All Hazards Risk Assessment Report

Local Disaster Management Plan

City of Logan

30 June 2022

Prepared by GHD

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CITY OF LOGAN

Project name	City of Logan AHRA Review 2022					
Document title	All Hazards Risk Assessment Report | Local Disaster Management Plan					
Project number	12585222					
File name	City of Logan AHRA Review Report 2022.docx					
Status Code		Author	Reviewer		Approved for issue		
			Name	Signature	Name	Signature	Date
Draft		F. Hill	E. Kerr	E.K.	H. Lancaster	H.L.	30.6.22
Final		F. Hill	E. Kerr	E.K.	H. Lancaster	H.L.	1.8.22
[Status code]							
[Status code]							
[Status code]							

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Executive Summary

This report has been compiled to provide an overview of the process, background reference material, preparation and results of the All Hazards Risk Assessment review facilitated by GHD for City of Logan (Council). The content of the report sections and appendices are summarised under each heading below.

Section 1.0 Introduction

The introduction provides a history of the scope and purpose for this report. The hazards are identified and listed.

Section 2.0 Background

Provides some background information on the legislative context of the risk assessment process under the relevant Act. The Queensland Emergency Risk Management Framework (QERMF) is introduced and the history of its implementation and ongoing development and use at City of logan is explained.

Section 3.0 Risk assessment process

This section restates the hazard categories and scenarios considered in more detail. There is a list of the identified exposed elements, QERMF input assumptions and methodology applied to determine inherent risk scores, and details discussions with lead agencies undertaken to develop the QERMF tool to date.

Section 4.0 Risk scoring

This section details the results of the City of Logan QERMF AHRA to June 2022. Inherent and residual risk scores are tabulated.

Section 5.0 Current issues and context

Outcomes and key issues from the QERMF process are identified and discussed. These issues are prioritised to address the largest risks identified and report on the status of actions being undertaken to further mitigate these. Climate change impacts affecting the risk assessment are addressed.

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1. Introduction

GHD Pty Ltd (GHD) has been engaged by Logan City Council (City of Logan) to undertake a review of the All Hazard Risk Assessment (AHRA) in response to the amendments of the *Disaster Management Act 2003* (the Act) which forms the legislative basis for disaster management activities within all levels of Government in Queensland. The AHRA was originally undertaken in 2017 and utilised the processes of both the ISO 31000:2009 – Risk Management, and the National Emergency Risk Assessment Guidelines (NERAG) to establish the context, identify the risks, analyse the risks and evaluate the risks for each identified hazard.

Reviews of the AHRA were undertaken in 2019 and again in 2020. The Queensland Emergency Risk Management Framework (QERMF) has been applied since 2019, resulting in adjustment to the HRA process, including hazard identification, consequence and likelihood criteria.

The All Hazards Risk Assessment (AHRA) is presented in the Queensland Emergency Risk Management Framework (QERMF) format, in alignment with:

- Queensland Fire and Emergency Services (QFES) provided State Hazard Assessments
- ISO 31000:2009 Risk management – Principles and guidelines
- SA/SNZ HB 436: 2013 Risk management guidelines – companion to AS/NZS ISO 31000:2009
- SA/SNZ HB 89:2013 Risk management – Guidelines on risk assessment techniques
- AS/NZS 5050: 2010 Business continuity – Managing disruption related risk
- National Emergency Risk Assessment Guidelines (NERAG) (Australian Emergency Management Institute, 2015)
- Queensland Climate Adaptation Strategy

The hazards were identified, and grouped into those largely recommended by QFES, with a commonality of impacts, exposure, and response methods as follows:

- Severe Tropical Cyclone (eg STC Dinah 1967) incorporating Flash Flooding, Major Flooding (>500mm/24hour)
- Severe Thunderstorm Event - Severe Storm, East Coast Low, incorporating Flash Flooding, Major Flooding (>500mm/24 hour)
- Bushfire
- Earthquake (Magnitude 5.35 similar to 1989 Newcastle)
- Heatwave
- Pandemic / Epidemic

- Exotic Animal / Plant Disease
- Major Accident (Air, Road or Rail Transport, Urban Fire, Hazardous Materials)
- Terrorism / Cybersecurity Attack

GHD compiled information provided from City of Logan including previous local and district risk assessments. Material from other sources included:

- QERMF Tool and guidelines
- QFES provided state-wide risk assessments and probability statistics to be applied
- Sourcing Information from **www.longpaddock.qld.gov.au** and other official climate change sources
- Applicable and relevant information from assessments from other Queensland councils and LDMGs
- Information sourced from lead and key agencies

The QERMF tool is populated with the following:

- Risk description
- Nominated climate change scenario to be included as applicable
- Known vulnerabilities and history
- Lead agencies / key agencies for each element
- Known plans, strategies and measures in place for each - Preventive & preparedness, and Response & recovery
- Comments and assessments on effectiveness of current controls
- Current risk rating in terms of consequence and likelihood – prepopulated from QFES state-wide assessments
- Establish risk actions in line with risk appetite to either accept the current risk level, or if not accepted, mitigate what is in the LDMG's control, and transfer (escalate) the risks that are not.

1.1. Purpose of this report

This report is to provide an update to the previous 2020 review, to assess:

- Any changes in the nature or risk levels of the hazards
- Any changes in methodology of assessment
- Effects and learnings from events encountered since the last report
- Actions undertaken by any party; mitigations applied to reduce risk levels
- Improvements to the assessment methodology and tool

1.2. Scope and limitations

This report: has been prepared by GHD for City of Logan and may only be used and relied on by City of Logan for the purpose agreed between GHD and City of Logan as set out in section 1.1 of this report.

GHD otherwise disclaims responsibility to any person other than City of Logan arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD. GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared this report on the basis of information provided by Logan City Council and others who provided information to GHD (including Government authorities), which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

2. Background

2.1. Queensland Emergency Risk Management Framework (QERMF)

The Queensland Disaster Management Act requires that each Local Disaster Management Group ensures that:

> *"all events, whether natural or caused by human acts or omissions, should be managed in accordance with the following—*
>
> *(i) a strategic policy framework developed by the State group;" (Part 1, Division 2, 4A (b))*

And states 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" (Division 3, Subdivision 1, Section 30(a)).*

The Queensland Emergency Risk Management Framework (QERMF) was endorsed by the Queensland Disaster Management Committee (QDMC) as Queensland's approach to disaster risk management in 2017. Accordingly, it is the legislated framework to be used by Logan City Council (City of Logan).

This project was initiated by City of Logan to facilitate an all hazards risk analysis (AHRA) utilising the Queensland Emergency Risk Management Framework (QERMF). This involved identifying the agencies involved, and the exposed elements for each hazards type, and the treatments and controls in place to mitigate impacts.

The QERMF tool is to be used as a living and active plan for ongoing planning and improvement.

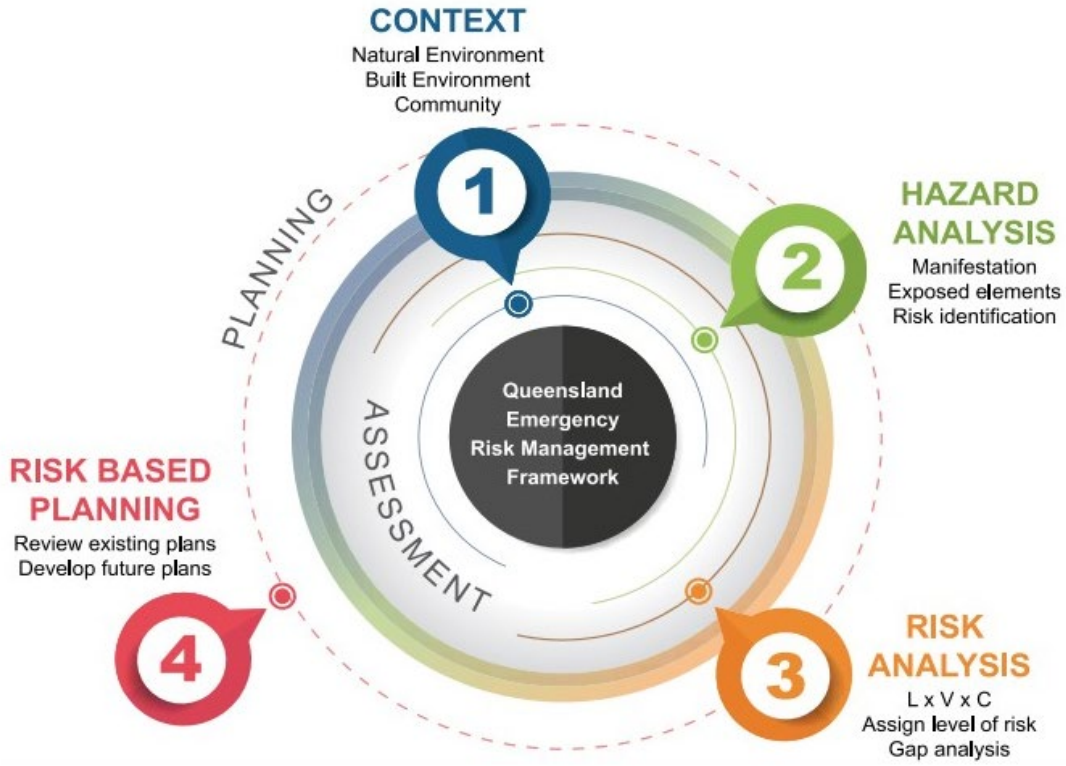

Figure 1 Queensland Emergency Risk Management Framework (QERMF)

