure (including power, water, telecommunications, transport) as well as ensuring recovery and rebuilding of damaged Council infrastructure; and
 - (d) Natural Environment Subgroup - coordinates recovery of the natural environment.
- 5.32 The Local Recovery Coordinator (**LRC**) is a key member of the LRRG while also being a core member of the TLDMG. On 4 February 2019, the TLDMG noted that the LRRG moved from 'Lean Forward' to 'Stand Up'. The first meeting of the LRRG was held at 3:00pm on 4 February 2019 and the development of the *Townsville Monsoon Trough Rainfall and Flood January - February 2019 - Recover Plan (Recovery Plan)* for the 2019 weather event was commenced.
- 5.33 The Recovery Plan identifies the need for both immediate recovery as well as staged recovery as the City of Townsville continues to rebuild following the 2019 weather event. Ongoing tasks identified for the LRRG include public information and public relations, meeting with community organisations, and implementing funding strategies.
- 5.34 Appended to the Recovery Plan is an Action Plan for each subgroup. The recovery strategies for each subgroup were identified as follows:
- (a) Human/Social Subgroup Action Plan - understand the impact of the event as the base for informed recovery activities. Tasks include:
 - (i) working with the Department of Housing and Public Works to provide accommodation needs;
 - (ii) working with the Department of Communities to provide financial support;
 - (iii) working with partner organisations to provide personal needs (e.g. clothing, food, transport, medicine etc.);
 - (iv) the provision of psychosocial support;
 - (v) restoration of personal belongings;
 - (vi) support the health, safety and wellbeing of community members; and
 - (vii) conduct activities to aid recovery and build community resilience;
 - (b) Economic Subgroup Action Plan - coordinate economic recovery through:
 - (i) making contact with other councils to understand level of impact;
 - (ii) developing and enacting the local Economic Recovery Strategy;
 - (iii) developing and conducting business surveying;
 - (iv) appointing an economic analyst;
 - (v) compiling an economic impact assessment data;
 - (vi) establishing and operating the Business Recovery Centre;

- (vii) investigating and confirming subsidies available to affected businesses; and
- (viii) engaging with insurance agencies;
- (c) Built Environment Subgroup Action Plan - coordinate recovery by:
 - (i) facilitating Queensland Government agencies and service providers to restore essential public infrastructure;
 - (ii) implementing a waste management strategy including by establishing temporary transfer stations for residents and coordinating the disposal of hazard materials and flood debris;
 - (iii) undertaking a QFES-led assessment of damage;
 - (iv) coordinating the restoration of critical infrastructure;
 - (v) coordinating volunteers;
 - (vi) programming and planning repair work;
- (d) Natural Environment Subgroup Action Plan - coordinate recovery by:
 - (i) conducting impact assessments including of city waterways, river and creek banks, wetlands, grasslands, freshwater ecology, coral reef and marine ecosystems, and plants and animals;
 - (ii) establishing ecological restoration, resilience and adaptation activities and projects;
 - (iii) arranging community based clean-up activities; and
 - (iv) sustainability resilience planning.

5.35 It is anticipated that the implementation of TCC's recovery strategy will continue for a period of up to 18 to 24 months.

Informing the Community

- 5.36 The provision of critical information to the community is a key element of TCC's disaster response and this has been reinforced by previous experience with recent weather events such as Tropical Cyclone Debbie in 2017.
- 5.37 That this was a priority for the TLMDG is reflected in the early identification of objective 2 of the Event Action Plan issued on 30 January 2019 (i.e. deliver clear and effective communication to the community to support event response).
- 5.38 Communications to the broader community were undertaken in accordance with the requirements of the *Community Information and Warnings Sub Plan*.²² As set out in that sub plan, the focus of communications was to ensure the community was informed of :
- (a) the development of the 2019 weather event;
 - (b) the progress made in combating the 2019 weather event; and
 - (c) the threats to the community and the actions to be taken.

²² Version 5 November 2018.

- 5.39 The marketing and media team from TCC was activated at the time of the TLDMG moving to 'Stand Up' and communications activities were coordinated through the TLDMG. The primary means for the dissemination of information to the community about the 2019 weather event was TCC's emergency management dashboard which provided a user-friendly platform for provision of TCC emergency news and displaying updates from BOM, TMR and other agencies.
- 5.40 A summary table of the key announcements to the community is set out in Annexure A.
- 5.41 A summary of the Emergency Alerts sent between 31 January 2019 and 8 February 2019 regarding flooding and evacuations is set out in Annexure B.

Protecting life and private and public property

- 5.42 The TLDMG commenced operational meetings from 10:00am on 31 January 2018. These meetings provided the forum for updates from emergency services stakeholders (QPS, QFES, QAS and SES) and facilitated cooperation between agencies with respect to:
- (a) communication of information to the community regarding the status of the 2019 weather event;
 - (b) identification of issues of significance to a variety of agencies such as power supply, flooding, telecommunications and road closures;
 - (c) feedback received by the community by way of social media and the LDCC's call centre;
 - (d) doorknocking of residents in relation to flood risk;
 - (e) relocation of the public from flooded areas;
 - (f) coordinating the opening of shelters and evacuation centres;
 - (g) undertaking damage assessments; and
 - (h) provision of sand and sandbagging to the community.
- 5.43 In response to the 2019 weather event, TCC took steps to protect life and property which included:
- (a) providing communications to the community to respond to key questions such as property flooding information, relocation and availability of evacuation centres, power outages, telecommunications and road flooding and closures;
 - (b) opening TCC-staffed shelters at the Bluewater and Alligator Creek Community centres (from 30 January 2019) and receiving information regarding the Heatley evacuation centre;
 - (c) provision of sand and sandbags for residents and coordinating their distribution with the assistance of ADF and QPS;
 - (d) responding to wastewater issues (e.g. 15 residents with waste water back up in their houses on 1 February 2019); and
 - (e) providing assistance to support the evacuation planning and specific plans developed by the Evacuation & Transport Working Group and discussed with the TLDMG. This is discussed below.
- 5.44 From 31 January 2019, Emergency Alerts were sent regarding flooding by SMS. These alerts identified suburbs that would likely experience flooding and urged residents to move to higher

ground and where concerned about their safety, to evacuate. The location of evacuation centres was also provided.

- 5.45 On 1 February 2019, the TLDMG discussed the Flooding Evacuation Zones and those at risk locations falling within the Black, Brown and Pink Zones, outlined at 4.44 above, depending upon discharge levels from the RRD.
- 5.46 QPS conducted a door knocking exercise in the Black zone with assistance from ADF on 1 February 2019.
- 5.47 From 2 February 2018, work was done regarding scripting for messages to residents about the doorknock campaign and a request to move to higher ground rather than a directed evacuation. There was also a shift back to attendance for service calls rather than doorknocking as relevant residents should have moved. The Transport & Evacuation Group was activated to 'Stand Up' on 2 February 2019 and held its first meeting on that day.
- 5.48 TCC offered plant and equipment (100 large plant and trucks) to assist QPS with evacuation in the event large numbers of people had to be moved.
- 5.49 By 3 February 2018, affected and likely affected areas had been doorknocked three to four times by QPS and ADF personnel and it was reported that there was a general reluctance by residents to relocate. Work was undertaken by QPS to identify vulnerable properties also single high dependency people for further contact. ADF assisted with provision of multiple vehicle types being Bushmasters, light armoured vehicles and G wagons.
- 5.50 From 4 February 2019, efforts of agencies including QPS and ADF focussed on rescue and responding to calls for assistance in affected suburbs rather than doorknocking. By way of example, 398 requests were made for assistance and this was reduced to 11 in the 24 hour period to 5 pm on 4 February 2019. In addition, protection of unoccupied properties was also prioritised. The ADF response was significant with some 400-500 troops on the ground on 5 February 2019.

Managing the supply of essential services

- 5.51 The TLDMP and the operational meetings held at the LDCC provided the forum for the provision of information regarding the status of the essential services and the actions being undertaken by relevant stakeholders to maintain them through the 2019 weather event. As set out below in the examples, there were a number of instances where agencies worked cooperatively together to achieve outcomes where strict adherence to responsibilities was impractical.
- 5.52 The key essential services which are set out in the TLDMP²³ include:
 - (a) power;
 - (b) water;
 - (c) sewerage;
 - (d) communications;
 - (e) road;
 - (f) rail;
 - (g) airport; and

²³ See page 52.

(h) port.

5.53 As set out in the TLDMP, the services which are to be maintained by TCC for the community are:

(a) water

(b) sewerage

(c) refuse disposal;

(d) animal control; and

(e) environmental protection.

5.54 The response of TCC (coordinated through the TLDMG) is set out below.

Water

5.55 TCC, through Townsville Waste and Water, managed all water supply issues during the 2019 weather event.

5.56 Some water treatment facilities were impacted by power supply failure, flooding and overland flow at times during the 2019 weather event. Specific occurrences included:

(a) reduced treatment capacity at the Giru water treatment plant (operated remotely) from 30 January 2019 due to turbidity issues. This issue continued until early in February 2019;

(b) the Cungulla water treatment plant sustained a period of being de-energised. TCC responded by sending messages to residents to conserve water in the affected area;²⁴ and

(c) the Northern water treatment plant was not operational as noted in the TLDMG minutes of 3 February 2019 due to access issues and was offline until 10 February 2019. However, TCC was able to divert the capacity to the North Shore water treatment plant to address this load issue.

5.57 Leaks were reported in the water system from 4 February 2019 and these were attended to and repaired by TCC as and when they occurred. Examples included a broken water main at Black River reported to the TLDMG on 9 February 2019.

5.58 There was a significant focus by TCC on understanding leaks in the water supply system, repairing same and rerouting of water supplies to reduce impacts to supply.

5.59 Despite the significance of the 2019 weather event, TCC were able to largely maintain drinking water supplies. Where this was not possible, residents were encouraged to boil water for consumption.

Sewerage

5.60 Due to the significant rainfall, overland flow and flooding associated with the 2019 weather event, TCC crews had to attend to a variety of issues over the course of the period from 30 January 2019 to 9 February 2019:

(a) a number of pump stations were offline for periods as a result of either access, water inundation or power failure issues:

²⁴ ADF provided fuel in addition to an operator to reinstate the plant's generator capacity.

- (i) on 2 February 2019, it was reported that 114 of 176 pump stations were impacted;
 - (ii) on 5 February 2019 it was reported to the TLDMG that 75 of 150 pump stations were offline; and
 - (iii) on 9 February 2019 it was reported to the TLDMG that 20 of the 150 pump stations were offline;
- (b) flooding was sustained at the Bohle River pump station;
 - (c) a major break occurred at the Cleveland Bay pump station and repair and maintenance works were required;
 - (d) the Cosgrove treatment plant was compromised;
 - (e) power outages impacted the Kelso pump station (albeit functionality was maintained with fuel to ensure the mains stayed on); and
 - (f) an issue arose with respect to the Toomulla pump station where thieves stole diesel fuel which disrupted the service until that fuel was replaced. This was reported to the TLDMG on 7 February 2019.

5.61 TLDMG was advised that 15 properties had been impacted by sewerage back-ups.

5.62 TCC worked to direct sewage away from the hospital and other sensitive areas. Despite some instances of uncontrolled releases of sewage, the sewerage system was managed appropriately to reduce both environmental and community impacts. Due to the complexity of the network and the 2019 weather event, further review of TCC's sewerage network is underway.

Refuse disposal

5.63 TCC operates two landfill sites:²⁵

- (a) Stuart - which accepts both commercial and domestic waste; and
- (b) Hervey Range - which accepts domestic waste only.

5.64 In response to the 2019 weather event, both of these waste management facilities were closed from 31 January 2019.

5.65 TCC also operates six waste transfer stations including at the above landfill sites.

5.66 The Hervey Range waste management facility was opened for essential use only from 4 February 2019 with additional temporary waste collection sites being identified. This task was significant as by 8 February 280 tons of waste had been collected with a further 90,000 tons expected.

5.67 Normal waste collection services were also resumed from 4 February 2019.

5.68 A focused clean-up operation was undertaken by TCC and the assistance of the ADF was obtained from 11 and 12 February during a period of peak activity and temporary waste collection sites were established.

²⁵ A further waste management facility at Jensen was closed permanently on 28 January 2018.

Roads

- 5.69 The oversight of road closures, maintenance and recovery work associated with the road network within Townsville is a shared responsibility of TCC with TMR.
- 5.70 From 30 January 2019, road closures occurred as a result of flooding, landslips and undermining and these were identified (for both State and local government controlled roads) and communicated to the TLDMG and the broader community through TCC's emergency management dashboard.
- 5.71 TCC with the assistance of ADF were able to clear and open most local roads by 9 February 2019. Importantly, TMR had considerable resources which were able to be deployed for clean-up with respect to State controlled roads
- 5.72 TMR and TCC maintained a dialogue both through the TLDMG and separately to coordinate information regarding road closures, traffic signalling, landslide information and traffic management and control. Examples included concerns with Hervey Range and Paluma (reported in the period from 5 February 2019 to 8 February 2019) including landslides and undermining of the road which required a geotechnical inspection.
- 5.73 Timely road closure information was also relevant to evacuation plans such as that identified with Rooney's Road closure, which was discussed at the TLDMG meeting on 2 February 2019.
- 5.74 There was a high degree of cooperation and collaboration between TCC and TMR. For example, TCC crews working on land slips and clearing debris from local government roads assisted the TMR crews by taking over the recovery of two motor vehicles which had become trapped between two landslips around Hervey Range road as they were better equipped to carry out the recovery.

Power

- 5.75 Ergon was a core member of the TLDMG.
- 5.76 The responsibility for de-energising (where deliberate) and re-energising properties and addressing network faults and access issues rested with Ergon. Notably updates regarding the status of power supply were provided by Ergon at each of the twice daily operational meetings of the TLDMG and in the SITREPs issued by the TLDMG.
- 5.77 Notably, Ergon informed the TLDMG at its meeting on 4 February 2019 at 5:00pm that *"information that Ergon had been receiving from the TLDMG and the ADF has been very useful and if we can continue to share that information I am sure that it will help both parties and help the community so thank you."*
- 5.78 At the peak of the 2019 weather event, TCC understands that some 17,000 to 18,000 customers were without power with a significant number of these as a result of flooding. Ergon made its restoration plan available to the public on its website on 6 February 2019.

Rail

- 5.79 Both Queensland Rail and Aurizon were advisory members of the TLDMG. The primary responsibility for rail operations, closure of the network and depots and inspections for damage rests with these entities.
- 5.80 TCC relayed information regarding the rail lines to the first operational meeting on 31 January 2019 and following this representatives of Queensland Rail and Aurizon attended the TLDMG operational meetings to receive updates.

Airport

- 5.81 Both Air Services Australia and Townsville Airport Pty Ltd were advisory members of TLDMG. Information was provided regarding the status of the airport (which remained open during

much of the 2019 weather event with the exception of 4 February 2019), flight status, the levels of staffing, localised flooding and repairs.

- 5.82 Information was sought from the TLDMG as to accommodation needs for returning passengers unable to make it home and this was responded to by Tourism and Events Limited in terms of accommodation and evacuation centre availability.
- 5.83 In addition, information and guidance as to road status was sought from TCC and TMR in terms of road safety both from the perspective of travellers and staff.

Port/Marine

- 5.84 The Port of Townsville Ltd was an advisory member of the TLDMG. Updates were provided to the TLDMG in respect of the port being open as well as the status of Townsville harbour and ferry/barge services.

Telecommunications

- 5.85 Information and updates regarding telecommunications were provided to the TLDMG at operational meetings by NBN, Telstra and Optus. Telecommunications infrastructure was disrupted at various time between 30 January 2019 and 9 February 2019 due to power disruptions and/or flooding issues.
- 5.86 24 hour monitoring was put in place and there was little impact to the NBN service until 2 February 2019 where a number of services were affected due to flooding and being de-energised with 21 sites and 2,436 services identified as being at risk on 2 February 2019.
- 5.87 A satellite vehicle was stationed at the Heatley evacuation centre to provide connectivity for the community. TCC assisted by providing a channel for community requests for assistance in relation to connectivity.
- 5.88 TCC understands that telecommunications services were not materially affected during the 2019 weather event.

6. Dam Operations

Operation and ownership of the Ross River Dam

- 6.1 The RRD is located approximately 9km upstream of the urban area of Townsville with the central business district only 19km north-east of the dam. The RRD has an upstream catchment area of approximately 760km². Downstream of the RRD, there are three weirs that create permanent water in the river: Black Weir, Gleesons Weir and Aplins Weir. The 10km of Ross River downstream of Aplins Weir is tidal.
- 6.2 The RRD was constructed by Leighton Holdings between 1971 and 1974 and received further upgrades in 1987 and 2007, with the latter upgrade including the installation of three radial gates on the dam's only spillway at Ross River. While the RRD was designed to provide a level of flood mitigation, as noted at 4.4 above, it is not a prescribed dam under the *Water Supply (Safety and Reliability) Regulation 2011* and is not required to have a flood mitigation manual.
- 6.3 The processes to be followed when outflows from the RRD are anticipated are prescribed in the EAP. In accordance with the WSSR Act, the EAP states the actions that TCC is to take in response to a dam hazard event or emergency event and it has been updated and approved from time to time by the DNRME as the dam safety regulator.
- 6.4 In 2014, at the request of TCC, the dam safety regulator approved the inclusion of the 'Flood Rules' into the EAP. Appendix C2 to the current EAP are the 'Ross River Dam Flood Rules' which note that the operation of the spillway gates on RRD is directly related to the water level in the reservoir and contains the following technical information on gate openings, spillway and tailwater data:
- (a) the Gate Trigger Level of the RDD is 38.65m AHD with a Dam Crest Level of 48.00m AHD;
 - (b) flood discharges are controlled by the three spillways gates for lake levels less than 43.00m AHD; and
 - (c) for lake levels equal to and above 43.00m AHD, the spillway gates are to be fully open with free discharge over the crest of the spillway.
- 6.5 Other relevant information contained in the EAP includes:
- (a) Appendices A1 - A5 - notification and communication lists;
 - (b) Appendix A6 - Emergency Alert polygons;
 - (c) Appendix A7 - Dam failure Emergency Alert request guidelines;
 - (d) Appendix B - Inundation maps and emergency control measures;
 - (e) Appendix C3 - RRD gate opening details;
 - (f) Appendix C4, C5 & C6 - RRD gate discharges details; and
 - (g) Appendix C7 - RRD storage curve.
- 6.6 While TCC is the owner of the RRD, SunWater operates the RRD under a contract with TCC.
- 6.7 The EAP²⁶ provides that if SunWater identifies a situation during an event that is either not contemplated by the EAP, or SunWater believes the current EAP requirements do not

²⁶ See page 11.

constitute an appropriate response to the situation under the circumstances, the following actions are required to occur:

- (a) SunWater calls the TCC Technical Decision Maker and outlines the nature of the issue and, where dam safety is relevant, provides a recommended course of action from a dam safety perspective;
- (b) the TCC Technical Decision Maker provides a direction to SunWater in relation to the issue raised; and
- (c) SunWater implements the actions as directed by the TCC Technical Decision Maker.

Management of the 2019 Weather Event

6.8 As noted above at 5.10, the management by TCC of the 2019 weather event was coordinated through the TLDMG. In addition to providing a number of core members constituting the TLDMG, TCC received intelligence on the scale and nature of the weather event from a number of organisations including:

- (a) AECOM;
- (b) BOM;
- (c) SunWater; and
- (d) QIT Plus.

6.9 Throughout the course of the 2019 weather event, BOM issued numerous Severe Weather Warnings and 77 Flood Warnings, while SunWater provided continual intelligence and advice with respect to dam levels and the operation of the RRD.

Response Phases

- 6.10 As noted above at 3.4, the 2019 weather event was unprecedented to the extent that rainfalls were measured at historic highs and the level of the RRD exceeded previous flood records.
- 6.11 On 1 January 2019, BOM reported that Tropical Cyclone Penny was a category 1 system and possibly could develop into a category 2 system. By 4 January 2019, Tropical Cyclone Penny developed into a category 2 system and BOM reported that it had moved offshore to the northeast of Townsville and was expected to approach Townsville.
- 6.12 On 7 January 2019, BOM reported that the system had been downgraded to an ex-tropical cyclone, however heavy rainfall and damaging winds were to be expected as ex-Tropical Cyclone Penny made its way towards the Queensland coastline.
- 6.13 On 8 January 2019, TCC were advised that the weather system was expected to cross the Queensland coastline between 8 and 9 January 2019. In anticipation of ex-Tropical Cyclone Penny's arrival, the Ross River was placed on flood watch and enhanced monitoring of the RRD commenced.
- 6.14 Between 9 January 2019 and 27 January 2019, minimal weather warnings were received from BOM and TCC received advice in relation to the operation of the RRD which indicated that outflows remained unlikely.
- 6.15 On 28 January 2019, TCC received advice which indicated that based on BOM rainfall predictions, outflows from the RRD were possible. At that time, the RRD level was 36.99m.
- 6.16 In accordance with the EAP, the RRD spillway gate opening trigger level is 38.65m.

- 6.17 On 29 January 2019, TCC were advised that the RRD had received approximately 72mm of rainfall over the preceding 24 hour period and that the RRD was at 37.2m. It was noted that BOM forecasted that the RRD would receive 155mm of rainfall in the next 24 hours and that based on this forecast it was possible that the RRD gates would open in accordance with the EAP. 24-hour monitoring of the RRD also commenced at this time.
- 6.18 Later on 29 January 2019, TCC were advised that the RRD was at 37.4m and rising and that the flood watch remained in place for the Ross River.
- 6.19 On 30 January 2019, a BOM severe weather briefing reported that:
- (a) Townsville was forecasted to have the highest flood levels in 20 years and it could exceed the 1998 record which recorded the Ross River at Alpin Weir at 1.77m;
 - (b) 1 in 100 year rainfall rates were recorded on Bluewater Creek and the Black River;
 - (c) daily rainfall totals were expected to be in excess of 150mm; and
 - (d) discharges from the RRD were to be expected.
- 6.20 Later on 30 January 2019 at 10:00am, TCC were advised that the RRD was at 38.2m having received between 100mm-130mm of rainfall over the preceding 24 hours and that BOM predicted a further 200mm of rainfall would be received in the next 24 hours. It was noted that it was likely that discharges from the RRD would occur within 24 hours and that the RRD's EAP had been activated to 'Alert'.
- 6.21 As noted at 5.24(d) above, at 11:00am on 30 January 2019, the TLDMG moved to 'Alert' which is recorded in the TLDMP as being:
- "A heightened level of vigilance due to the possibility of an event in the area of responsibility. No action is required however the situation should be monitored by someone capable of assessing the potential of the threat."*
- 6.22 By approximately 12:30pm on 30 January 2019, TCC were advised that the RRD was at 38.45m and gate operations were likely to be initiated between 1:00pm-3:00pm in accordance with the EAP.
- 6.23 As noted at 5.24(d) above, at 1:00pm on 30 January 2019 the TLDMG moved directly to 'Stand Up' which is recorded in the TLDMP as being:²⁷
- "The operational state following 'lean forward' whereby resources are mobilised, personnel are activated and operational activities commenced. Disaster coordination centres are activated."*
- 6.24 At approximately 1:45pm on 30 January 2019, TCC were advised that the RRD had reached 38.65m and that its first gate had automatically risen to 0.25m. From this time, the RRD gates continued to rise automatically in accordance with the EAP.
- 6.25 On 31 January 2019:
- (a) TCC were advised that the RRD had reached 40.31m, being 1.76m above its full supply level. It was noted that BOM forecasted 273mm of rainfall over the next 48 hours, which would result in the RRD reaching 41.45m and discharging water in the amount of 650m³/second;
 - (b) TLDMG made a request for assistance to TCC and SunWater to manually open the RRD spillway gates;

²⁷ Proceeding to 'Stand Up' immediately is allowed for under the TLDMP.

- (c) TCC contacted the DNRME as the dam safety regulator seeking advice on whether to manually release water from the RRD earlier than as stated in the EAP. At 5:31pm on 31 January 2019, TCC received a response from the DNRME which stated as follows:

"I refer to our discussion earlier this afternoon about the request from the Townsville Local Disaster Management Group to Townsville City Council and SunWater to operate the Ross River Dam gates manually and earlier than as stated in the emergency action plan for Ross River Dam, due to an impending forecast from the Bureau of Meteorology.

It is the department's position that as the dam owner, Townsville City Council is the decision maker regarding the management of Ross River Dam. Should TCC wish to operate outside the parameters of its EAP for Ross River Dam, the department considers that this is a matter for TCC to decide.

While the Water Supply (Safety and Reliability) Act 2008 requires TCC to prepare an EAP, there is no express obligation in the Act requiring TCC to comply with its EAP at all times. This is because TCC, as the dam owner, may need to make decisions during an event which go beyond that which is already addressed.

Given TCC's engineering and planning capabilities and local knowledge, TCC is well positioned to make those decisions. In addition, SunWater has advised me that it will provide technical support to TCC as needed."

- (d) following the multi-agency discussions referred to above, the TLDMG's decision to manually open the RRD spillway gates (referred to at (b) above) was not actioned and was deferred until the morning of 1 February 2019. In the event, there was no material adverse impact in delaying the gate openings as the RRD spillway gates opened automatically in accordance with the EAP to the level that had been requested by the TLDMG.

6.26 From this period up until the morning of the 7 February 2019, TCC made various strategic decisions in relation to the operation of the RRD gates. TCC's strategic decisions in relation to the operation of the RRD gates are outlined below.

6.27 At all times in the lead up to the peak of the 2019 weather event, all strategic decisions made by TCC with respect to manually operating the RRD gates did not, at any point in time, result in discharges greater than the peak discharge forecast on the basis of the 25th percentile rainfall estimate.

Strategic Decision #1

6.28 On 1 February 2019 at 6:00am, TCC were advised that BOM predicted the RRD was expected to receive 308mm of rainfall over the next 48 hours. Based on this forecast, it was anticipated that the RRD would peak at 41.58m on the morning of 3 February 2019 which would result in the gates opening to allow discharges of 716m³/second.

6.29 Based on the information available, at approximately 10:00am on the 1 February 2019, TCC directed that all three RRD gates be manually opened from 2.25m to 2.75m, equating to an upper limit estimated discharge rate of 706m³/second. In issuing this direction, TCC confirmed that it had commenced communications with the community about the downstream effect of the dam releases.

6.30 At 11:30am on 1 February 2019, the RRD gates transitioned to manual operation, with all three gates opened to 2.75m.

Strategic Decision #2

6.31 Later on 1 February 2019, after advice that 196mm of rainfall over the next 24 hour period was expected with an estimate peak dam discharge of 1,208m³/s, TCC directed the RRD gates to

be further manually opened to 3.25m to allow discharges of 870m³/second. TCC advised that all parties, including QPS, had been alerted and that evacuation preparations had been made. TCC further noted that as the downstream effects of Strategic Decision #1 were minimal, one hour between each step would not be required.

Strategic Decision #3

- 6.32 On 2 February 2019 at 5:00pm, TCC were advised that BOM predicted that the RRD would receive 204mm of rainfall over the next 24 hours and that the estimated peak dam discharge would be 1,305m³/s. It was noted that the RRD's levels were gradually rising, despite all three gates being open manually to 3.25m and discharging at approximately 866m³/second.
- 6.33 Based on this information, TCC directed that all three of the RRD gates be further manually opened to 3.75m to allow discharges of 1,000m³/second. In doing so, TCC advised that all parties, including QPS, had been alerted and that evacuation preparations had been made. TCC again noted that as the downstream effects of Strategic Decision #2 had been observed to be minimal, one hour between each step would not be required.