Key documents regarding QERMF can be found as follows:

- **https://www.disaster.qld.gov.au/qermf/Documents/QERMF-Fact-Sheet.pdf**
- **https://www.disaster.qld.gov.au/qermf/Documents/User-Guide-QERMF-GIS-Risk-Assessment-Tool.pdf**
- **QERMF Risk Assessment Handbook (disaster.qld.gov.au)** (https://www.disaster.qld.gov.au/dmg/st/Documents/H1102-QFES-Risk-Assessment-Process-Handbook.pdf)

2.2. Implementation history at City of Logan

2.2.1. QERMF introduction

GHD Advisory were engaged by City of Logan in 2019 to facilitate an All Hazards Risk Assessment (AHRA) utilising the Queensland Emergency Risk Management Framework (QERMF) format and tool. This involved identifying the agencies involved, and the exposed elements for each hazards type, and the treatments and controls in place to mitigate impacts. A further review of the AHRA and QERMF tool was undertaken in 2020.

Prior to 2019, City of Logan maintained the AHRA and provided risk analysis and reporting utilising a NERAG aligned approach.

2.2.2. Ongoing QERMF development

Since 2019, ongoing work has been undertaken to provide further detail and context to each hazard, exposed element, and risk mitigation. This has involved interaction with key agencies and communication of issues and risk levels. In many cases, information has been provided to better establish the effectiveness of current mitigations and confirm risk levels faced.

Actions undertaken since initial implementation have included:

- Further assessment of the existence and effectiveness of measures and controls in place to manage identified hazards
- Refined scoring of residual risk scores and prioritisation
- Development of discussion papers targeted to lead and key agencies (Department of Communities, Housing and Digital Economy, Queensland Health, Logan City Council)
- Interactions undertaken within City of Logan to further inform the risk assessment, and update risk scoring and priorities
- Articulation of the major risks being transferred to State/District, in preparation of building cases for State funding and action where most needed

3. Risk Assessment Process

3.1. Identification and definition of all hazard risks

The following hazards have been identified and grouped into those with a commonality of impacts, exposure, and response methods. The scenarios for each are established as follows:

- **Severe Tropical Cyclone** – Category 3-5 (eg STC Dinah 1967) incorporating flash flooding, major flooding (>500mm/24hour)
- **Severe Thunderstorm** - Severe Storm, East Coast Low, incorporating Flash Flooding, Major Flooding (>500mm/24 hour)
- **Bushfire** - Extreme or catastrophic rated bushfire within the region requiring external resources to control and that has significant impact on people, infrastructure, the environment and economy.
- **Earthquake** - similar magnitude (5.35) as the 1989 Newcastle earthquake
- **Heatwave** - severe and extreme (as per BoM classification)
- **Pandemic / Epidemic** - Equivalent to COVID-19 pandemic 2020-2022 resulting in moderate number of fatalities and second order impacts on the health systems, business, infrastructure and community functionality. Health becomes lead agency.
- **Exotic Animal / Plant Disease** - a transmissible disease or condition that degrades the health or productivity of a plant or animal.
- **Major Accident (Air, Road or Rail Transport, Urban Fire, Hazardous Materials)** - A major accident involving passenger transport vehicles (air, road and/or rail). Fatalities number over 10 with multiple serious injuries requiring immediate medical support. Fire involving or inside a building or structure, including houses, outbuildings, ships, tank farms and petrochemical complexes. An incident involving chemicals but no fire, ranging from a petrol wash away as a result of a leak from an overfilled container to a large scale industrial chemical spill.
- **Terrorism / Cybersecurity Attack** - An attack by an extremist group and/or individuals. The attack is generally aimed at soft targets, are politically motivated, intended for mass casualties and destruction and intended to cause mass fear or panic. Includes cyber security/terrorism, critical infrastructure and essential services.

Risk statements are developed and included for each identified hazard.

3.1.1. Cyclical hazard likelihoods

The likelihood of some hazards will reduce at certain times of the year. The "QERMF Hazard Wheel" provided in the QERMF Fact Sheet demonstrates the relative risks throughout the yearly cycle. It has been noted that in light of the COVID-19 pandemic, the onset of a pandemic is not limited to a particular time of year, however the transmission rates will still vary depending on seasonal temperatures.

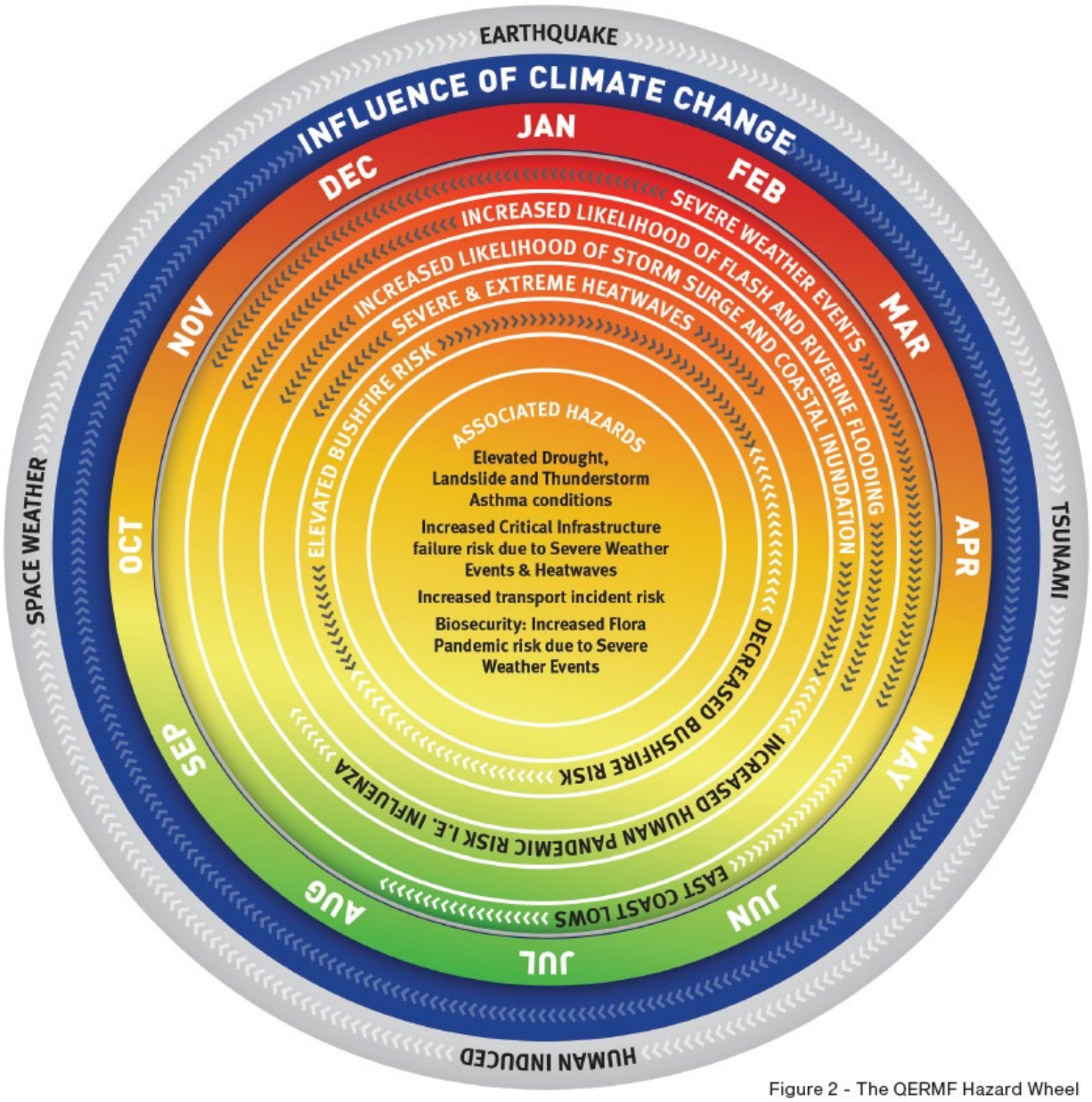

Figure 2 - The QERMF Hazard Wheel

Figure 2 QERMF Hazard Wheel

3.2. Identification and definition of exposed elements

Asset elements were addressed i.e., those elements at risk (people, systems, networks and assets) which are vital to the area of interest that may be exposed to hazards in the event of their occurrence. This necessitated the identification of exposed elements related to:

- Infrastructure
- Access & resupply
- Community & social
- Medical
- Significant industries
- Environmental

A complete list of all exposed elements was generated from the QERMF tool, a spreadsheet established by QFES. This generates 222 potential combinations of exposed element. The final list contains 50 exposed elements applicable to one or more hazards. Lead and key agencies were identified for most exposed elements.

Table 1 – Exposed elements

Type	Risk no.	Exposed Element	Asset Name	Asset Type/ Demographic/ Concern
R1 - Infrastructure	3	Power (Stations)	Various - Energy Queensland and Private	Other
	6	Power (Transmission)	Powerlink Transmission lines and substations	Other
	18	Power (Sub Distribution)	Extensive Network across Logan	Power Line
	29	Communications (Telecommunications)	Telstra / NBN	Other
	40	Communications (Emergency Services)	PSBA Emergency Towers	Radio Tower
	43	Water (Water Treatment)	Water Treatment Plants	Treatment Plant

Type	Risk no.	Exposed Element	Asset Name	Asset Type/ Demographic/ Concern
	46	Water (Reticulation)	SEQ Water Supply Reticulation	Other
	47	Water (Waste Water Treatment)	Wastewater Treatment Plants (WWTPs)	Treatment Plant
	49	Water (Dams & Reservoirs)	Seqwater Supply Dams	Dam
	50	Water (Dams & Reservoirs)	Reservoirs	Reservoir
	71	Fuel Infrastructure (Gas & Oil)	Gas Supply	Gas Infrastructure
	78	Fuel Infrastructure (Bulk Fuel)	Bulk fuel storage	Other
R2 – Access & Resupply	79	Roads (State)	Motorway Infrastructure (Queensland Motorways / DTMR)	Motorway
	80	Roads (State)	Highway (DTMR)	Highway
	83	Roads (Local)	Local Connector Roads (DTMR / City of Logan)	Local Connector Road
	85	Roads	Roads (general)	Other
	92	Roads (Bridges)	Bridges	Concrete
	95	Rail (Passenger)	Brisbane to Gold Coast	Electrified
	96	Rail (Passenger)	Rail Lines and Associated Infrastructure	Non-Electrified
	118	Active Transport	Footpaths and cycleways	Footpaths and cycleways

Type	Risk no.	Exposed Element	Asset Name	Asset Type/ Demographic/ Concern
R3 - Community & Social	119	Population Centres	Central Business Districts	Urban
	120	Population Centres	Jimboomba Residential Area	Regional
	129	Demographics	N/A	Other Vulnerable Persons (Isolation)
	129	Demographics	N/A	Other Vulnerable Persons (Direct impact)
	130	Community Infrastructure	Education Facilities	School
	135	Community Infrastructure	Parks Assets	Other
	140	Centres of Governance	Governance Arrangements	Other
	140	Centres of Governance	Defence	Other
	141	Emergency Services	QFES/QRFS	QFES
	143	Emergency Services	QPS	QPS
	144	Emergency Services	QAS	QAS
	145	Emergency Services	SES	SES
	156	Building Stock	Pre-1980 Construction (Pre-code)	Residential (all)
	157	Building Stock	Pre-1990 Asbestos Construction (Pre-code)	Residential (all)

Type	Risk no.	Exposed Element	Asset Name	Asset Type/ Demographic/ Concern
	163	Emergency Shelters & Places of Refuge	Emergency Shelters	Purpose Built Shelter, Schools, public halls, community centres, places of refuge
	167	Cultural Elements	Historical Buildings, Landmarks and Sacred Sites	Area or Object of Cultural Significance
R4 - Medical	168	Hospitals	Logan Hospital	Hospital
	169	Hospitals	Community Clinics	Community Clinic
	170	Hospitals	Health Service	Health Service
	171	Hospitals	Care Centre	Care Centre
	176	Public Health	Not prompted	Mental Health
	179	Aged Care Facilities	Aged Care and Retirement Villages in Logan - Overall	Private
R5 - Significant Industry	184	Heavy Industry & Manufacturing	Mining and Quarries, Plants and Refineries, Industrial	Industrial
	192	Agriculture, Fishing and Forestry	Crops and Livestock	Primary Producer
	194	Agriculture, Fishing and Forestry	Plantation and Native Forestry	Forestry
	196	Agriculture, Fishing and Forestry	Agriculture and Associated Businesses	Other
	204	Local & Other Industries	Key Local Industry and Regional Centres	Defence, Mining, Logistics, Financial Services etc.

Type	Risk no.	Exposed Element	Asset Name	Asset Type/ Demographic/ Concern
R6 - Environmental	210	Waste Management	Landfill Transfer Station Recycling Station	Other
	216	Areas of State Environmental Significance (ASES)	National Parks, Council Parks and Reserves	National Parks
	222	Local Ecosystems or Species of Concern	National Park, Protected Area, Wetland Habitat Area	Other

3.3. Data, information and resources compiled

GHD compiled information provided from City of Logan including previous local and district risk assessments. Material from other sources included:

- QERMF Tool and guidelines
- QFES provided state-wide risk assessments and probability statistics to be applied
- Sourcing Information from *www.longpaddock.qld.gov.au* and other official climate change sources
- Applicable and relevant information from assessments from other Queensland councils and LDMGs
- Information sourced from lead and key agencies
- Queensland State Earthquake Risk Assessment
- Queensland State Heatwave Risk Assessment

With this information, the QERMF tool was populated with key details, including:

- Asset owners
- Asset names and types
- Notes regarding vulnerability
- Known likelihoods and severity of hazards
- Known risk treatments and controls
- Current risk assessment scores

The following details and assumptions in the risk scoring process are to be noted, especially as the QFES guideline varies from the standard ISO 31000 and NERAG risk management processes previously applied:

- The QERMF scoring process results in an 'inherent' risk level that represents a potential risk level if assumed to be effectively managed
- The application of an effectiveness score produces a 'residual risk' score that, at best, produces a score equal to the inherent risk score if measures are deemed 'Totally Effective'
- If effectiveness is scored anything less than "Totally Effective", the residual risk score rises, providing a score that relates directly to each listed "Existing Risk Treatment or Control" and places the focus on each individual treatment/control
- With the QERMF tool providing such scope and variance in scoring vulnerability and effectiveness for each hazard, exposed element and effectiveness, and likelihood constant for each hazard, it was determined that the consequence score for each hazard would be as determined by the NERAG/ISO 31000 process, and constant for each exposed element of each hazard
- While there is the ability to vary the consequence score for each individual treatment of each exposed element, it was determined to leave this as constant across the hazard (as determined by NERAG process for each hazard). Attempts to customise these scores individually (for People, Financial, Community, Public Administration or Environmental) resulted in risk levels that did not ring true eg , for an Environmental consequence determined to be Major, but not affecting other risk aspects (i.e., scoring Insignificant or Minor), this would result in an overall scoring of Minor or Insignificant for this exposed element (eg , for Local Ecosystems or Species of Concern). In this example, inflating the Environmental consequence to Catastrophic does not change the residual risk rating significantly, and is false in that: the overall consequence under the NERAG process would deem that environmental consequence was never higher than Major at worst. Rather than manipulate each one to get the right result, the decision was to use a singular set of consequence scores for each hazard.