Strategic Decision #4

- 6.34 On 3 February 2019 at 9:00am, TCC's Mayor chaired a meeting with the TLDMG and its extended members. During this meeting, it was reported that unless overridden, when the RRD reached 42.5m, the EAP prescribes any continuation of manual operations and requires that automatic operations be reengaged. The EAP also provides that when the RRD reaches 42.75m, gate two will automatically fully open, amounting to discharges of approximately 1,300m³/second. At this time, it was noted that the RRD was at 42.29m.
- 6.35 Based on this information, the TLDMG decided to revert the operation of the RRD gates back to automatic under the EAP, once the RRD level reached 42.5m. At approximately 12:30pm on 3 February 2019, it was noted that the RRD had reached 42.5m and gate operations had been switched back to automatic operation, in line with the EAP.
- 6.36 At approximately 2:30pm on 3 February 2019, the RRD reached 42.75m and in accordance with the EAP, gate two was automatically fully opened and raised to 11.5m, while gates one and three remained at 3.75m.
- 6.37 Later, at approximately 7:30pm on 3 February 2019, the RRD reached 43m, and in accordance with the EAP, all three gates were automatically fully opened and raised to 11.5m.

Strategic Decision #5

- 6.38 On 4 February 2019 at 9:00am, BOM issued a Severe Weather Briefing which reported that Townsville and surrounding locations were likely to receive 150mm-200mm of rainfall over the next six hours, with totals of 300mm possible in isolated areas.
- 6.39 At approximately 11:20am on 4 February 2019, TCC were advised that the RRD level was at 42.59m and slowly lowering and that when the level reached 42.5m gates one and three would automatically lower to 3.75m and gate two would remain at 11.5m.
- 6.40 Based on the forecasted rainfall, TCC directed that the RRD gates be switched back to manual mode, holding all three of the RRD gates open at 11.5m. TCC advised that this would be a hold point for a decision to be made, which would be based on the available data and downstream impacts.

Strategic Decision #6

- 6.41 Later on the 4 February at 4:25pm, TCC's Mayor chaired a meeting with the TLDMG and its extended members. During this meeting it was noted that as at 12:00pm, BOM rainfall prediction had reduced to 25mm over the next six hours and approximately 100mm over the next 24 hours. Considering multiple rainfall scenarios, the TLDMG decided to transition the operation of the RRD gates back to automatic in line with the EAP at 9:00pm.

- 6.42 After the TLDMG meeting, TCC directed that automatic operation of the RRD gates be resumed in line with the EAP as of 9:00pm. At 9:00pm on 4 February 2019, the RRD gates transitioned to automatic operation.

Strategic Decision #7

- 6.43 On 5 February 2019 at 6:00am, TCC were advised that the RRD level was falling at 41.9m and that BOM predicted 66mm of rainfall over the next 24 hour period and 135mm over the next 48 hour period.
- 6.44 At 9:00am on 5 February 2019, TCC's Mayor chaired a meeting with the TLDMG and its extended members, whereby it was noted that further to its earlier forecasts, BOM predicted the RRD would receive further rainfall, making it possible for the RRD to reach 42m again.
- 6.45 Based on BOM's amended predictions, at 11:50am on 5 February 2019, TCC directed that the operation of the RRD gates be switched from automatic to manual until further instruction. TCC advised that the intended effect of this was to:
- (a) avoid the possibility of the RRD gates automatically opening at 11.5m again allowing for full flow;
 - (b) prevent any possible erosion around to spillway by keeping the velocity of discharges to a minimum; and
 - (c) more importantly, protect the lives of members of the community by avoiding a situation whereby people entered an evacuation area only to require re-evacuation if the RRD level rose.
- 6.46 Subsequent to this direction, TCC further directed that all three of the RRD gates should be manually operated and held at 3.25m. At 12:20pm, all three of the RRD gates converted to manual operation, and were held at 3.25m.

Strategic Decision #8

- 6.47 On 6 February 2019 at 6:00am, TCC were advised that the RRD level was falling at 42.52m and that that BOM predicted 42mm of rainfall over the next 24 hour period and 105mm over the next 48 hour period.
- 6.48 At 12:00pm on 6 February 2019, TCC were advised that the RRD level was at 42.54m and that BOM's forecasts had altered to now predict 47mm of rainfall over the next 24 hour period and 119mm over the next 48 hour period.
- 6.49 Based on the increased forecast of rain TCC directed that the RRD gates should remain in manual operation.
- 6.50 On 7 February 2019 at 6:00am, TCC were advised that the RRD was at 41.18m and that that BOM predicted 68.7mm of rainfall over the next 24 hour period and 81mm over the next 48 hour period.
- 6.51 At approximately 9:15am on 7 February 2019, TCC directed that:
- (a) all three of the RRD gates be manually lowered from 3.25 to 3m;
 - (b) thereafter, changes be made to the RRD gates in accordance with the EAP until the levels proscribed in the EAP match the RRD; and
 - (c) following (a) and (b), the RRD gates be transitioned from manual to automatic mode.
- 6.52 At approximately 10:40am on 7 February 2019, the RRD gates were transitioned back to automatic mode and were open at 2.75m in accordance with the EAP.

- 6.53 The RRD gates remained in automatic mode and were slowly lowered in accordance with the EAP, until the RRD reached 38.5m (99.2% capacity) at 4:30pm on 15 February 2019 and all three of the RRD gates closed.

The effect of releases from Ross River Dam on flooding

- 6.54 The hydraulic and hydrological analysis that has been subsequently conducted in the time available suggests that the decisions to manually operate the gates achieved an almost identical result to that which would have been achieved had the agreed operational principles under the EAP as agreed with the regulator been followed.
- 6.55 In other words, given the scale of the event and the agreed operating procedures under the EAP, there was nothing that TCC could have done to prevent, and very little it could have done to reduce, the inundation of the City of Townsville that occurred.
- 6.56 That being said the RRD did provide significant mitigation of the flood peak. Estimates of the peak inflow to the dam are approximately 4,400 m³/s, whereas the peak outflow was less than 1,900 m³/s. That is to say that had RRD not been in place during the event, flood impacts to the Townsville catchment would have been significantly worse.

7. Resourcing, Overall Coordination and Deployment of Personnel and Equipment

TCC's role and steps taken

- 7.1 TCC played a key role in the management and response to the 2019 weather event. This role involved three key parts:
- (a) taking responsibility for the TLDMG and deployment of resources to the LDCC;
 - (b) managing communications with the community by providing essential updates about the status of the 2019 weather event and critical public safety issues; and
 - (c) deploying TCC's own assets and resources to the maintenance and repair of essential services and the provision of disaster related community services such as evacuation centres and shelters and sandbagging.

TLDMG

- 7.2 The response by TCC to the extreme weather changes during the course of the 2019 weather event was managed by the TLDMG and coordinated by the LDC in accordance with the TLDMP.
- 7.3 In the period from 8 January 2019 until 28 January 2019, the TLDMG (through its Chair - Mayor Jenny Hill), the LDCC (through the LDC) and the Townsville City Council Emergency Response Group (through acting CEO Mike Chiodo) monitored the weather and related reports from a variety of advisory sources. All of the relevant personnel involved at this stage were TCC employees including a small group staffed with TCC employees operating from the LDCC.
- 7.4 From 31 January 2019, the TLDMG fully activated the LDCC and convened operational meetings. The TLDMG operated on a 24 hours basis during the height of the disaster.
- 7.5 In keeping with its primary responsibility for managing disaster events contained within the LGA, TCC's contribution of core members to the TLDMG was significant and comprised:
- (a) Chairperson;
 - (b) Deputy Chair
 - (c) LDC;
 - (d) Emergency Response Group;
 - (e) LRC; and
 - (f) Communications.
- 7.6 In addition to the above, there are also up to three deputy positions which were held by TCC personnel.
- 7.7 There were also advisory members provided by TCC:
- (a) Chief Executive Officer; and
 - (b) Shelter & Evacuation Centre Coordinator and a deputy.
- 7.8 In addition to the above, the following TLDMG working groups were deployed during the 2019 weather event:

- (a) Evacuation & Transport Working Group;
- (b) Shelters & Evacuation Centres Group; and
- (c) Local Recovery & Resilience Group.

Communications

- 7.9 The content and strategy for TCC's communications regarding the 2019 weather event are set out above in section 5.
- 7.10 TCC Communications had core member status within the TLDMG. During the course of the 2019 weather event and the operational meetings convened by the TLDMG, members of the TCC communications team (whether they be member or deputy designations) attended each TLDMG meeting.
- 7.11 The broader TCC communications team operated from the LDCC and approximately 28 employees operated during the period from 31 January 2019 until 9 February 2019 on a 24-hour basis.
- 7.12 In addition to the communications team, the TCC call centre operated throughout this period until 11 February 2019 and was staffed by a team of up to 30 TCC employees working on a 24 basis.

Service operations

- 7.13 TCC made a significant contribution of its own assets and resources to the maintenance and repair of essential services and the provision of disaster related community services such as evacuation centres, shelters and sandbagging. This occurred in TCC's own capacity and also in conjunction with other agencies coordinated through the TLDMG. This contribution was outlined at the TLDMG meeting on 6 February 2019, where Mr Mike Chiodo, the TCC acting CEO, acknowledged that TCC had 800 employees working across each 24 hour period to maintain usual functionality beyond the emergency response.
- 7.14 Water/Sewerage: TCC devoted significant resources to management of all water supply issues and water treatment facilities which were impacted by power supply failure, flooding and overland flow at various times during the 2019 weather event. There was also a significant focus by TCC on the deployment of resources to identify leaks in the water supply system, repair those leaks and re-direct water supplies to reduce impacts to the potable water supply network.
- 7.15 Sandbags: The filling and provision of sandbags and sand to residents was a significant activity undertaken by TCC and coordinated with the assistances of other agencies such as the ADF. The operation was large with some 30,000 sand bags distributed on 2 February 2019 and some 680 tons of sand used. A total of 18 sandbag locations were established each with around the clock staffing. In total, 143,000 sand bags and 9,000 tons of sand was issued. The scale of the demand was exemplified by the fact that the ADF flew a C17 into the Townsville RAAF base around 3 February 2019 with 90,000 sandbags.
- 7.16 Road works: TCC crews actively responded to landslips and road repairs during the 2019 weather event. TCC Crews operated on 24 hour shifts.
- 7.17 Road safety: TCC also coordinated a large and effective workforce to assist QPS with road safety and management, road closures and signage and the provision of water and sustenance to working crews.
- 7.18 Evacuation centres and shelters: TCC also operated evacuation centres at North Shore, Alligator Creek, Ignatius Park, Heatley, Bluewater, YWAM. In addition, a further evacuation centre was opened by the ADF at the Lavarack barracks. These centres were also staffed with TCC employees as well as personnel from other organisations such as the Red Cross, ADF

and the QPS. TCC also undertook precautionary scoping activities of the entertainment centre and rugby league stadium in the case a number of people needed to be evacuated and accommodated at those venues.

- 7.19 Waste: TCC's landfills and waste transfer facilities were closed during the critical period of the 2019 weather event. Resources were deployed by TCC to resume waste collection services by 4 February 2019 and temporary waste collection areas were established from 11 February 2019.

8. Land Use Planning and Building Codes

Introduction

- 8.1 This section addresses the current land use planning and building controls that constitute an integrated approach to the management of natural hazards, including flooding, in the TCC LGA.
- 8.2 The land use and building controls that apply to the TCC LGA include State and local planning instruments, and building controls through the *Building Act 1975* (**Building Act**).

State planning policy

- 8.3 The State Planning Policy (**SPP**) is a State planning instrument made pursuant to the *Planning Act 2016*²⁸ (**Planning Act**). The SPP sets out State interests that should be given effect through the planning scheme. The SPP also includes assessment benchmarks that apply to certain developments where the relevant planning scheme does not appropriately integrate the SPP. The SPP applies instead of a planning scheme, to the extent of any inconsistency.²⁹
- 8.4 The current SPP commenced on 3 July 2017, and the July 2014 version was in effect at the time City Plan was adopted.
- 8.5 The July version considered in the preparation of the current version of City Plan, and in approving City Plan in 2014, the Minister considered that all of the State interests had been appropriately integrated.³⁰ TCC is currently in the process of preparing amendments to City Plan as a result of the 2017 SPP, which came into effect after City Plan commenced.
- 8.6 The natural hazards State interest and its relevant assessment benchmarks are relatively unchanged between various versions of the SPP. The SPPs provides assessment benchmarks for development in a flood hazard area, including that development must:
- (a) avoid natural hazard areas, or where it is not possible to avoid the natural hazard areas, mitigate the risk to people and property to an acceptable or tolerable level;³¹
 - (b) support and not unduly burden disaster management or recovery capacity and capabilities;
 - (c) 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;
 - (d) avoids 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;
 - (e) maintain or enhance the natural processes and protective function of landforms and the vegetation that can mitigate risks associate with the natural hazard;
 - (f) facilitate the location and design of community infrastructure to maintain the required level of functionality during and immediately after a natural hazard event; and

²⁸ Section 286 *Planning Act 2016* (Qld).

²⁹ Section (8)(4) *Planning Act 2016* (Qld).

³⁰ Section 2.1 Townsville City Plan 2014.

³¹ Where a development is in an erosion prone area in a coastal management district, this benchmark will not apply and a specific benchmark to those developments will apply.

- (g) 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.³²

Townsville City Plan 2014

- 8.7 The primary document regulating land development in the Townsville LGA is City Plan, made pursuant to the repealed *Sustainable Planning Act 2009 (SPA)*.³³ However, City Plan continues to have effect for the Planning Act.³⁴
- 8.8 City Plan was adopted on 13 October 2014 by TCC, following the statutory process of public consultation and State interest review and approval.³⁵
- 8.9 City Plan regulates development in the Townsville LGA by categorising development as either:
- (a) accepted development, which does not require a development approval; or
 - (b) assessable development, which requires a development approval.³⁶ Assessable development may be either:
 - (i) code assessable, which must be assessed only against the assessment benchmarks in City Plan and having regard to any matters prescribed by the *Planning Regulation 2017 (Planning Regulation)*;³⁷ or
 - (ii) impact assessable, meaning that the development application is subject to public notification and third party appeal rights. The assessment of an impact assessable development application must be carried out against the assessment benchmarks in City Plan, having regard to any matters prescribed by the Planning Regulation, and may be carried out against, or having regard to, any other relevant matter, other than a person's personal circumstances, financial or otherwise.³⁸
- 8.10 City Plan cannot regulate development that is listed as prohibited development under the Planning Regulation, for which no development application can be made.³⁹
- 8.11 Development that is not categorised as assessable development or prohibited development is accepted development i.e. no development approval is required.⁴⁰

³² See the definition of the term "hazardous chemicals flood hazard threshold" in Part G: Glossary of the SPP for the specified hazardous chemical thresholds.

³³ Chapter 3, Part 5 *Sustainable Planning Act 2009* (Qld) (repealed on 3 July 2017).

³⁴ Section 286 *Planning Act 2016* (Qld).

³⁵ Statutory Guideline: Making and Amending Local Planning Instruments.

³⁶ Note that the *Planning Act 2016* (Qld) states certain development that cannot be made assessable by City Plan. See section 43(5) *Planning Act 2016* (Qld); section 16 and Schedule 6 *Planning Regulation 2017*(Qld).

³⁷ Section 45(4) *Planning Act 2016* (Qld).

³⁸ Section 45(5) *Planning Act 2016* (Qld).

³⁹ Schedule 10 *Planning Regulation 2017* (Qld).

⁴⁰ Section 44(6)(a) *Planning Act 2016* (Qld),

- 8.12 City Plan includes a strategic framework which has adopted a 25 year planning horizon for the TCC LGA.
- 8.13 City Plan's strategic framework includes:
- (a) planning of future land uses to ensure adequate supply, while considering broader outcomes sought by the LGA. This includes planning for a population set to grow from 190,000 in 2011, to between 270,000 and 300,000 by 2031.⁴¹
 - (b) stated themes that collectively represent the policy intent of the scheme. Relevantly, one of these themes is that City Plan seeks to ensure that:

*"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."*⁴²
 - (c) elements that further refine and describe the strategic outcomes. For natural hazards (bushfire, landslide and flood) the specific outcomes of City Plan's strategic framework include that:
 - (i) new development in areas subject to bushfire, landslide or flooding hazard is compatible with the nature of the hazard;
 - (ii) 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;
 - (iii) the settlement pattern avoids further expansion of urban and rural residential uses into hazard areas; and
 - (iv) 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;
- 8.14 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.⁴³ Relevant assessment benchmarks are set out at paragraphs 8.36 to 8.38 below.

The Defined Floor Height (DFE) and the Defined Floor Level (DFL)

- 8.15 Under City Plan:
- (a) the DFE is defined as follows:

⁴¹ Section 3.2.1 Townsville City Plan 2014.

⁴² Section 3.2.4 Townsville City Plan 2014.

⁴³ Australian Institute for Disaster Resilience "Managing the Flood Plain: A Guide to Best Practice Flood Risk Management in Australia Handbook 7" Australian Emergency Management Handbook Series: Building a Disaster Resilient Australia, page 78.

"For this planning scheme, this is the 1% annual exceedance probability (AEP) flood and is mapped as the combined extent of the high and medium flood hazard areas identified on overlay map OM-06.1 and OM-06.2.",⁴⁴ and

(b) the DFL is defined as follows:

"The flood level relative to the Australian Height Datum (AHD) of the 1% AEP flood".⁴⁵

- 8.16 The definition of the DFE is a risk management decision, that is recognised as balancing the flood risk and the costs of living with this risk. In Australia, the 1% AEP plus a freeboard is often used in government guidelines and policy instruments to define the standard up to which general development controls are applied to new standard residential development to limit growth in risk. A residual risk remains from floods larger than the 1% AEP.⁴⁶
- 8.17 City Plan's adoption of the 1% AEP (which is often referred to as the Q100 flood) is in line with currently accepted land use regulatory standards. Along with adoption of the Q100 flood, City Plan requires that habitable floor levels for development in the Flood Hazard Overlay have a minimum 300mm freeboard above the Q100 flood level. This is set out in the assessment benchmarks at paragraphs 8.36 to 8.38 below.

Flood hazard planning scheme policy

- 8.18 The Flood Hazard PSP was adopted by TCC on 13 October 2014. The purpose of the Flood Hazard PSP is to:
- (a) provide background information on the derivation of the flood hazard overlay; and
 - (b) provide applicants with additional information and guidance in meeting the requirements of the flood hazard overlay code.
- 8.19 The Flood Hazard PSP applies to the whole of the Townsville LGA and specifically relates to the assessment of the Flood Hazard Overlay code.
- 8.20 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 received by TCC.

Land not regulated by City Plan

- 8.21 There are a number of areas within the Townsville LGA that are not regulated by City Plan, or for which the application of City Plan has been varied. These areas are:

Priority development areas

- 8.22 Two priority development areas (**PDAs**) under the *Economic Development Act 2012* have been declared within the Townsville LGA, being:

⁴⁴ Schedule 1.2 Townsville City Plan.

⁴⁵ Schedule 1.2 Townsville City Plan.

⁴⁶ Australian Institute for Disaster Resilience "*Managing the Flood Plain: A Guide to Best Practice Flood Risk Management in Australia Handbook 7*" Australian Emergency Management Handbook Series: Building a Disaster Resilient Australia, page 78.

- (a) The Oonoonba urban development area (now PDA) which was declared on 23 April 2010.⁴⁷ Development within the Oonoonba PDA cannot be made assessable by a local planning instrument, including City Plan.⁴⁸ Development in the Oonoonba PDA is managed through the *Economic Development Act 2012*, primarily by way of the Oonoonba Urban Development Area Development Scheme dated April 2011.⁴⁹ The Oonoonba PDA is administered by the Minister for Economic Development Queensland; and
- (b) The Townsville City Waterfront PDA was declared on 5 September 2014. Development in the Townsville City Waterfront PDA is managed through the *Economic Development Act 2012*, primarily by way of the Townsville City Waterfront PDA Development Scheme dated October 2015.

Townsville State development area

- 8.23 Part of the Townsville LGA has been declared a "State development area" pursuant to the State Development and *Public Works Organisation Act 1971*.⁵⁰
- 8.24 The Townsville State Development Area Development Scheme dated July 2013 regulates land use in the Townsville State development area, to the exclusion of, amongst other things, City Plan.⁵¹ Other development within the State development area may be subject to City Plan, such as operational works.

Port of Townsville

- 8.25 Part of the land within the Townsville LGA is strategic port land for the *Transport Infrastructure Act 1994*. Land that is strategic port land is not subject to a local planning instrument (including City Plan).⁵²

Townsville Airport

- 8.26 Townsville Airport is a declared airports site for the *Airports Act 1996* (Cth).⁵³ Matters of land use, planning and building control are primarily regulated through the *Airports Act 1996* (Cth).

Department of Defence facilities

- 8.27 Defence facilities, including the Lavarack Barracks and Ross Island Barracks, will generally not be subject to land use controls under City Plan.

⁴⁷ The Oonoonba urban development area was declared pursuant to the *Urban Land Development Authority Act 2007* (Qld). That Act was repealed and replaced by the *Economic Development Act 2012* (Qld), which continued the effect of the declared urban development areas, pursuant to section 190.

⁴⁸ Section 16 and Schedule 6, Part 5, Item 28 *Planning Regulation 2017* (Qld).

⁴⁹ The Oonoonba Urban Development Area Development Scheme is continued by section 192 of the *Economic Development Act 2012* (Qld).

⁵⁰ Section 8 *State Development and Public Works Organisation (State Development Areas) Regulation 2009* (Qld).

⁵¹ Section 84 *State Development and Public Works Organisation Act 1971* (Qld).

⁵² Section 287 *Transport Infrastructure Act 1994* (Qld).

⁵³ Section 1.03 and Part 1.21, Schedule 1, *Airports Regulations 1997* (Cth).

Special legislation

8.28 There is a range of special legislation that applies to land in the Townsville LGA that either removes or modifies the effect of City Plan to particular sites. Relevant special legislation includes:

- (a) *Townsville Breakwater Entertainment Act 1991*: The Act has the effect that the casino site is in the Special Facilities (Convention, Exhibition, Sports, Entertainment and Ancillary Facilities) Zone under City Plan.⁵⁴
- (b) *Townsville Zinc Refinery Act 1996*: The Act has the effect that the Townsville Zinc Refinery site is included in the particular development zone under City Plan.⁵⁵

The Act also provides that despite any changes to City Plan, development for certain purposes set out in Schedule 3 of the Act may either be lawful, or carried out with the consent of the Council.⁵⁶

The Townsville Zinc Refinery is also located within the Townsville State development area.

- (c) *Queensland Nickel Agreement Act 1970*: City Plan is excluded under the Agreement. Section 10, Part VIII of the Schedule of the Act states that land which is subject to the Special Mineral Leases, the land on which the treatment plant is erected, and all other lands required for the purpose of the project shall be and remain zoned for use and otherwise protected during the currency of the Agreement so that the operations of the Companies can be carried out without any interference or interruption by any municipal or shire council, or by any other government or semi-governmental authority of the State. Zoning by-laws or regulations of other municipal authorities are also excluded.
- (d) *Townsville City Council (Douglas Land Development) Act 1993*: City Plan is excluded and replaced with a master plan for the Douglas Land Development area.⁵⁷

Development assessment under City Plan

Local planning instruments generally

8.29 Under the Planning Act, all development is accepted (i.e. no development approval is required), unless it is assessable development or prohibited development.

8.30 A planning scheme is a "local categorising instrument" and may categorise development as assessable development, unless the development is:

- (a) development that a local categorising instrument cannot make assessable development;⁵⁸
- (b) development that is inconsistent with prescribed assessable development under the Planning Regulation;⁵⁹ or

⁵⁴ Section 16 *Townsville Breakwater Entertainment Centre Act 1991* (Qld).

⁵⁵ Section 12 *Townsville Zinc Refinery Act 1996* (Qld).

⁵⁶ Section 13(4) *Townsville Zinc Refinery Act 1996* (Qld).

⁵⁷ Section 24 *Townsville City Council (Douglas Land Development) Act 1993* (Qld).

⁵⁸ Section 43(5) *Planning Act 2016* (Qld); section 16 and Schedule 6 *Planning Regulation 2017* (Qld).

(c) development that is not regulated by City Plan, as set out at paragraphs 8.21 to 8.28 above.

8.31 Development that is accepted development subject to requirements must comply with the requirements contained in the assessment benchmarks in the tables of assessment under City Plan.

8.32 Building work generally cannot be assessable under City Plan, but must instead be assessed against the Building Assessment Provisions in the Building Act.⁶⁰ This includes assessment against relevant provisions of City Plan, the Building Code of Australia and the Queensland Development Code.

Development under City Plan

8.33 City Plan includes a "Flood Hazard Overlay", which can change the level of assessment for premises identified on the flood hazard overlay maps. The Flood Hazard Overlay identifies four flood hazard areas, as follows:

Flood Hazard Area	Description	What does the hazard code mean for development?
High hazard area	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. Flooding may involve fast flowing and/or deeper flood floodwaters.	New development within these areas should be avoided. Any new development would be subject to the highest development assessment requirements.
Medium hazard area	Medium hazard area represents the 1% AEP event. This is the Defined Flood Event and the Defined Flood Level for Townsville City. 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.
Low hazard area	Areas of the floodplain outside the 1% AEP flood extent are still susceptible to flooding in rarer, more extreme flood events. 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. New development with a role in community resilience may be built in these areas subject to higher standards.
Medium hazard – further investigation areas	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

8.34 The flood hazard overlay maps have been derived from numerous sources, including:

(a) detailed flood modelling studies identified in SC6.7.2.1.1 of the Flood Planning Scheme Policy; and

(b) interim flood assessment overlay mapping completed by the QRA and amended for local constraints by TCC.

⁵⁹ Section 43(4) *Planning Act 2016* (Qld).

⁶⁰ Section 8(5) *Planning Act 2016* (Qld).

8.35 City Plan changes the level of assessment for certain development within the flood hazard overlay. For example:⁶¹

Flood hazard area	Development	Level of assessment
High hazard area Medium hazard area Medium hazard - further investigation area	Material change of use for: (i) Dwelling house; or (ii) Dual occupancy; or (iii) Community residence.	Accepted development subject to requirements
High hazard area Medium hazard area Medium hazard - further investigation area	Material change of use for: (i) Emergency services; or (ii) Hospital; or (iii) Special industry; or (iv) High impact industry; or (v) Residential care facility; or (vi) Retirement facility; or (vii) Major electricity infrastructure; or (viii) Air services.	Assessable development - code assessment
High hazard area Medium hazard area Medium hazard - further investigation area	Building work involving the lowering of floor levels or enclosure of a ground floor storey on an existing: (i) Dwelling house; or (ii) Dual occupancy; or (iii) Community residence.	Accepted development subject to requirements

8.36 Development that is either assessable development, or accepted development subject to requirements, is assessed against the assessment benchmarks in the Flood Hazard Overlay Code.

8.37 The assessment benchmarks, amongst other things, provide minimum development standards relative to the defined flood event, or the defined flood level. The minimum habitable floor levels for City Plan are generally identified as acceptable solutions in the flood hazard overlay, and vary depending on the type of development and the flood hazard area.

8.38 The acceptable solutions for various types of development as set out in the Flood Hazard Overlay Code are listed below. 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 sufficient to comply with this code, the Coastal environment overlay code and the Building Regulation 2006*". Therefore in some cases, the acceptable solution may be higher than that stated in the Flood Hazard Overlay Code.

⁶¹ See table 5.9.1 and 5.9.2 Townsville City Plan 2014.