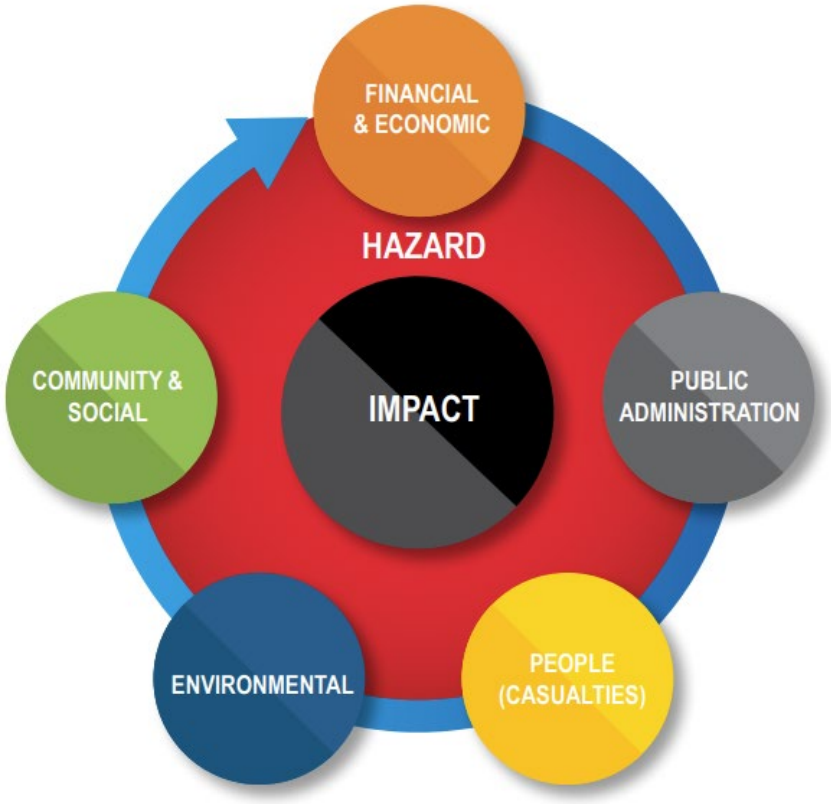

Figure 3 QERMF Consequence Wheel

The consequence wheel from the QERMF Risk Assessment Process Handbook shows how a hazard may manifest itself across several categories listed, some impacts greater than others. The level of consequence is based on the highest rated impact for planning and mitigation purposes.

3.4. Inherent risk scores

To this point the QERMF tool was complete with the following:

- Risk description
- Nominated climate change scenario to be included as applicable
- Comments on vulnerability and vulnerability scores
- Known existing measures/controls – Preventive & preparedness, and Response & recovery
- Comments on effectiveness of current controls
- Current risk rating in terms of consequence and likelihood – prepopulated from QFES state-wide assessments if available (based on NERAG and ISO 31000 methodology)

At this stage in the process, inherent scores were generated for all exposed elements. The results are shown in Table 2 – Inherent risk scores (June 2022).

3.5. Lead and key agencies

For each exposed element, the following were noted and entered into the QERMF tools for each hazard:

- Lead agencies / key agencies for each element
- Known vulnerabilities and history
- Known plans, strategies and measures in place for each

The 2019 process, including workshop and questionnaires, were used to populate many of the nominated mitigation measures for many of the exposed elements identified, and to assist evaluation of the effectiveness of these measures. Where possible, these were migrated across to the latest iteration of the QERMF tool.

In the 2020 review, it was identified that the essential emergency services are key to all hazards, so it was determined that concentration should be placed on understanding fully how these services operate and prepare. These services included:

- Queensland Police Service (QPS)
- Queensland Ambulance Service (QAS)
- Queensland Fire & Emergency Services (QFES)
- Queensland Rural Fire Service (QRFS)
- State Emergency Services (SES)

Accordingly, workshops were facilitated with each of them to analyse the capability and capacity to manage, identify gaps, and give a self-assessment as to how effective these measures currently are. QAS were unable to attend a workshop but were able to respond to a set of questions posed via email.

More specifically, the discussions included:

- Relevant plans/procedures (BCPs, Disaster Plans, Strategy documents) in place relating to the exposed elements listed
- Commentary on the purpose of these documents (including capacity and capability), and reliance of other entities within
- Other risk treatments or controls in place to manage the impacts on the exposed elements listed eg , redundancy, physical infrastructure or other
- Commentary on the purpose of these treatments/controls (including capacity and capability) and reliance on other entities
- Training and operation plans developed and tested

- Gaps existing within the entity's current planning, capability and/or capacity regarding management of the impact of the hazard (known gaps in the procedures and treatments listed above, or assumed reliance on other entities)
- A self-assessment score regarding the effectiveness of risk treatments and controls cited in the form response (as per QERMF tool scoring criteria)

The results of the discussions were entered into the QERMF tool as a demonstration of the mitigations undertaken, and their effectiveness. The risks are acknowledged by the LDMG, and currently accepted.

3.6. Effectiveness and residual risk scores

Effectiveness scores were applied as follows:

- Self-assessment scores provided by agencies at face value from questionnaires provided in the last 12 months (including those from other GHD clients where agencies have provided a Statewide assessment)
- Assessment by City of Logan LDMG where known
- A default value of 'Partially Effective' was applied to all remaining risk treatments and controls

Once an effectiveness was applied to each treatment, the QERMF tool generated a Residual Risk score. Table 3 – Residual risk scores (June 2022) shows the highest residual risk score for each exposed element of each hazard.

Note that at the time of this report, work is ongoing to establish effectiveness and residual risk, accordingly, we expect these values to be refined over the next few months as more assessment results are forthcoming.

4. Risk scoring

This section details the results of the City of Logan QERMF AHRA to June 2022. The following tables show the highest inherent and residual risks for each exposed element against each hazard.

These tables and scores are a snapshot of the tool at the time of preparing this report and based on the information and evaluation compiled to date. This is intended to act as a live system that is updated as information comes to hand, and proposed actions are undertaken.

4.1. Results summary and update

4.1.1. Overall hazard risk scores

The most extreme residual risks are associated with the heatwave and pandemic risks (noting that the inherent risk scoring for this hazard was undertaken prior to February 2020, and the realisation of the impact of COVID-19).

After review of the two years since the last report in 2020, there have been no shifts in the expected frequency or magnitude of each identified hazard. There has also not been any further state-wide risk assessments published or any other publication that would change the current risk status. Similarly, there has been no changes to the QERMF methodology or risk criteria applied. Therefore, overall hazard risk levels have not varied.

4.1.2. Inherent risk scores

No changes have been identified to the list of exposed elements or the associated vulnerability levels. Therefore the inherent risks as shown in Table 2 – Inherent risk scores (June 2022) remain unchanged from 2020.

4.1.3. Residual risk scores

Although progress and learnings have resulted over the last two years as detailed in section 5 Current issues and context, the actions undertaken have not been sufficient to alter the assessed effectiveness of each measure such that the residual scores shown in Table 3 – Residual risk scores (June 2022) remain static from the 2020 review.

While it is recognised that many effectiveness scores are based on a lack of knowledge with corresponding action identified to ascertain these and reduce residual risk scores. The nature of the working environment over the pandemic has not been conducive to having discussions with agencies who were also operating in a disaster response environment for much of this period.

4.2. Inherent risk scores

Table 2 – Inherent risk scores (June 2022)