Development type	Acceptable solution
New buildings	Located outside of high hazard areas
Habitable Rooms	Floor levels are a minimum of 300mm above the DFL (the flood level relative to the AHD of the 1% AEP flood)
Non-habitable Rooms	Floor levels are above the DFE(the 1% AEP flood event)
Underground Parking	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
New lots or roads	New lots or roads are not created within high hazard areas
New lots	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
New subdivisions - roads	Arterial, sub-arterial or major collector roads are located above the 2% AEP flood level
Cul-de-sacs or dead end streets	Located outside of medium hazard areas
Manufacture or storage of hazardous materials	Does not occur within the high hazard area
Structures used for the manufacture or storage of hazardous materials in bulk	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
Emergency services Hospitals and associated facilities Major electricity infrastructure	0.2% AEP
Emergency/evacuation shelters Storage of valuable records or items of historic/cultural significance (e.g. libraries, galleries) Aeronautical facilities Telecommunication facilities Substations Water treatment plants Regional fuel storage Food storage warehouse Retirement facility and residential care facility	0.5% AEP
Sewage treatment plants (requiring licensing as an environmentally relevant activity)	1% AEP

Relationship with other overlays

- 8.39 In some cases development may need to comply with the requirements of the Flood Hazard Overlay Code and the Coastal Environmental Overlay Code.
- 8.40 The Coastal Environmental Overlay Code ensures that development in the coastal zone is planned, designed, constructed and operated to:
- (a) avoid risk to people and property from coastal hazards, including storm tide inundation and coastal erosion, and taking into account the predicted effects of climate change; and
 - (b) manage the coast to protect coastal resources and allow for the natural fluctuations of coastal processes as far as possible.⁶²
- 8.41 The requirements of each overlay code apply to the part of the premises affected by the overlay, and TCC will assess the requirements of each overlay in consideration of a development application
- 8.42 Development that is included within storm tide hazard areas and flood hazard areas must comply with the highest floor level for either the defined flood level or the defined storm-tide level.⁶³

Building Act 1975 and Building Regulation 2006

- 8.43 A local government may, for the *Building Regulation 2006* (**Building Regulation**):
- (a) designate parts of its area as a flood hazard area; and
 - (b) declare the following for all or part of a flood hazard area:
 - (i) the defined flood level;
 - (ii) the maximum flow velocity of water;
 - (iii) an inactive flow or backwater area;
 - (iv) a freeboard that is more than 300mm; and
 - (v) the finished floor level of class 1 buildings built in all or part of the flood hazard area.⁶⁴
- 8.44 These matters become part of the building assessment provisions in accordance with section 32 of the Building Act and become assessment benchmarks against which assessable building work must be assessed.
- 8.45 City Plan designates the following for section 32 of the Building Act and section 13 of the Building Regulation:⁶⁵

⁶² Section 8.2.3 Townsville City Plan 2014.

⁶³ See Figure SC6.7.3.1.1.1-Floor control levels for both flooding and storm tide contained in the Flood hazard PSP located at Schedule 6, SC6.7 Townsville City Plan 2014.

⁶⁴ Section 13 *Building Regulation 2006* (Qld).

⁶⁵ See Table 1.6.1 in the Townsville City Plan 2014.

Description of designation and Building assessment provisions	Planning Scheme Part	<i>Building Act 1975, Building Regulation 2006 or Queensland Development Code Reference</i>
Flood hazard area Note - in accordance with s.13(4) of the Building Regulation 2006, the flood hazard area was designated on 27 October 2014	OM-06.1 OM-06.2	section 32(a) Building Act section 13(1)(a) Building Regulation QDC MP3.5 - Construction of buildings in flood hazard areas
Defined flood level	Schedule 1, Table SC1.2.2 Administrative definitions "Defined flood level" Table 8.2.6.3(a) Flood overlay code Editor's Note - P01 and P04	section 32(a) Building Act section 13(1)(b)(i) Building Regulation QDC MP3.5 - Construction of buildings in flood hazard areas
The finished floor level of class 1 buildings built in all or part of the flood hazard area	Table 8.2.6.3(a) Flood hazard overlay code	section 32(a) Building Act section 13(1)(b)(v) Building Regulation QDC MP3.5 - Construction of buildings in flood hazard areas

- 8.46 Each of the building assessment provisions is an assessment benchmark for assessing building work that is assessable development under the Planning Act.⁶⁶
- 8.47 The Building Assessment Provisions for the Building Act also include the Queensland Development Code.

Queensland Development Code mandatory part 3.5

- 8.48 Mandatory part 3.5 of the Queensland Development Code commenced on 20 December 2013. Mandatory part 3.5 applies to the lawful carrying out of certain building work to the extent the building work is carried out wholly or partly within a flood hazard area and a defined flood level declared by a local government for the flood hazard area.⁶⁷
- 8.49 The performance criteria in MP 3.5 of the Queensland Development Code will apply to assessable building work.

Development assessment process

- 8.50 TCC as an assessment manager under the Planning Act is required to follow the process in the Planning Act in assessing a development application. TCC has published a general overview of the development assessment process on its website.⁶⁸
- 8.51 TCC has an internal process to refer applications affected by the flood hazard overlay to The Infrastructure Planning - Floodplain and Coastal Engineer. The Infrastructure Planning - Floodplain and Coastal Engineer provides technical advice to the assessment manager to inform any information request, and in the assessment of the development application.

⁶⁶ Section 31(1) *Building Act 1975* (Qld).

⁶⁷ Section 3(1) MP 3.5 Queensland Development Code.

⁶⁸ An information sheet on the development assessment process can be accessed at www.townsville.qld.gov.au.

- 8.52 TCC undertakes an assessment of a development application in accordance with the requirements of the Planning Act. For an impact assessable development application, in addition to the assessment benchmarks in City Plan and matters prescribed by the Planning Regulation, TCC's assessment may be carried out against, or having regard to, any other relevant matter, other than a person's personal circumstances, financial or otherwise.
- 8.53 After carrying out an assessment of the development application, TCC must decide a development application according to the requirements of the Planning Act.
- 8.54 To the extent a development application involves code assessable development, TCC must approve the development application if the development complies with all of the assessment benchmarks for the development.⁶⁹ TCC may also decide to approve the development application even if the development does not comply with some of the assessment benchmarks.⁷⁰ TCC may only refuse a code assessable development application that does not comply with some of the assessment benchmarks, only if compliance with the assessment benchmarks cannot be achieved by imposed development conditions.⁷¹
- 8.55 To the extent a development application involves impact assessable development, TCC must decide to approve all or part of the development application, approve all or part of the development but impose development conditions on the approval or refuse the application.⁷²
- 8.56 TCC's notice of decision must include stated reasons for TCC's decision as an assessment manager, and if the approved development did not comply with any of the assessment benchmarks, reasons must be provided for why a development application was approved despite the proposed development not complying with any of the assessment benchmarks.⁷³

Development conditions

- 8.57 A development approval generally includes conditions of approval, which must be relevant to, and not an unreasonable imposition on, the development.⁷⁴ TCC has developed standard conditions which may be used to condition approved development subject to a flood hazard as follows:
- (a) For a material change of use development approval, a standard condition is that:
 - (i) Floor levels must achieve immunity from flood hazards by ensuring floor levels for residential buildings are 300mm above the defined flood event.
 - (ii) Documentation signed by an engineer (who must be an RPEQ) must be submitted to a Building Certifier identifying the required minimum floor height of all habitable rooms to achieve storm tide/flood immunity.

Timing: Prior to the issuing of a Development Permit for Building Works

- 8.58 For a reconfiguration of a lot development approval, a standard condition is that:

⁶⁹ Section 60(2)(a) *Planning Act 2016* (Qld).

⁷⁰ Section 60(2)(b) *Planning Act 2016* (Qld).

⁷¹ Section 60(2)(d) *Planning Act 2016* (Qld).

⁷² Section 60(2)(d) *Planning Act 2016* (Qld).

⁷³ Sections 65(5)(d) and 65(5)(e) of the *Planning Act 2016* (Qld).

⁷⁴ Section 65 *Planning Act 2016* (Qld).

- (a) The finished level on all new allotments/building envelopes created within the development site must be above the 1% AEP flood or the minimum level of 3.9m AHD, whichever is the greater.
- (b) Where works are required to achieve this immunity, a hydraulic report must be submitted that:
 - (i) determines these levels;
 - (ii) identifies the works required to achieve this level of immunity; and
 - (iii) demonstrates that the works have no impact on flooding of surrounding lots.

Timing: Technical details are to be submitted to TCC as part of an application for Operational Work.

8.59 TCC's standard conditions are publicly available and published on its website.

8.60 Development approvals issued by TCC generally include advice that the flood hazard overlay can be amended upon provision of digital mapping which clearly shows that the development is above the 1% AEP flood level and based on "as constructed" plans or documentation. Any requested amendments to the flood hazard overlay will not be incorporated into the planning scheme until a planning scheme amendment is finalised.

Development assessment for building work

TCC as a referral agency under the Planning Act 2016

- 8.61 A development application for assessable building work must be referred to the local government (as a referral agency) if all or part of the premises are in a flood hazard area and either or both:
- (a) the application states a DFL that is lower than the DFL defined by the local government; and/or
 - (b) the application states a maximum flow velocity of water lower than a maximum flow velocity of water declared by the local government under the Building Regulation.⁷⁵
- 8.62 As a referral agency, TCC may, amongst other things, state development conditions for any development approval, or direct the assessment manager to refuse a development application for stated reasons.⁷⁶

Accessibility of flood information

Flood studies

8.63 A number of publicly available engineering reports are on TCC's website. The following flood studies are available:

- 2016 Eastern Alligator Creek Flood Study
- 2013 Ross River Flood Study

⁷⁵ Schedule 9, Part 3, Division 2, Table 12 *Planning Regulation 2017* (Qld).

⁷⁶ Section 56(1) *Planning Act 2016* (Qld). There are no limits on the powers of a local government as a referral agency for a flood hazard area (see section 56(5) and Schedule 9, Part 3, Division 2, Table 12 *Planning Regulation 2017*(Qld)).

- 2016 CBD Hydraulic Model
- 2014 Douglas and Annandale Flood Study
- 2014 Gordon Creek Flood Study
- 2014 Louisa Creek Flood Study
- 2014 Black River Flood Study
- 2014 Captains Creek Flood Study
- 2014 Lower Bohle/Stony Creek Flood Study
- 2014 Upper and Middle Bohle Flood Study
- 2014 Althaus Creek Flood Study
- 2013 Bluewater Creek Flood Study
- 2013 - Ross Creek Flood Study
- 2011 - Horseshoe Bay Flood Study
- 2011 - North Ward Flood Study
- 2011 - Upper Bohle Plains Flood Study
- 2011 - Little Bohle River Flood Study
- 2008 - Alligator Creek Flood Study
- 2005 - Townsville Regional Flood Hazard Assessment Study

8.64 In addition to the flood studies, a range of other engineering reports are available, including storm tide studies and stormwater management studies.

Flood hazard overlay maps

- 8.65 Property searches based on address or lot on plan can be undertaken for the Flood Hazard Overlay Maps in City Plan.
- 8.66 The Flood Hazard Overlay Maps show the high hazard area, medium hazard area, low hazard area and medium hazard - further investigation area.
- 8.67 TCC has published a technical information sheet on its website that provides general information on the application of the flood hazard overlay to development⁷⁷.

Individual property reports

- 8.68 Property-level flood reports are provided as part of a "property search report" which is commonly requested as part of the standard conveyance searches for a property transfer. These reports provide detail on the modelled flood impact to a property during a 1% and 2% AEP flood event.
- 8.69 Since 2014, property-level flood reports have been available free of charge through the TCC website. Prior to this time, property-level flood reports could be accessed by inquiries through TCC.
- 8.70 The maps show the 1% AEP flood event, which is the DFE for TCC. The maps also show the 2% AEP flood event.
- 8.71 The flood reports are based on the flood modelling studies (as set out at 8.34(a) above) and therefore are based on regional flooding. The flood reports provide an indication as to whether regional flooding is likely to be a concern for an individual property.
- 8.72 Limitations to the mapping are detailed in the document "Flood Information Service Explanatory Notes". The mapping does not show:

⁷⁷ The Townsville City Plan Overlay Information Sheet - Flood Hazard Overlay can be accessed at www.townsville.qld.gov.au.

- (a) historical flood levels;
- (b) the absolute worst flooding that could occur - the maps are based on the 1% AEP;
- (c) flooding or inundation due to storm tide;
- (d) flooding that occurs because a drain is obstructed with debris or otherwise not functioning.

8.73 Explanatory Notes state that flood mapping may not be accurate if there have been substantial changes to the topography of the property of interest or to the catchment after the topographical data for the flood study was collected.⁷⁸

⁷⁸ The Flood Information Service Explanatory Notes Part 1 can be accessed at www.townsville.qld.gov.au.

Schedule 1 - List of Abbreviations

ADF	Australian Defence Force
AHD	Australian Height Datum
ARI	Average Recurrence Interval
BOM	Bureau of Meteorology
DFE	Defined Flood Height
DFL	Defined Flood Level
DNRME	Department of Natural Resources Mines and Energy
EAP	Emergency Action Plan for the Ross River Dam
IGEM	Inspector-General Emergency Management
LDC	Local Disaster Coordinator
LDCC	Local Disaster Coordination Centre
LGA	Local government area
LRC	Local Recovery Coordinator
LRRG	Local Recovery and Resilience Group
PDA	Priority development area
QAS	Queensland Ambulance Service
QFES	Queensland Fire and Emergency Services
QPS	Queensland Police Service
RRD	Ross River Dam
SDCC	State Disaster Control Centre
SES	State Emergency Services
SITREP	Situation Report
SPA	<i>Sustainable Planning Act 2009 (Qld)</i>
SPP	State Planning Policy
TARDIS	Torrent Rainfall and Distribution Information System
TCC	Townsville City Council
TLDMG	Townsville Local Disaster Management Group
TLDMP	Townsville Local Disaster Management Plan
THHS	Townsville Hospital & Health Service
TMR	Department of Transport and Main Roads
WSSR Act	<i>Water Supply (Safety and Reliability) Act 2008 (Qld)</i>

Annexure A - Summary of Key Announcements

29 January 2019 at 12:00pm to 30 January 2019 at 12:00pm	
Media Releases	3 media releases
Social Media	Facebook: <ul style="list-style-type: none"> • 8 posts • 7 shares Twitter: <ul style="list-style-type: none"> • 4 posts • 6 shares
30 January 2019 at 12:00pm to 31 January 2019 at 10:00am	
Media Releases	11 media releases
Radio Advertisements	115 advertisements 14 live reads
Billboards	6 digital billboards running
Interviews	5 radio interviews
Social Media	Facebook: <ul style="list-style-type: none"> • 18 posts • 15 shares • 43 messages and/or comments Twitter: <ul style="list-style-type: none"> • 14 posts • 30 shares • 6 messages
31 January 2019 at 4:00pm to 1 February 2019 at 11:00am	
Emergency Alerts	2 Emergency Alerts delivered
Media Releases	4 media releases
Radio Advertisements	88 advertisements 44 live reads
Billboards	7 digital billboards running
Interviews	9 interviews
Emergency Management Dashboard	240,911 views
Social Media	Facebook:

- 13 posts
 - 13 shares
 - 68 messages and/or comments
- Twitter:
- 12 posts
 - 37 shares