Element Code	Type	Exposed Element	Asset Name	Asset Type/Demo-graphic/ Concern	Tropical Cyclone/	Severe Storm	Fire	Earthquake	Heatwave	Pandemic	Animal / Plant Disease	Major Accident	Terrorism
3	R1 - Infrastructure	Power (Stations)	Biloela, Stanwell, Gladstone etc. and private solar	Other	L5	L6	L6	L6	M8				L5
4	R1 - Infrastructure	Power (Transmission)	Transmission Lines	Power Line	M8	H9	H9	M7	H9				
8	R1 - Infrastructure	Power (Transmission)	Powerlink and EQ Substations	Substation	M7	M8	L6		M8				L6
16	R1 - Infrastructure	Power (Sub Distribution)	Local Distribution Network	Other	L6	M7	M7		H9				
29	R1 - Infrastructure	Communications (Telecommunications)	Comms Networks Telstra Optus NBN Vodafone etc.	Other	M8	H9	M8	M7	H9				L6
35	R1 - Infrastructure	Communications (Fibre Optic)	Network	Other	L6	M7	M7	L6					
40	R1 - Infrastructure	Communications (Emergency Services)	PSBA/Ergon	Radio Tower	L6	M7	M8	M7					
43	R1 - Infrastructure	Water (Water Treatment)	CHRC Water Treatment Plants	Treatment Plant	L6	M7	M7		M8				M7
46	R1 - Infrastructure	Water (Reticulation)	CHRC Reticulated Water Network	Other	M7	M8	M8	M7	M8				
47	R1 - Infrastructure	Water (Waste Water Treatment)	CHRC Waste Water Treatment Plants	Treatment Plant	M7	M8		M7					
49	R1 - Infrastructure	Water (Dams & Reservoirs)	Dams & Weirs - Sunwater, Isaac RC, Mine	Dam	M7	M8		M7	H9				M7
50	R1 - Infrastructure	Water (Dams & Reservoirs)	CHRC & Sunwater Reservoirs (Tanks)	Reservoir	L6	M7		M7	H10				L5
71	R1 - Infrastructure	Fuel Infrastructure (Gas & Oil)	Wells	Gas Infrastructure			M7					L6	M7
76	R1 - Infrastructure	Fuel Infrastructure (Bulk Fuel)	Depots - Bulk Fuel	Depots	M7	M8	M7	L6				M7	
85	R2 - Access & Resupply	Roads	Roads and Bridges (general)	Other		H9	M7	M7	H9			M7	M7
104	R2 - Access & Resupply	Rail (Freight)	Rail Network (mining & stock)	Non-Electrified	M7	M8	M8	M7	H10			M7	M7
110	R2 - Access & Resupply	Air (Airports/Aerodromes)	Emerald Airport and others	Other	M7	M8	M8	M7	M8			M7	M7
119	R3 - Community & Social	Population Centres	Towns	Urban	M8	H9	M8		H10				
120	R3 - Community & Social	Population Centres	Rural, Regional and Remote Communities	Rural	M8	H9	H9		E12				
129	R3 - Community & Social	Demographics	N/A	Isolation Vulnerable Perso	M8	H9	H9	M7	H11	H9	M8	M8	M7
129	R3 - Community & Social	Demographics	N/A	Impact Vulnerable Person	M8	H9	H9	M7	E13	H10	M8	M8	M8
130	R3 - Community & Social	Community Infrastructure	Education facilities	School	M8	H9	M7	L6	H10	H9	L6	L6	M7
135	R3 - Community & Social	Community Infrastructure	Social Infrastructure (built environments)	Other					H11				
138	R3 - Community & Social	Centres of Governance	CHRC Disaster Coordination Centre	Disaster Coordination Cen	M8	H9							
140	R3 - Community & Social	Centres of Governance	Governance arrangements	Other	M8	H9	H9	L6	H11	H10	M7	M7	M8
141	R3 - Community & Social	Emergency Services	QFES / QRFS	QFES / QRFS	M8	H9							
143	R3 - Community & Social	Emergency Services	QPS Police Station	QPS	M8	H9							
144	R3 - Community & Social	Emergency Services	QAS Centre	QAS	M8	H9							
145	R3 - Community & Social	Emergency Services	SES Centre	SES	L6	M7							
159	R3 - Community & Social	Building Stock	N/A	N/A	M8	H9	H9	M8	H10				
163	R3 - Community & Social	Emergency Shelters & Places of Refuge	Shelters Halls Centres Schools Places of Refuge	Other	M7	M8	M7	L6	M8				
167	R3 - Community & Social	Cultural Elements	Areas of Cultural, Indigenous, Religious Significance, Cemeteries	Other	L6	M7							
168	R4 - Medical	Hospitals	Hospitals & Community Clinics	Hospital	M8	H9	M8	M7	H10	H9			
175	R4 - Medical	Public Health	Not prompted	Heat Stress					H10				
176	R4 - Medical	Public Health	Not prompted	Mental Health	M7	M8	M8	L6	H10	M8	M7	M7	M7
181	R4 - Medical	Aged Care Facilities	CHRC and Private Aged Care Centres	Other	M8	H9	H9	M7	H11	H10			
182	R5 - Significant Industry	Heavy Industry & Manufacturing	Mines and Quarries	Mine	M8	H9	H9	M8	H10			M8	M8
203	R5 - Significant Industry	Heavy Industry & Manufacturing	Industrial and Manufacturing Facilities	Industrial Facility	M7	M8	M7	M8	H10			M7	L5
184	R5 - Significant Industry	Transport & Logistics	Inland Port	Other			M8						
191	R5 - Significant Industry	Agriculture, Fishing and Forestry	Crops and Livestock	Primary Producer	M8	H9			H10		H9		L5
192	R5 - Significant Industry	Agriculture, Fishing and Forestry	Plantation and Native Forestry	Forestry	M8	H9	H9		H11		M8		
194	R5 - Significant Industry	Tourism	Tourism Industry	Other	M7	M8	M8		H11	M8	L6		
222	R6 - Environmental	Waste Management	Landfill Transfer Station Recycling Station Tailings Dams	Other	L5	L6	L6	M7					
210	R6 - Environmental	Areas of State Environmental Significance (ASES)	National Park, Protected Area, Wetland Habitat Area	Other	L6	M7	M8		H11		M7		
216	R6 - Environmental	Local Ecosystems or Species of Concern	National Park, Protected Area, Wetland Habitat Area	Other	L6	M7	M8		H11		M7	M7	

4.3. Residual risk scores

Table 3 – Residual risk scores (June 2022)

EE No.	Type	Exposed Element	Asset Name	Asset Type/Demo-graphic/Concern	Tropical Cyclone/ Monsoon	Severe Storm	Fire	Earthquake	Heatwave	Pandemic	Animal / Plant Disease	Major Accident	Terrorism
3	R1 - Infrastructure	Power (Stations)	Biloela, Stanwell, Gladstone etc. and private solar	Other	L6	M7	M7	M8	H9				L6
4	R1 - Infrastructure	Power (Transmission)	Transmission Lines	Power Line	H9	H10	H11	M8	H10				
8	R1 - Infrastructure	Power (Transmission)	Powerlink and EQ Substations	Substation	H9	H10	M8		H10				M7
16	R1 - Infrastructure	Power (Sub Distribution)	Local Distribution Network	Other	M7	M8	H9		H11				
29	R1 - Infrastructure	Communications (Telecommunications)	Comms Networks Telstra Optus NBN Vodafone etc.	Other	H10	H11	H9	H9	H11				H9
35	R1 - Infrastructure	Communications (Fibre Optic)	Network	Other	M7	M8	M8	M7					
40	R1 - Infrastructure	Communications (Emergency Services)	PSBA/Ergon	Radio Tower	M7	M8	H9	M8					
43	R1 - Infrastructure	Water (Water Treatment)	CHRC Water Treatment Plants	Treatment Plant	M8	H9	M8		H9				H9
46	R1 - Infrastructure	Water (Reticulation)	CHRC Reticulated Water Network	Other	H9	H10	H10	H9	H10				
47	R1 - Infrastructure	Water (Waste Water Treatment)	CHRC Waste Water Treatment Plants	Treatment Plant	H9	H10		H9					
49	R1 - Infrastructure	Water (Dams & Reservoirs)	Dams & Weirs - Sunwater, Isaac RC, Mine	Dam	M8	H9		M8	E12				H9
50	R1 - Infrastructure	Water (Dams & Reservoirs)	CHRC & Sunwater Reservoirs (Tanks)	Reservoir	M8	H9		H9	H11				H9
71	R1 - Infrastructure	Fuel Infrastructure (Gas & Oil)	Wells	Gas Infrastructure			H9					M8	M7
76	R1 - Infrastructure	Fuel Infrastructure (Bulk Fuel)	Depots - Bulk Fuel	Depots	H9	H10	H9	M8				H9	
85	R2 - Access & Resupply	Roads	Roads and Bridges (general)	Other	H10	H10	H9	H9	H11			H9	H9
104	R2 - Access & Resupply	Rail (Freight)	Rail Network (mining & stock)	Non-Electrified	M8	H9	H9	M8	H11			M8	M8
110	R2 - Access & Resupply	Air (Airports/Aerodromes)	Emerald Airport and others	Other	M8	H9	H9	M8	H10			M8	M8
119	R3 - Community & Social	Population Centres	Towns	Urban	H10	H11	H10		E12				
120	R3 - Community & Social	Population Centres	Rural, Regional and Remote Communities	Rural	H10	H11	H11		E13				
129	R3 - Community & Social	Demographics	N/A	Isolation Vulnerable Persons	H10	H11	H11	H9	E13	H11	H10	H10	H9
129	R3 - Community & Social	Demographics	N/A	Impact Vulnerable Persons	H10	H11	H11	H9	E13	E12	H10	H10	H10
130	R3 - Community & Social	Community Infrastructure	Education facilities	School	H10	H11	H9	M8	E12	H11	M8	M8	H9
135	R3 - Community & Social	Community Infrastructure	Social Infrastructure (built environments)	Other					E13				
138	R3 - Community & Social	Centres of Governance	CHRC Disaster Coordination Centre	Disaster Coordination Centre	H10	H11							
140	R3 - Community & Social	Centres of Governance	Governance arrangements	Other	H9	H10	H11	H9	H11	H11	H9	M8	H9
141	R3 - Community & Social	Emergency Services	QFES / QRFS	QFES / QRFS	H9	H10	H11	M8	E12	H10	H9	H9	H9
143	R3 - Community & Social	Emergency Services	QPS Police Station	QPS	H9	H10	H11	M8	E12	H10	H9	H9	H9
144	R3 - Community & Social	Emergency Services	QAS Centre	QAS	H9	H10	H11	M8	E12	H10	H9	H9	H9
145	R3 - Community & Social	Emergency Services	SES Centre	SES	H9	H10	H11	M8	E12	H10	H9	H9	H9
159	R3 - Community & Social	Building Stock	N/A	N/A	H10	H11	H11	H10	E12				
163	R3 - Community & Social	Emergency Shelters & Places of Refuge	Shelters Halls Centres Schools Places of Refuge	Other	M8	H9	M8	M7	H10				
167	R3 - Community & Social	Cultural Elements	Areas of Cultural, Indigenous, Religious Significance, Cem	Other	M8	H9							
168	R4 - Medical	Hospitals	Hospitals & Community Clinics	Hospital	H9	H10	H9	M7	H11	H10			
175	R4 - Medical	Public Health	Not prompted	Heat Stress					H11				
176	R4 - Medical	Public Health	Not prompted	Mental Health	H9	M8	H10	M8	E12	H10	H9	H9	M8
181	R4 - Medical	Aged Care Facilities	CHRC and Private Aged Care Centres	Other	H10	H11	H11	H9	E13	E12			
182	R5 - Significant Industry	Heavy Industry & Manufacturing	Mines and Quarries	Mine	H10	H11	H11	H10	E12			H10	H10
184	R5 - Significant Industry	Heavy Industry & Manufacturing	Industrial and Manufacturing Facilities	Industrial Facility	H9	H10	H9	H10	E12			H9	M7
191	R5 - Significant Industry	Transport & Logistics	Inland Port	Other			H10						
192	R5 - Significant Industry	Agriculture, Fishing and Forestry	Crops and Livestock	Primary Producer	H9	H11			H11		H10		L6
194	R5 - Significant Industry	Agriculture, Fishing and Forestry	Plantation and Native Forestry	Forestry	H10	H11	H11		E13		H10		
203	R5 - Significant Industry	Tourism	Tourism Industry	Other	H10	H11	H10		E13	H11	H11		
210	R6 - Environmental	Waste Management	Landfill Transfer Station Recycling Station Tailings Dams	Other Areas	M7	M8	M8	H9			M7		
216	R6 - Environmental	of State Environmental Significance (ASES	National Park, Protected Area, Wetland Habitat Area	Other Local	M7	M8	H9		E12		M8		
222	R6 - Environmental	Ecosystems or Species of Concern	National Park, Protected Area, Wetland Habitat Area	Other	M8	H9	H10		E13		H9	H9	