1 February 2019 at 11:00am to 1 February 2019 at 4:00pm

Emergency Alerts	2 Emergency Alerts delivered
Media Releases	14 media releases
Radio Advertisements	176 advertisements 28 live reads
Billboards	7 digital billboards running
Interviews	14 interviews
Emergency Management Dashboard	4 emergency news articles published 241,134 views
Social Media	Facebook: <ul style="list-style-type: none"> • 22 posts • 27 shares • 145 messages and/or comments • 1 live stream Twitter: <ul style="list-style-type: none"> • 21 posts • 68 shares

1 February 2019 at 4:00pm to 2 February 2019 at 10:00am

Emergency Alerts	2 Emergency Alerts submitted
Media Releases	5 media releases
Radio Advertisements	89 advertisements 18 live reads
Billboards	7 digital billboards running
Interviews	5 interviews
Emergency Management Dashboard	8 emergency news articles published 105,080 views
Social Media	Facebook: <ul style="list-style-type: none"> • 12 posts

- 10 shares
 - 113 messages and/or comments
- Twitter:
- 12 posts
 - 19 shares

2 February 2019 at 10:00am to 2 February 2019 at 4:00pm

Media Releases	7 media releases
Media Alerts	2 media alerts
Radio Advertisements	89 advertisements 18 live reads
Billboards	7 digital billboards running
Interviews	10 interviews
Emergency Management Dashboard	7 emergency news articles published 297,803 views
Social Media	Facebook: <ul style="list-style-type: none"> • 32 posts • 37 shares • 287 messages and/or comments • 1 live stream Twitter: <ul style="list-style-type: none"> • 31 posts • 52 shares

3 February 2019 at 9:00am to 3 February 2019 at 4:00pm

Emergency Alerts	7 Emergency Alerts delivered
Media Releases	3 media releases
Radio Advertisements	88 advertisements 18 live reads
Billboards	7 digital billboards running
Interviews	3 interviews
Emergency Management Dashboard	12 emergency news articles published 71,568 views
Social Media	Facebook: <ul style="list-style-type: none"> • 11 posts • 13 shares

- 117 messages and/or comments

Twitter:

- 6 posts
- 31 shares

3 February 2019 at 4:00pm to 4 February 2019 at 10:00am

Media Releases	6 media releases
Radio Advertisements	88 advertisements 18 live reads
Billboards	7 digital billboards running
Interviews	7 interviews
Emergency Management Dashboard	14 emergency news articles published 153,681 views
Social Media	Facebook: <ul style="list-style-type: none"> • 23 posts • 11 shares • 109 messages and/or comments Twitter: <ul style="list-style-type: none"> • 7 posts • 44 shares • 9 comments

4 February 2019 at 10:00am to 5 February 2019 at 10:00am

Emergency Alerts	1 Emergency Alert delivered
Media Alerts	1 media alert
Media Releases	11 media releases
Radio Advertisements	88 advertisements 18 live reads
Billboards	7 digital billboards running
Interviews	14 interviews
Emergency Management Dashboard	9 emergency news articles published 57,595 views
Social Media	Facebook: <ul style="list-style-type: none"> • 40 posts • 36 shares • 389 messages and/or comments

	<p>Twitter:</p> <ul style="list-style-type: none"> • 17 posts • 136 shares • 9 comments
5 February 2019 at 10:00am to 6 February 2019 at 12:00pm	
Media Releases	8 media releases
Interviews	20 interviews
Emergency Management Dashboard	9 emergency news articles published 27,959 views
Social Media	<p>Facebook:</p> <ul style="list-style-type: none"> • 12 posts • 30 shares • 84 messages and/or comments • 2 live streams <p>Twitter:</p> <ul style="list-style-type: none"> • 2 posts • 27 shares • 4 comments
6 February 2019 at 12:00pm to 7 February 2019 at 12:00pm	
Interviews	6 interviews
Emergency Management Dashboard	4 emergency news articles published 20,066 views
Social Media	<p>Facebook:</p> <ul style="list-style-type: none"> • 4 posts • 6 shares • 29 messages and/or comments • 2 live streams <p>Twitter:</p> <ul style="list-style-type: none"> • 2 posts • 9 shares
7 February 2019 at 12:00pm to 8 February 2019 at 12:00pm	
Media Releases	1 media release
Interviews	8 interviews
Emergency Management Dashboard	8 emergency news articles published 12,140 views (3,487,720 total views)

Social Media	5 posts 24 shares 35 messages/ and or comments
<i>8 February 2019 at 12:00pm to 9 February 2019 at 12:00pm</i>	
Media Releases	1 media release
Interviews	81 interviews
Emergency Management Dashboard	5 emergency news articles published 10,157 views
Social Media	3 posts 32 shares 26 messages/ and or comments 1 live stream

Annexure B - Summary of Emergency Alerts delivered

Emergency Alert Details			SMS Messages			Voice Messages
No.	Date and time	Location	SMS messages delivered	SMS Message details	Answered Calls	Voice message details
1.	31/01/2019 11:55am	Alligator Creek	2,608	FLOOD WARNING FROM TSV LOCAL DISASTER GROUP. Imminent flooding from intense rainfall. Move to higher ground if concerned. Ph 1800738541 or listen to local radio	602	FLOOD WARNING FROM TOWNSVILLE LOCAL DISASTER MANAGEMENT GROUP. Properties in Nome, Julago and Alligator Creek areas may experience intense rainfall on top of already elevated flood levels. This may cause fast moving and rapidly rising water levels leading to flash flooding. Residents are advised to move to higher ground if concerned. For more information listen to local radio, visit www.townsville.qld.gov.au or phone, 1800 738 541
2.	01/02/2019 7:38am	Townsville	24,219	FLOOD WARNING FROM TLDMG. Imminent flooding from intense rainfall. Move to higher ground if concerned. Ph 1800 738 541 or listen to local radio.	1,400	Emergency. Flood warning from Townsville Local Disaster Management Group. Properties in Black River, Blue Water. Beach Home, Yar bool ooh, and Too lar key ah, areas may experience intense rainfall on top of already elevated flood levels. This may cause fast moving and rapidly rising water levels leading to flash flooding. Residents are advised to move to higher ground if concerned. For more information listen to local radio, visit www dot Townsville dot q l d dot gov dot au or phone, 1 800 738 541.
3.	01/02/2019 10:51am	Townsville	29,504	FLOOD WARNING FROM TCC. Your property may experience imminent flooding from Ross River. Warn others, take action now. Ph	4,712	FLOOD WARNING FROM TOWNSVILLE LOCAL DISASTER MANAGEMENT GROUP. Residents in Clue-den, Ross lea, Hermit Park, OOh noom bah, Eye day lee ah, and Railway Estate may experience flooding from Ross River in the next 1

Emergency Alert Details		SMS Messages			Voice Messages	
No.	Date and time	Location	SMS messages delivered	SMS Message details	Answered Calls	Voice message details
				1800738541 or listen to local radio.		to 2 hours. Take action now, warn others, secure belongings and move to higher ground. If you require evacuation assistance, contact S E S on 1 3 2 500. For more information listen to local radio and visit w w w dot townsville dot q l d dot gov dot au or phone 1800 738 541.
4.	01/02/2019 2:39pm	Townsville	25,877	FLOOD WARNING FROM TLDMG. Increased flooding from intense rainfall. Move to higher ground if concerned. Ph 1800738541 or listen to local radio.	5,358	FLOOD WARNING FROM TOWNSVILLE LOCAL DISASTER MANAGEMENT GROUP. Properties in areas adjacent to the Bowl lee River, Sawnders and Stoney Creeks. This includes Jensen, Dearagun and Bur dell, may experience intense rainfall on top of already elevated flood levels. This may cause fast moving and rapidly rising water levels leading to flash flooding. Residents are advised to move to higher ground if concerned. For more information listen to local radio visit w w w dot townsville dot q l d dot gov dot au or phone, 1 800 738 541.
5.	01/02/2019 2:40pm	Rasmussen	46,671	FLOOD WARNING FROM TLDMG. Imminent flooding from intense rainfall. Move to higher ground if concerned. Ph 1800738541 or listen to local radio.	9,120	FLOOD WARNING FROM TOWNSVILLE LOCAL DISASTER MANAGEMENT GROUP. Properties in areas adjacent to the upper reaches of the Bowl lee River including the suburbs of Condon, Rass muss sun, Kelso, and Kirwan, may experience intense rainfall on top of already elevated flood levels. This may cause fast moving and rapidly rising water levels leading to flash flooding. Residents are advised to move to higher ground if concerned. For more information listen to local radio, visit w w w dot townsville dot q l d dot gov

Emergency Alert Details		SMS Messages			Voice Messages	
No.	Date and time	Location	SMS messages delivered	SMS Message details	Answered Calls	Voice message details
						dot a you or phone, 1 8 hundred 7 3 8 5 4 1.
6.	01/02/2019 8:12pm	Townsville	26,823	FLOOD WARNING: TLDMG. Your property may experience imminent flooding from Ross River. Evacuation is urged if safety concerns. Ph 1800738541 or listen to radio.	4,609	EMERGENCY. EMERGENCY. FLOOD WARNING FROM TOWNSVILLE LOCAL DISASTER MANAGEMENT GROUP. Residents in Clue-den, Ross-lea, Hermit Park, OoH noon bah, Eye day lee ah and Railway Estate are likely to experience increased flooding from, Ross River, in the next 1 to 2 hours due to continued rising levels in Ross River Dam. If residents are concerned about their safety they are strongly urged to evacuate immediately, by the safest route possible. Evacuation Centre open at Heatley, Secondary CollEge on Fulham Road. For more information go to w w w dot disaster dot townsville dot q l d dot gov dot a u or phone 1800 738 541.
7.	02/02/2019 8:17am	Kelso	46,996	FLOOD WARNING FROM TLDMG. Increased flooding from intense rainfall. Move to higher ground if concerned. Ph 1800738541 or listen to local radio.	9,094	Emergency. Emergency. FLOOD WARNING FROM TOWNSVILLE LOCAL DISASTER MANAGEMENT GROUP. Properties in areas adjacent to the upper reaches of the Bowl lee River including the suburbs of Condon, Rass muss sun, Kelso and Kirwan, have experienced intense rainfall on top of already elevated flood levels. This is likely to cause fast moving and rapidly rising water levels leading to flash flooding. Residents are advised to move to higher ground if concerned. For more information listen to local radio, visit www.townsville.qld.gov.au or phone, 1800 738 541.

Emergency Alert Details		SMS Messages			Voice Messages	
No.	Date and time	Location	SMS messages delivered	SMS Message details	Answered Calls	Voice message details
8.	02/02/2019 9:10am	Toolakea	26,716	FLOOD WARNING FROM TLDMG. Increased flooding from intense rainfall. Move to higher ground if concerned. Ph 1800738541 or listen to local radio.	1,395	Emergency. Emergency. FLOOD WARNING FROM TOWNSVILLE LOCAL DISASTER MANAGEMENT GROUP. Properties in Black River, Blue water, Beach Holm, Yabooloo and Toolakea areas have experienced intense rainfall on top of already elevated flood levels. This is likely to cause fast moving and rapidly rising water levels leading to flash flooding. Residents are advised to move to higher ground if concerned. For more information listen to local radio, visit www.townsville.qld.gov.au or phone, 1800 738 541.
9.	02/02/2019 2:18pm	Idalia	13,155	FLOOD WARNING FROM TLDMG. Imminent flooding from intense rainfall. Move to higher ground if concerned. Ph 1800738541 or listen to local radio.	1,641	Emergency. Emergency. FLOOD WARNING FROM TOWNSVILLE LOCAL DISASTER MANAGEMENT GROUP. Properties in Rosslea, Hermit Park, Railway Estate and South Townsville have experienced intense rainfall on top of already elevated flood levels. This is likely to cause fast moving and rapidly rising water levels leading to flash flooding. Residents are advised to move to higher ground if concerned. If residents are concerned about their safety they are strongly urged to evacuate immediately, relocating to family and friends if safe to do so. Evacuation Centres are open at Heatley Secondary College on Fulham Road and Ignatius Park College on Ross River Road. For more information go to www.disaster.townsville.qld.gov.au or phone 1800 738 541.

Emergency Alert Details		SMS Messages			Voice Messages	
No.	Date and time	Location	SMS messages delivered	SMS Message details	Answered Calls	Voice message details
10.	02/02/2019 3:04pm	Ooononba	18,581	FLOOD WARNING FROM TLDMG. Increased flooding from intense rainfall. Move to higher ground if concerned. Ph 1800738541 or listen to local radio.	235	FLOOD WARNING FROM TOWNSVILLE LOCAL DISASTER MANAGEMENT GROUP. Properties in Oo noon bah and Eye dah leah a have experienced intense rainfall on top of already elevated flood levels. This is likely to cause fast moving and rapidly rising water levels leading to flash flooding. Residents are advised to move to higher ground if concerned. If residents are concerned about their safety they are strongly urged to evacuate immediately, relocating to family and friends if safe to do so. Evacuation Centres are open at Heatley Secondary College on Fulham Road and Ignatius Park College on Ross River Road. For more information go to www.disaster.townsville.qld.gov.au or phone 1800 738 541.
11.	02/02/2019 3:44pm	Hermit Park	23,449	FLOOD WARNING FROM TLDMG. Increased flooding from intense rainfall. Move to higher ground if concerned. Ph 1800738541 or listen to local radio.	6,528	Emergency. Emergency. FLOOD WARNING FROM TOWNSVILLE LOCAL DISASTER MANAGEMENT GROUP. Properties in Ross lea, Hermit Park, Rail way Estate, Townsville City and South Townsville have experienced intense rainfall on top of already elevated flood levels. This is likely to cause fast moving and rapidly rising water levels leading to flash flooding. Residents are advised to move to higher ground if concerned. If residents are concerned about their safety they are strongly urged to evacuate immediately, relocating to family and friends if safe to do so. Evacuation Centres are open at Heatley Secondary College on Fulham Road and Ignatius Park College on Ross River

Emergency Alert Details		SMS Messages			Voice Messages	
No.	Date and time	Location	SMS messages delivered	SMS Message details	Answered Calls	Voice message details
						Road. For more information go to www.disaster.townsville.qld.gov.au or phone 1800 738 541.
12.	02/02/2019 3:53pm	Railway Estate	16,169	FLOOD WARNING FROM TLDMG. Increased flooding from intense rainfall. Move to higher ground if concerned. Ph 1800738541 or listen to local radio.	641	FLOOD WARNING FROM TOWNSVILLE LOCAL DISASTER MANAGEMENT GROUP. Properties in Rosslea, Hermit Park, Railway Estate and South Townsville have experienced intense rainfall on top of already elevated flood levels. This is likely to cause fast moving and rapidly rising water levels leading to flash flooding. Residents are advised to move to higher ground if concerned. If residents are concerned about their safety they are strongly urged to evacuate immediately, relocating to family and friends if safe to do so. Evacuation Centres are open at Heatley Secondary College on Fulham Road and Ignatius Park College on Ross River Road. For more information go to www.disaster.townsville.qld.gov.au or phone 1800 738 541.
13.	02/02/2019 4:18pm	West End	34,371	FLOOD WARNING FROM TLDMG. Increased flooding from intense rainfall. Move to higher ground if concerned. Ph 1800738541 or listen to local radio.	2,925	Emergency. Emergency. FLOOD WARNING FROM TOWNSVILLE LOCAL DISASTER MANAGEMENT GROUP. Properties in West End, Rows Bay and Garbutt have experienced intense rainfall on top of already elevated flood levels. This is likely to cause fast moving and rapidly rising water levels leading to flash flooding. Residents are advised to move to higher ground if concerned. If residents are concerned about their safety they are strongly urged to evacuate immediately, relocating

Emergency Alert Details		SMS Messages			Voice Messages	
No.	Date and time	Location	SMS messages delivered	SMS Message details	Answered Calls	Voice message details
						to family and friends if safe to do so. Evacuation Centres are open at Heatley Secondary College on Fulham Road and Ignatius Park College on Ross River Road. For more information go to www.disaster.townsville.qld.gov.au or phone 1800 738 541.
14.	02/02/2019 4:27pm	Hyde Park	31,358	FLOOD WARNING FROM TLDMG. Increased flooding from intense rainfall. Move to higher ground if concerned. Ph 1800738541 or listen to local radio.	5,001	EMERGENCY EMERGENCY. FLOOD WARNING FROM TOWNSVILLE LOCAL DISASTER MANAGEMENT GROUP. Properties in Hyde Park, Ate ken vale, Kurra jong, Ross Lee, Pim Lee Co, Mister ton, Munding burra have experienced intense rainfall on top of already elevated flood levels. This is likely to cause fast moving and rapidly rising water levels leading to flash flooding. Residents are advised to move to higher ground if concerned. If residents are concerned about their safety they are strongly urged to evacuate immediately, relocating to family and friends if safe to do so. Evacuation Centres are open at Heatley Secondary College on Fulham Road and Ignatius Park College on Ross River Road. For more information go to www.disaster.townsville.qld.gov.au or phone 1800 738 541.
15.	02/02/2019 4:34pm	Douglas	34,501	FLOOD WARNING FROM TLDMG. Increased flooding from intense rainfall. Move to higher ground if concerned. Ph 1800738541 or listen	1,705	Emergency. Emergency. FLOOD WARNING FROM TOWNSVILLE LOCAL DISASTER MANAGEMENT GROUP. Properties in Douglas and Annandale have experienced intense rainfall on top of already elevated flood levels. This is likely

Emergency Alert Details		SMS Messages			Voice Messages	
No.	Date and time	Location	SMS messages delivered	SMS Message details	Answered Calls	Voice message details
				to local radio.		to cause fast moving and rapidly rising water levels leading to flash flooding. Residents are advised to move to higher ground if concerned. If residents are concerned about their safety they are strongly urged to evacuate immediately, relocating to family and friends if safe to do so. Evacuation Centres are open at Heatley Secondary College on Fulham Road and Ignatius Park College on Ross River Road. For more information go to www.disaster.townsville.qld.gov.au or phone 1800 738 541.
16.	03/02/2019 9:53am	Townsville	3,505	FLOOD WARNING FROM TLDMG. Increased flooding from intense rainfall. Move to higher ground if concerned. Ph 1800738541 or listen to local radio.	600	FLOOD WARNING FROM TOWNSVILLE LOCAL DISASTER MANAGEMENT GROUP. Properties in Nome, Joo la go and Alligator Creek areas may experience intense rainfall on top of already elevated flood levels. This may cause fast moving and rapidly rising water levels leading to flash flooding. Residents are advised to move to higher ground if concerned. For more information listen to local radio, visit www.townsville.qld.gov.au . or phone, 1 800 7 3 8 5 4 1.
17.	03/02/2019 1:17pm	Townsville	31,594	FLOOD WARNING FROM TLDMG. Increased flooding from intense rainfall. Move to higher ground if concerned. Ph 1800738541 or listen to local radio.	31,594	Emergency. Emergency. FLOOD WARNING FROM TOWNSVILLE LOCAL DISASTER MANAGEMENT GROUP. Properties in Hyde Park, Ate ken vale, Kurra jong, Ross Lee, Pim Lee Co, Mister ton, Munding burra have experienced intense rainfall on top of already elevated flood levels. This is likely to cause fast moving and rapidly rising water levels leading to flash flooding.

Emergency Alert Details			SMS Messages			Voice Messages
No.	Date and time	Location	SMS messages delivered	SMS Message details	Answered Calls	Voice message details
						Residents are advised to move to higher ground if concerned. If residents are concerned about their safety they are strongly urged to evacuate immediately, relocating to family and friends if safe to. Evacuation Centres are open at Heatley Secondary College on Fulham Road, and Ignatius Park College on Ross River Road. For more information go to w w w dot disaster dot townsville dot q l d dot gov dot au. Or phone 1 800 738 541.
18.	03/02/2019 1:36pm	Townsville	15,679	FLOOD WARNING FROM TLDMG. Increased flooding from intense rainfall. Move to higher ground if concerned. Ph 1800738541 or listen to local radio.	231	EMERGENCY. EMERGENCY. FLOOD WARNING FROM TOWNSVILLE LOCAL DISASTER MANAGEMENT GROUP. Properties in OOh noom bah and Eye day lee ah have experienced intense rainfall on top of already elevated flood levels. This is likely to cause fast moving and rapidly rising water levels leading to flash flooding. Residents are advised to move to higher ground if concerned. If residents are concerned about their safety they are strongly urged to evacuate immediately relocating to family and friends if safe to do so. Evacuation Centres are open at Heatley Secondary College on Fulham Road and Ignatius Park College, on Ross River Road. For more information go to w w w dot disaster dot townsville dot q l d dot gov dot au. or phone 1 800 738 541.
19.	03/02/2019 1:53pm	Townsville	13,732	FLOOD WARNING FROM TLDMG. Increased flooding from intense rainfall. Move to higher ground if concerned. Ph 1800738541 or listen	617	Emergency. Emergency. FLOOD WARNING FROM TOWNSVILLE LOCAL DISASTER MANAGEMENT GROUP. Properties in Ross lea, Hermit Park, Railway Estate and South Townsville

Emergency Alert Details		SMS Messages			Voice Messages	
No.	Date and time	Location	SMS messages delivered	SMS Message details	Answered Calls	Voice message details
				to local radio.		have experienced intense rainfall on top of already elevated flood levels. This is likely to cause fast moving and rapidly rising water levels leading to flash flooding. Residents are advised to move to higher ground if concerned. If residents are concerned about their safety they are strongly urged to evacuate immediately, relocating to family and friends if safe to do so. Evacuation Centres are open at Heatley Secondary College on Fulham Road and Ignatius Park College on Ross River Road. For more information go to w w w dot disaster dot townsville dot q l d dot gov dot a u or phone 1 800 7 3 8 5 4 1
20.	03/02/2019 1:56pm	Townsville	11,961	FLOOD WARNING FROM TLDMG. Increased flooding from intense rainfall. Move to higher ground if concerned. Ph 1800738541 or listen to local radio.	1,555	EMERGENCY. EMERGENCY. FLOOD WARNING FROM TOWNSVILLE LOCAL DISASTER MANAGEMENT GROUP. Properties in Ooh noom bah, Eye day llee ah a and Clue-den have experienced intense rainfall on top of already elevated flood levels. This is likely to cause fast moving and rapidly rising water levels leading to flash flooding. Residents are advised to move to higher ground if concerned. If residents are concerned about their safety they are strongly urged to evacuate immediately, relocating to family and friends if safe to do so. Evacuation Centres are open at Heatley Secondary College on Fulham Road and Ignatius Park College, on Ross River Road. For more information go to w w w dot disaster dot townsville dot q l d dot gov dot au. Or phone 1 800 7 3 8 5 4 1.

Emergency Alert Details		SMS Messages			Voice Messages	
No.	Date and time	Location	SMS messages delivered	SMS Message details	Answered Calls	Voice message details
21.	03/02/2019 2:15pm	Townsville	35,415	FLOOD WARNING FROM TLDMG. Increased flooding from intense rainfall. Move to higher ground if concerned. Ph 1800738541 or listen to local radio.	1,627	Emergency. Emergency. FLOOD WARNING FROM TOWNSVILLE LOCAL DISASTER MANAGEMENT GROUP. Properties in Douglas and Anandale have experienced intense rainfall on top of already elevated flood levels. This is likely to cause fast moving and rapidly rising water levels leading to flash flooding. Residents are advised to move to higher ground if concerned. If residents are concerned about their safety they are strongly urged to evacuate immediately, relocating to family and friends if safe to do so. Evacuation Centres are open at Heatley Secondary College on Fulham Road, and Ignatius Park College on Ross River Road. For more information go to w w w dot disaster dot townsville dot q l d dot gov dot au or phone 1 800 738 541.
22.	03/02/2019 2:10pm	Townsville	20,802	FLOOD WARNING FROM TLDMG. Increased flooding from intense rainfall. Move to higher ground if concerned. Ph 1800738541 or listen to local radio.	6,310	Emergency. Emergency. FLOOD WARNING FROM TOWNSVILLE LOCAL DISASTER MANAGEMENT GROUP. Properties in Rosslea, Hermit Park, Rail way Estate, Townsville City and South Townsville have experienced intense rainfall on top of already elevated flood levels. This is likely to cause fast moving and rapidly rising water levels leading to flash flooding. Residents are advised to move to higher ground if concerned. If residents are concerned about their safety they are strongly urged to evacuate immediately, relocating to family and friends if safe to do so. Evacuation Centres are open at Heatley Secondary College on Fulham Road, and, Ignatius Park College on Ross River

Emergency Alert Details		SMS Messages			Voice Messages	
No.	Date and time	Location	SMS messages delivered	SMS Message details	Answered Calls	Voice message details
						Road. For more information go to w w w dot disaster dot townsville dot q l d dot gov dot a u or phone 1800 738 541.
23.	03/02/2019 5:04pm	Townsville	12,665	EMERGENCY EMERGENCY WARNING FROM TLDMG. Move away from Ross River now. Flash flooding from Dam between 20:30 and 06:00 Call 000 for life threatening emergencies	617	EMERGENCY. EMERGENCY. FLASH FLOOD WARNING FROM TOWNSVILLE LOCAL DISASTER MANAGEMENT GROUP. Dam levels are expected to rise during the hours of eight thirty p m Sunday, and, 6 am Monday. If maximum capacity is reached, dam gates will open. Areas in Rosslea, Hermit Park, Railway Estate and South Townsville will experience imminent flash flooding and significant sudden rise in Ross River. Move away from Ross River immediately. Get to higher ground now. If at home, move to the highest point of your dwelling. Call 000 for all life threatening emergencies.
24.	03/02/2019 5:10pm	Townsville	2,392	EMERGENCY EMERGENCY WARNING FROM TLDMG. Move away from Ross River now. Flash flooding from Dam between 20:30 and 06:00 Call 000 for life threatening emergencies	-	-
25.	03/02/2019 5:14pm	Townsville	33,760	EMERGENCY EMERGENCY WARNING FROM TLDMG. Move away from Ross River now. Flash flooding from Dam between 20:30 and 06:00 Call 000 for life	2,771	EMERGENCY. EMERGENCY. FLASH FLOOD WARNING FROM TOWNSVILLE LOCAL DISASTER MANAGEMENT GROUP. Dam levels are expected to rise during the hours of eight thirty p m Sunday and 6 am Monday. If maximum

Emergency Alert Details			SMS Messages			Voice Messages
No.	Date and time	Location	SMS messages delivered	SMS Message details	Answered Calls	Voice message details
				threatening emergencies		capacity is reached, dam gates will open. Areas in West End, Rows Bay and Gar butt will experience imminent flash flooding and significant sudden rise in Ross River. Move away from Ross River immediately. Get to higher ground now. If at home, move to the highest point of your dwelling. Call 000 for all life threatening emergencies.
26.	03/02/2019 5:21pm	Townsville	2,696	EMERGENCY EMERGENCY WARNING FROM TLDMG. Move away from Ross River now. Flash flooding from Dam between 20:30 and 06:00 Call 000 for life threatening emergencies	-	-
27.	03/02/2019 5:29pm	Townsville	9,670	EMERGENCY EMERGENCY WARNING FROM TLDMG. Move away from Ross River now. Flash flooding from Dam between 20:30 and 06:00 Call 000 for life threatening emergencies	1,591	EMERGENCY. EMERGENCY. FLASH FLOOD WARNING FROM TOWNSVILLE LOCAL DISASTER MANAGEMENT GROUP. Dam levels are expected to rise during the hours of eight thirty p m Sunday and, 6 am Monday. If maximum capacity is reached, dam gates will open. Areas in Oo noon bah and Eye dah Leah a, will experience imminent flash flooding and significant sudden rise in Ross River. Move away from Ross River immediately. Get to higher ground now. If at home, move to the highest point of your dwelling. Call 000 for all life threatening emergencies.
28.	03/02/2019 5:31pm	Townsville	4,601	EMERGENCY EMERGENCY WARNING FROM TLDMG. Move	-	-