5. Current issues and context

Since the last review in 2020, the Covid-19 pandemic has dominated the community landscape. This has affected the way people live and work and added challenges to the management of hazards.

On top of the pandemic, Logan has had two severe storms, ex-tropical cyclone Seth in January 2022, and an East Coast Low in May 2022 bringing record rainfall. In addition, there were two mini tornadoes in late January, and early February 2022.

The constancy and severity of these events, underpinned by the ongoing pandemic, has required the attention and energy of the City of Logan Disaster Management staff and LDMG over these last 2 years, and all of the agencies listed in the QERMF tool. Despite this, efforts have been made to increase preparedness and capability for response. However, it is conceded that many proposed actions pending in the QERMF tool have not been progressed due to higher priority event response.

The following section discusses the main issues identified in QERMF and potential actions nominated to reduce risks. QERMF is maintained as a living assessment and action plan to be managed and assessed as part of the LDMG responsibilities.

5.1. QERMF issues and action items

5.1.1. Queensland Health and Department of Communities Housing and Digital Economy

The Demographics (direct impact and isolation effects) are highlighted as high-risk elements. Similarly, Mental Health, Hospitals and Heat Stress feature highly. Queensland Health (QH) and the State Department of Communities Housing and Digital Economy (DCHDE) have key responsibilities as the lead agencies for these elements and manage the mitigation planning and actions.

A draft discussion document was developed in 2021 that specifically identified the exposed elements listed in QERMF that were relevant to QH and DCHDE. This highlighted current mitigation capacities and capabilities, and residual risk scores as currently stated in the QERMF tool. Table 4 was compiled and included for this document.

The discussion still needs to be facilitated but will inform the tool regarding current mitigations and potentially reduce several residual risk scores currently based on conservative assessments of their effectiveness.

Table 4 Residual risk scores for QH and DCHDE mitigation measures

Exposed element	*Mitigation plans and measures*	*Effectiveness*	*Residual Risk Scores*
Demographics - Other Vulnerable Persons (Isolation)	*QH Disaster and Emergency Incident Plan including QH Heatwave Response Plan and Pandemic Influenza Management activities*	*Substantially Effective (main plan)* *Partially Effective (pandemic)*	H10-E13
	DCHDE Welfare services and emergency funding. Standing Offer Arrangement with a range of Community Service Providers. District Human and Social Recovery Group	*Partially Effective*	M8-E13
	DCHDE Disaster Management and Recovery (A toolkit for Community Based Organisations)	*Partially Effective*	M8-E13
Demographics - Other Vulnerable Persons (Direct impact)	*QH Disaster and Emergency Incident Plan including QH Heatwave Response Plan and Pandemic Influenza Management activities*	*Substantially Effective*	H10-E13
	DCHDE Welfare services and emergency funding. Standing Offer Arrangement with a range of Community Service Providers. District Human and Social Recovery Group	*Partially Effective*	M8-E13
	DCHDE Disaster Management and Recovery (A toolkit for Community Based Organisations)	*Partially Effective*	H9-E13

Exposed element	*Mitigation plans and measures*	*Effectiveness*	*Residual Risk Scores*
Hospitals	*Queensland Health Disaster and Emergency Incident Plan including QH Heatwave Response Plan*	*Substantially Effective*	M7-H11
	QH Security Plan	*Substantially Effective*	H10
	QH Business Continuity Plans	*Substantially Effective*	H10
	QH Public Communication Strategy	*Substantially Effective*	H10
Public Health - Mental Health	*Queensland Health Disaster and Emergency Incident Plan including QH Mental Health Subplan*	*Partially Effective*	H9-E12

5.1.2. Planning and development

Many of the elements come back to control of built environments and planning for the future. Population Centres are vulnerable in terms of managing flood and bushfire prone zones, as well as the state of public assets and amenities to manage heatwave effects. Centres of Governance (Governance Arrangements) rely upon the application of National Construction Codes for new development and is linked in with the existing Building Stock.

It has been noted that growth in certain areas tends to proceed and outstrip any preparation or allowance for emergency services and infrastructure (i.e., responds after growth has occurred)

A draft discussion document was developed in 2021 that specifically identified the exposed elements listed in QERMF that were relevant to departments of Logan City, including Development and assessment, Logan Utilities and Roads. This highlighted current mitigation capacities and capabilities, and residual risk scores as currently stated in the QERMF tool. Table 5 was compiled and included for this document.

The discussion still needs to be facilitated but will inform the tool regarding current mitigations and potentially reduce several residual risk scores currently based on conservative assessments of their effectiveness.

Table 5 Exposed elements relevant to City of Logan

Type	*Exposed element*	*Relevant hazards & Residual risk*	*Mitigation plans and current actions*
R1 - Infrastructure	18 Power (Sub Distribution)	Cyclone, storm, heatwave H10-E12	Generators and Redundancy Much of the critical infrastructure operated by council are fitted with or for generator back-up in the event of power outages. LDMG to run a redundancy exercise to identify what critical infrastructure is not currently fitted for or with redundancy, and identify any existing agreements with fuel suppliers
	47 Water (Waste Water Treatment) City of Logan Wastewater Treatment Plants (WWTPs)	Cyclone, storm, bushfire, earthquake, heatwave H9-H11	Water and Wastewater Incident Management Plan & Toolkit, Logan Water Drinking Water Quality Management Plan, WWTP site-based Management Plans Liaise with District wastewater infrastructure (wastewater treatment) representatives to discuss existing mitigation, redundancy and response measures in relation to assessed vulnerabilities. Discussions to be held around the levels and susceptibility of existing and aged infrastructure.
	49 Water (Dams & Reservoirs) Dams	Bushfire H9	Water security measures Review with City of Logan - Logan Water managers regarding processes and procedures to prepare for oncoming events.