Emergency Alert Details		SMS Messages			Voice Messages	
No.	Date and time	Location	SMS messages delivered	SMS Message details	Answered Calls	Voice message details
				away from Ross River now. Flash flooding from Dam between 20:30 and 06:00 Call 000 for life threatening emergencies		
29.	03/02/2019 5:39pm	Townsville	19,094	EMERGENCY EMERGENCY WARNING FROM TLDMG. Move away from Ross River now. Flash flooding from Dam between 20:30 and 06:00 Call 000 for life threatening emergencies	4,895	EMERGENCY EMERGENCY WARNING FROM TLDMG. Move away from Ross River now. Flash flooding from Dam between 20:30 and 06:00 Call 000 for life threatening emergencies
30.	03/02/2019 5:42pm	Townsville	11,780	EMERGENCY EMERGENCY WARNING FROM TLDMG. Move away from Ross River now. Flash flooding from Dam between 20:30 and 06:00 Call 000 for life threatening emergencies	234	EMERGENCY. EMERGENCY. FLASH FLOOD WARNING FROM TOWNSVILLE LOCAL DISASTER MANAGEMENT GROUP. Dam levels are expected to rise during the hours of eight thirty p m Sunday, and 6 am Monday. If maximum capacity is reached, dam gates will open. Areas in Oo noon bah, Eye dah Leah a, and Clue den will experience imminent flash flooding and significant sudden rise in Ross River. Move away from Ross River immediately. Get to higher ground now. If at home, move to the highest point of your dwelling. Call 000 for all life threatening emergencies.
31.	03/02/2019 5:44pm	Townsville	675	EMERGENCY EMERGENCY WARNING FROM TLDMG. Move away from Ross River now. Flash flooding from Dam between 20:30 and 06:00 Call 000 for life	-	-

Emergency Alert Details		SMS Messages			Voice Messages	
No.	Date and time	Location	SMS messages delivered	SMS Message details	Answered Calls	Voice message details
				threatening emergencies		
32.	03/02/2019 5:45pm	Townsville	13,782	EMERGENCY EMERGENCY WARNING FROM TLDMG. Move away from Ross River now. Flash flooding from Dam between 20:30 and 06:00 Call 000 for life threatening emergencies	-	-
33.	03/02/2019 5:49pm	Townsville	26,048	EMERGENCY EMERGENCY WARNING FROM TLDMG. Move away from Ross River now. Flash flooding from Dam between 20:30 and 06:00 Call 000 for life threatening emergencies	4,695	EMERGENCY. EMERGENCY. FLASH FLOOD WARNING FROM TOWNSVILLE LOCAL DISASTER MANAGEMENT GROUP. Dam levels are expected to rise during the hours of eight thirty p m Sunday and, 6 am Monday. If maximum capacity is reached, dam gates will open. Areas of Hyde Park, Ate ken vale, Kurra jong, Ross Lee, Pim Lee Co, Mister ton, Mun ding bur ra will experience imminent flash flooding and significant sudden rise in Ross River. Move away from Ross River immediately. Get to higher ground now. If at home, move to the highest point of your dwelling. Call 000 for all life threatening emergencies.
34.	03/02/2019 5:54pm	Townsville	32,037	EMERGENCY EMERGENCY WARNING FROM TLDMG. Move away from Ross River now. Flash flooding from Dam between 20:30 and 06:00 Call 000 for life threatening emergencies	1,540	EMERGENCY. EMERGENCY. FLASH FLOOD WARNING FROM TOWNSVILLE LOCAL DISASTER MANAGEMENT GROUP. Dam levels are expected to rise during the hours of eight thirty p m Sunday, and 6 am Monday. If maximum capacity is reached, dam gates will open. Areas of Douglas and Annandale will experience imminent

Emergency Alert Details			SMS Messages			Voice Messages
No.	Date and time	Location	SMS messages delivered	SMS Message details	Answered Calls	Voice message details
						flash flooding, and significant sudden rise in Ross River. Move away from Ross River immediately. Get to higher ground now. If at home, move to the highest point of your dwelling. Call 000 for all life threatening emergencies.
35.	03/02/2019 5:55pm	Townsville	8,925	EMERGENCY EMERGENCY WARNING FROM TLDMG. Move away from Ross River now. Flash flooding from Dam between 20:30 and 06:00 Call 000 for life threatening emergencies	-	-
36.	03/02/2019 6:01pm	Townsville	44,850	EMERGENCY EMERGENCY WARNING FROM TLDMG. Move away from Ross River now. Flash flooding from Dam between 20:30 and 06:00 Call 000 for life threatening emergencies	3,000	EMERGENCY. EMERGENCY. FLASH FLOOD WARNING FROM TOWNSVILLE LOCAL DISASTER MANAGEMENT GROUP. Dam levels are expected to rise during the hours of eight thirty p m Sunday, and 6 am Monday. If maximum capacity is reached, dam gates will open. Areas of Kir wan and Thur in gowah will experience imminent flash flooding and significant sudden rise in Ross River. Move away from Ross River immediately. Get to higher ground now. If at home, move to the highest point of your dwelling. Call 000 for all life threatening emergencies.
37.	03/02/2019 6:20pm	Townsville	5,433	EMERGENCY EMERGENCY WARNING FROM TLDMG. Move away from Ross River now. Flash flooding from Dam between 20:30	-	-

Emergency Alert Details		SMS Messages			Voice Messages	
No.	Date and time	Location	SMS messages delivered	SMS Message details	Answered Calls	Voice message details
				and 06:00 Call 000 for life threatening emergencies		
38.	03/02/2019 6:06pm	Townsville	7,815	EMERGENCY EMERGENCY WARNING FROM TLDMG. Move away from Ross River now. Flash flooding from Dam between 20:30 and 06:00 Call 000 for life threatening emergencies	-	-
39.	03/02/2019 8:41pm	Townsville	45,720	EMERGENCY EMERGENCY WARNING FROM TLDMG Move from Ross River now. Flash flooding occurring now. Get to high ground now. Call 000 for life threatening emergencies	2,946	EMERGENCY. EMERGENCY. RISING OF FLOOD WATERS WARNING FROM TOWNSVILLE LOCAL DISASTER MANAGEMENT GROUP. Dam gates are now fully open. Properties in Kerr wan and Ther in gow wah will experience a sudden rise of fast moving water from Ross River. Move away from Ross River immediately. Get to higher ground now. If at home, move to the highest point of your dwelling. Call 000 for all life threatening emergencies.
40.	03/02/2019 8:47pm	Townsville	29,541	EMERGENCY EMERGENCY WARNING FROM TLDMG Move from Ross River now. Flash flooding occurring now. Get to high ground now. Call 000 for life threatening emergencies	1,493	EMERGENCY. EMERGENCY. RISING OF FLOOD WATERS WARNING FROM TOWNSVILLE LOCAL DISASTER MANAGEMENT GROUP. Dam gates are now fully open. Properties in Douglas and Anne an dale will experience a sudden rise of fast moving water from Ross River. Move away from Ross River immediately. Get to higher ground now. If at home, move to the highest point of your dwelling. Call 000 for all life

Emergency Alert Details		SMS Messages			Voice Messages	
No.	Date and time	Location	SMS messages delivered	SMS Message details	Answered Calls	Voice message details
						threatening emergencies.
41.	03/02/2019 8:53pm	Townsville	21,602	EMERGENCY EMERGENCY WARNING FROM TLDMG Move from Ross River now. Flash flooding occurring now. Get to high ground now. Call 000 for life threatening emergencies	4,165	EMERGENCY. EMERGENCY. RISING OF FLOOD WATERS WARNING FROM TOWNSVILLE LOCAL DISASTER MANAGEMENT GROUP. Dam gates are now fully open. Properties in Hyde Park, Ate ken vale, Kurra jong, Ross Lee, Pim Lee Co, Mister ton, Mun ding burr rah will experience a sudden rise of fast moving water from Ross River. Move away from Ross River immediately. Get to higher ground now. If at home, move to the highest point of your dwelling. Call 000 for all life threatening emergencies.
42.	03/02/2019 8:41pm	Townsville	9,456	EMERGENCY EMERGENCY WARNING FROM TLDMG Move from Ross River now. Flash flooding occurring now. Get to high ground now. Call 000 for life threatening emergencies	620	EMERGENCY. EMERGENCY. RISING OF FLOOD WATERS WARNING FROM TOWNSVILLE LOCAL DISASTER MANAGEMENT GROUP. Dam gates are now fully open. Properties in Ross lea, Hermit Park, Railway Estate and South Townsville will experience a sudden rise of fast moving water from Ross River. Move away from Ross River immediately. Get to higher ground now. If at home, move to the highest point of your dwelling. Call 000 for all life threatening emergencies.
43.	03/02/2019 8:45pm	Townsville	8,523	EMERGENCY EMERGENCY WARNING FROM TLDMG Move from Ross River now. Flash flooding occurring now. Get to high ground	1,577	EMERGENCY EMERGENCY. RISING OF FLOOD WATERS WARNING FROM TOWNSVILLE LOCAL DISASTER MANAGEMENT GROUP. Dam gates are now fully open. Properties in Oo noon

Emergency Alert Details		SMS Messages			Voice Messages	
No.	Date and time	Location	SMS messages delivered	SMS Message details	Answered Calls	Voice message details
				now. Call 000 for life threatening emergencies		bah and Eye dah leah a will experience a sudden rise of fast moving water from Ross River. Move away from Ross River immediately. Get to higher ground now. If at home, move to the highest point of your dwelling. Call 000 for all life threatening emergencies
44.	03/02/2019 8:54pm	Townsville	10,757	EMERGENCY EMERGENCY WARNING FROM TLDMG Move from Ross River now. Flash flooding occurring now. Get to high ground now. Call 000 for life threatening emergencies	234	EMERGENCY EMERGENCY. RISING OF FLOOD WATERS WARNING FROM TOWNSVILLE LOCAL DISASTER MANAGEMENT GROUP. Dam gates are now fully open. Properties in Oo noon bah and Eye dah leah a will experience a sudden rise of fast moving water from Ross River. Move away from Ross River immediately. Get to higher ground now. If at home, move to the highest point of your dwelling. Call 000 for all life threatening emergencies.
45.	03/02/2019 9:03pm	Townsville	16,646	EMERGENCY EMERGENCY WARNING FROM TLDMG Move from Ross River now. Flash flooding occurring now. Get to high ground now. Call 000 for life threatening emergencies	5,735	EMERGENCY EMERGENCY. RISING OF FLOOD WATERS WARNING FROM TOWNSVILLE LOCAL DISASTER MANAGEMENT GROUP. Dam gates are now fully open. Properties in Ross lea, Hermit Park, Rail way Estate, Townsville City and South Townsville will experience a sudden rise of fast moving water from Ross River. Move away from Ross River immediately. Get to higher ground now. If at home, move to the highest point of your dwelling. Call 000 for all life threatening emergencies.

Emergency Alert Details			SMS Messages			Voice Messages
No.	Date and time	Location	SMS messages delivered	SMS Message details	Answered Calls	Voice message details
46.	03/02/2019 9:07pm	Townsville	33,525	EMERGENCY EMERGENCY WARNING FROM TLDMG Move from Ross River now. Flash flooding occurring now. Get to high ground now. Call 000 for life threatening emergencies	1,838	EMERGENCY. EMERGENCY. RISING OF FLOOD WATERS WARNING FROM TOWNSVILLE LOCAL DISASTER MANAGEMENT GROUP. Dam gates are now fully open. Properties in West End, Rows Bay and Gar butt, will experience a sudden rise of fast moving water from Ross River. Move away from Ross River immediately. Get to higher ground now. If at home, move to the highest point of your dwelling. Call 000 for all life threatening emergencies.
47.	03/02/2019 9:27pm	Townsville	8,210	EMERGENCY EMERGENCY WARNING FROM TLDMG Move from Ross River now. Flash flooding occurring now. Get to high ground now. Call 000 for life threatening emergencies	1,565	EMERGENCY. EMERGENCY. RISING OF FLOOD WATERS WARNING FROM TOWNSVILLE LOCAL DISASTER MANAGEMENT GROUP. Dam gates are now fully open. Properties in OOh noom bah, Eye day lee ah, and Clue den will experience a sudden rise of fast moving water from Ross River. Move away from Ross River immediately. Get to higher ground now. If at home, move to the highest point of your dwelling. Call 000 for all life threatening emergencies.
48.	5/02/2019 12:01am	Townsville	12,035	FLOOD WARNING FROM TLDMG. Imminent flooding from Bluewater Creek. Move to higher ground if concerned. Ph 1800738541 or listen to local radio.	860	EMERGENCY. Emergency. FLOOD WARNING FROM TOWNSVILLE LOCAL DISASTER MANAGEMENT GROUP. Properties in, Blue water Park, Blue water, Too la key ah and Saunders Beach areas have experienced intense rainfall at the top of the Blue water Creek catchment. This is likely to cause fast moving and rapidly rising water levels leading to flash flooding. Residents are advised to move to higher ground if

Emergency Alert Details		SMS Messages			Voice Messages	
No.	Date and time	Location	SMS messages delivered	SMS Message details	Answered Calls	Voice message details
						concerned. For more information listen to local radio, visit www.townsville.qld.gov.au or phone, 1 eight hundred 7 3 8 5 4 1.
49.	5/02/2019 1:35am	Townsville	-	-	845	EMERGENCY. Emergency. FLOOD WARNING FROM TOWNSVILLE LOCAL DISASTER MANAGEMENT GROUP. Properties in, Blue water Park, Blue water, Too la key ah and Saunders Beach areas have experienced intense rainfall at the top of the Blue water Creek catchment. This is likely to cause fast moving and rapidly rising water levels leading to flash flooding. Residents are advised to move to higher ground if concerned. For more information listen to local radio, visit www.townsville.qld.gov.au or phone, 1 eight hundred 7 3 8 5 4 1.
50.	6/02/2019 11:23am	Townsville	26,212	Flash Flood advice from TLDMG. Imminent flooding from intense rainfall. Move to higher ground if concerned. Ph 1800 738 541 or listen to local radio	4,344	Flash flood advice from Townsville Local Disaster Management Group. Properties in Oo noon bah, hermit park, Ross lee, Railway Estate, Clue Dan and Eye dah lee a may experience heavy rainfall on top of already elevated flood levels. This may cause fast moving and rapidly rising water levels leading to flash flooding. Residents are advised to move to higher ground if concerned. For more information listen to local radio, visit www.townsville.qld.gov.au or phone, 1800 738 541.