Type	*Exposed element*	*Relevant hazards & Residual risk*	*Mitigation plans and current actions*
	50 Water (Dams & Reservoirs) Reservoirs	Cyclone, storm, bushfire, terrorism M8-H11	Drinking water advisories (Boil water alert, do not consume alert, do not use alert) Review with City of Logan Water Services (Utilities) managers regarding processes and procedures to prepare for oncoming events.
	78 Fuel Infrastructure (Bulk Fuel) Bulk fuel storage	Urban Accident H9	Fuel Storage Vulnerability Clarify & Liaise with infrastructure owners and operators (including Council) to discuss assessed vulnerability.
R2 - Access & Resupply	83 Roads – Local 92 Roads (Bridges)	Cyclone, storm, bushfire, heatwave, major accident, terrorism M8-H10	Critical Infrastructure Network Plan. Liaise with City of Logan Roads & DTMR to further investigate key access routes and the exposure to flooding, and evaluate effectiveness of current response and contingency plans. Combine potential blockages into DM exercises
R3 - Community & Social	119 Population Centres Towns Urban	Cyclone, storm, bushfire, earthquake, pandemic, biosecurity, urban accident H9-H11	Urban design - Planning and development controls Liaise with City of Logan Development and Assessment regarding flood, fire area studies and vulnerability – also to earthquakes, and urban accidents Liaise with City of Logan Development and Assessment Branch regarding how COVID-19 could affect how

Type	*Exposed element*	*Relevant hazards & Residual risk*	*Mitigation plans and current actions*
			population areas are planned in the future
	120 Population Centres Jimboomba Residential Area	Bushfire, heatwave, pandemic, biosecurity H9-H11	Local Disaster Management Plan Liaise with City of Logan Development and Assessment sections to gain an understanding of the state of public assets and amenities, and test heatwave scenarios Liaise with City of Logan Development and Assessment Branch regarding how COVID-19 could affect how population areas are planned in the future
	129 Demographics	Bushfire, H11	Local Planning Scheme Liaise with City of Logan Development and Assessment Branch regarding application of this scheme and development trends
	135 Community Infrastructure - Social Infrastructure (built environments) National Construction Code	Heatwave E13	Convene discussion with City of Logan Development and Assessment, asset owners and other stakeholders about the overall nature of this risk and how advanced, or prone Logan is, and what is intended in terms of enforcing requirements, designing and re-designing built environments to build resiliency to increasing heatwave intensities. Communicate results to State Government

Type	*Exposed element*	*Relevant hazards & Residual risk*	*Mitigation plans and current actions*
	140 Centres of Governance - National Construction Code	Cyclone, storm, bushfire, earthquake, heatwave M8-H10	National Construction Code Liaise with City of Logan Development and Assessment regarding application of this code and development trends
	156 Building Stock Pre-1980 Construction (Pre-code) 157 Pre-1990 Asbestos Construction (Pre-code) National Construction Code	Cyclone, storm, bushfire, earthquake, heatwave H9-H11	Development application procedures and controls Liaise with City of Logan Development and Assessment regarding the ongoing nature of existing building Discussion with regional DDMG and others regarding disposal of building materials Discuss insurance? Evaluate effectiveness and rescore *LDMG discussion around what can be done to encourage takeup of insurance or lobby/advocate to insurance companies*
	163 Emergency Shelters & Places of Refuge Shelters Halls Centres Schools Places of Refuge	Cyclone, storm, bushfire, earthquake M7-H10	Local Disaster Management Sub Plans - SP-5 Evacuation, SP-6 Evacuation Centre Evaluate effectiveness and rescore – ongoing

Type	*Exposed element*	*Relevant hazards & Residual risk*	*Mitigation plans and current actions*
	167 Cultural Elements - Historical Buildings, Landmarks and Sacred Sites	Cyclone, storm, bushfire, earthquake H9-H11	Discovery and registering sites Liaise with City of Logan Development and Assessment regarding the actual list of sites and their vulnerability

5.1.3. Aged care facilities

Until recently, LDMG/City of Logan has not had a way of effectively dealing with each of operators of aged care facilities. Attempts to elicit information, visit and educate had proven unsuccessful, with generally little to no buy-in from management and staff (eg , meeting on site, management and staff not present, only residents with other agenda).

The Royal Commission into Aged Care Quality and Safety (2020) was written in response to the effects of the COVID-19 pandemic on aged care, and it is clear that issues are prominent in regard to all the hazards covered and identified prior to the pandemic.

Refer **https://agedcare.royalcommission.gov.au/sites/default/files/2020-10/aged-care-and-covid-19-a-special-report.pdf**

The Aged Care Quality and Safety Commission published quality standards (https://www.agedcarequality.gov.au/providers/standards) The Aged Care Quality and Safety Commission monitors approve provider preparation for emergency events through assessment and monitoring processes, and require approved providers to demonstrate effective risk management systems and practices including the management of high-impact risk associated with the care of consumers (Standard 3 and Standard 8).

Additional to this, the federal government NDIS Quality and Safeguards Commission introduced new and amended quality indicators relating to emergency and disaster management for those providing NDIS services. This has applied across a range of existing NDIS practice standards and provide stronger guidance about what NDIS providers should have in place to prepare, prevent, manage and respond to emergency and disaster situations. The amendments came into effect 24 January 2022.

This has resulted in an understandable increase in cooperation and engagement in the aged care industry. In recent months, members of the City of Logan Disaster Management team have had positive interaction with the aged care industry, who have a new focus and ability

to engage and undertake emergency management planning to meet the requirements of Standard 8 at their next 2-yearly accreditation audit.

5.1.4. National Broadband Network

There is uncertainty as to the effects of the NBN network replacing fixed lines, such that landline telephone communication is not possible during a power outage. Mitigations such as battery backup and unmonitored medical alarms are the responsibility of the customer to 'opt-in' and pay accordingly. There is concern about the increased possibility of load shedding and battery capacity of only 24-36 hours in some areas. More information is needed about how well the community is informed around potential issues.

In addition, there is no longer representation from Telstra or NBN on the LDMG.

5.1.5. Flood management

Ongoing Flood Mapping and Stormwater Catchment Management Plan preparation is to be undertaken.

As much of Council's service delivery is location-based, access to spatial data and the ability to 'see' what's on the ground without the need to be physically at that location is a key enabler of improved efficiency and responsiveness. In combination with base data (eg , road and property boundaries, contours) and aerial imagery, access to reliable building footprints data would provide value for Council in many different areas including disaster management and response. Using that data in combination with other information, such as demographic data, can assist with a range of analysis and impact assessment activities and lead to improved decision making.

The Logan City Council Local Recovery Group recognises that the Logan community readily begins its own recovery and has developed a specific rainfall and flooding recovery action plan recognising community-led recovery. The Local Recovery Group recognises the need for flexibility to meet the changing recovery needs as the community may choose different recovery pathways.

The City of Logan SEQ Flood Local Recovery Plan (approved by Local Recovery Coordinator, Kay Sullivan 6 April 2022) was developed by the Local Recovery Subgroups (Human Social, Economic, Environment and Infrastructure) using available impact and needs assessments. The plan details recovery objectives and actions that will be undertaken to ensure recovery and build resilience across all sectors of the community.

This plan covers the period of 1 March 2022 to 30 September 2024, beginning the period immediately after the Local Recovery Group stand up through to the expiration of Local Recovery and Resilience Grant funding timelines.

The Queensland Reconstruction Authority (QRA) published the Queensland Flood Risk Management Framework (QFRMF) in June 2021. To quote QRA from an update provided 1 June 2022:

"Guided by national best practice, the QFRMF's purpose is to set the direction for flood risk management in Queensland and provide clarity around expectations. The document further outlines the roles and responsibilities of all stakeholders involved, including local governments to support your decision-making."

"In delivering the QFRMF, the QRA is developing a state-wide assessment of flood risk and will produce a prioritised list of flood risk areas, taking into consideration flood exposure, vulnerability, historical flood events, availability of flood studies, flood risk management strategies/plans, flood warning intelligence, and community awareness and education."

The City of Logan River and Catchment Engineering team have, all the while, been assessing the current flood consequences. Once the current program of new studies is completed council will undertake a regional floodplain management plan and develop strategies and an action plan. Council is preparing a new Planning Scheme which is their primary focus at the moment. It is anticipated that effective land use planning and property specific flood resilience will form council's primary flood mitigation responses.

The result of this is that the Vulnerability Score will be eventually reduced so long as less use is made of the flood prone areas (avoidance) but this will take time. As a further result, there will be an increased ability to identify and anticipate the effects and vulnerable areas in an event, enabling the response (mitigation) to be more effective.

At this stage, it doesn't change the current vulnerability scores or mitigation effectiveness in the QERMF Tool, but the QRA requirement and City of Logan intentions are noted.

5.1.6. Critical infrastructure locations

Limited information known about critical infrastructure locations for telecommunication and electricity sub stations.

Other infrastructure where the identification locations would assist are the Radio Towers for QFES, QAS, QPS and SES.

5.1.7. Rapid response plan

The intent of the Rapid response Plan (RRP) is to have a contingency plan for a "no-notice" event. There are feasibility issues around utilising LDCC/LDMG facilities to coordinate response. City of Logan have developed more of a mobile technology approach in recent times, but there are risks around failure of the NBN that have been considered. Overall, the

RRP has improved, with less reliance on face-to-face response, and exercises have been undertaken to develop this.

Ongoing issues affecting a rapid response are as follows:

- Ability to stand up LDMG
- Ability to communicate with internal and external stakeholders
- Ability to communicate with members of community
- Local capacity quickly exceeded
- Lack of access to impacted areas
- Large scale structure damage assessments

5.1.8. Logan City business continuity planning

At the time of writing this report, the Logan City BCPs are being thoroughly reviewed, however its capacity to assist the LDMG in a declared event is not fully known. Some desktop-driven exercises are undertaken annually.

Testing of the BCPs as part of an LDMG exercise would identify gaps. Some real events around mains power loss and generators have occurred, so there is an increased awareness and willingness to exercise and test business continuity practices.

5.1.9. School closure protocols

There is little information and assurance regarding the scope and capability of school closure protocols for various hazards. The pandemic has highlighted the different approaches between schools, and the role of government regarding weather events.

5.1.10. Evacuation centres and shelters

Availability, capacity and capabilities of evacuation centres and shelters is ever-changing. As well as the actual structures, this applies to the staff of each facility, and their awareness of the role in any emergency. They are managed by various agencies. A review of the current arrangements would assist, as well as the framework in place to maintain the availability of suitable venues.

All evacuation centres and shelters are council facilities, often leased. There is a recognised need for further education of lessees and staff at each location.

There is also an awareness Climate change implications for centres and shelters with models suggesting possibly less frequent, more severe, more southerly cyclones. SEQ buildings are not traditionally rated for cyclones.

5.1.11. Logan Water

In recent years Logan Water has been committed to maintaining very good incident management preparedness and practices. There is now a coordination centre with 24-hour where the network performance is monitored. Logan Water undertake their own incident management exercises and participate actively in LDMG exercises.

The following plans are in place to assist in emergency scenarios:

- Water and Wastewater Incident Management Plan & Toolkit
- Logan Water Drinking Water Quality Management Plan
- WWTP site-based Management Plans for Loganholme, Beenleigh, Jimboomba and Flagstone

Typical triggers for notification and activation of the DMG are based on whether additional resources (beyond Logan Water BAU) are required for managing.

5.1.12. State-wide assessments

During the course of developing the QERMF assessments in 2019, State-wide assessments were supplied by QFES with the instruction that these spreadsheets were to be used as the basis for the Logan assessments to be added. As mentioned at the start of this section, this altered some hazard definitions and risk levels, but also introduced some other exposed elements, agencies responsible, and mitigations treatments and controls.

In many cases, these assessments had not had capabilities, capacities, or effectiveness levels stated or assessed, so are unaddressed, and not actions are as yet assigned.

Areas highlighted at a state levels to be addressed include

- Powerlink and TransLink ability to supply power from other parts of the network
- Energex ability to respond and requirements for assistance from Ergon during restoration efforts
- Telecommunications representatives measures to mitigate seismic events effects on communication towers and associated infrastructure
- Built in redundancy for NBN fibre optic infrastructure, and whole-of-network communications
- Mitigation strategies for seismic effects on water supply via Seqwater and local suppliers, including Queensland health advice for affected reticulation networks
- Seismic effects on local wastewater treatment plants, dams, water reservoirs, bulk fuel and gas supply, local and state roads, buildings, purpose-built shelters, hospitals, various industries, national parks and species of concern
- Effects of heatwaves on Seqwater supply dams, public transport infrastructure for stations and stops (waiting and parking areas), loading of petroleum and gas products, sewage overflows, footpaths, cycleways and bridges

- Provision of cool public spaces for refuge in a heatwave, Queensland Health plans and strategies for heat stress and mental health, workers in significant industries, forestry, and sporting events
- Mitigation of heatwave effects on endangered species

5.2. Climate change impacts

Impacts associated with natural hazards need to consider the relationship with climate variables to understand current and future implications of climate change on people and infrastructure. The level of risk associated with a changing climate will not arise directly from the changes in the climate, but usually from a "cause-and-effect" chain. This is mapped out by considering the change in the climate variable (i.e., rainfall, temperature, wind etc.), the impacts on the vulnerable population or assets, and the risks to the objectives or operation of the community or infrastructure.

5.2.1. Climate variables

The Intergovernmental Panel on Climate Change (IPCC) has developed four scenarios for global climate projections that relate to how the world may respond to the challenge of a changing climate, the need to continue to produce and use energy and resources, and the global greenhouse gas emissions that may occur. These scenarios incorporate diverging tendencies based on alternative economic, globalisation and environmental pathways. Projections are then developed at national and regional levels (in Australia these are developed by CSIRO and the Bureau of Meteorology) to help understand how the climate is projected to change over time. For the purposes of the HRA, a more extreme (high emissions) scenario was used to develop projections over 20-year intervals from 2030 to 2090.

These projections were consulted during the 2017 Hazard Risk Assessment Workshop for the severe weather event, earthquake, landslide, bushfire, heatwave and flooding hazards. Since then, the longpaddock website (**www.longpaddock.qld.gov.au/qld-future-climate**) has further refined the projections to higher resolutions, meaning that the grid on which projection calculations are based have been downscaled such that they are specific to a region such as Logan. At the 2019 Risk Assessment Workshop, these projections were utilised.

5.2.2. Factors influencing overall risk

Projections of a changing climate carry a level of uncertainty and are subject to change over time as climate variables fluctuate. There are also several factors which influence the overall risk outcome, notably how climate variables work together to create different extreme weather events and natural hazards, and how this can affect the frequency and extremity of these events. Consequences of the risk will also depend on the vulnerability of people,

organisations and infrastructure; increased sensitivities to a particular climate variable and the ability to be resilient and adapt to the risk should be considered when determining risk.

5.2.3. Climate uncertainty and adaptive planning

Although the climate projections represent the presently accepted forefront of climate change science, there is still a high level of uncertainty that exists regarding the climate changes that may actually eventuate. This uncertainty becomes more pronounced as the timescale of the projection is extended. Several areas of uncertainty exist which influence the accuracy of climate change projections, including:

- Scenario uncertainty, due to the uncertain future emissions and concentrations of greenhouse gases and aerosols, resulting from uncertainties regarding the current and future activities of humans
- Response uncertainty, resulting from limitations in our understanding of the climate system and its representation in climate models
- Natural variability uncertainty, stemming from unperturbed variability in the climate system
- Uncertainties regarding the assignment of probability distributions to regional climate change projections
- Uncertainties associated with projecting climate change at small spatial scales, particularly for coastal and mountainous areas.

Accordingly, a key principle toward adapting to a future with an uncertain climate may be to adopt 'adaptive management', i.e., implementing incremental changes and adaptation measures based on climate and scientific monitoring and prescribed responses. Some adaptation options for infrastructure that may be deemed appropriate in response to the most extreme climate projections may require large-scale engineering or other works, the need (or otherwise) for which will depend on the extent of climate change that transpires over time, as opposed to the conditions that were modelled.

The notion of planning for future uncertainty may result in multiple plausible futures being considered through the development of several potential future scenarios that consider different economic, demographic, and climatic futures. The benefits of an adaptive scenario planning approach for developing strategies is that planning is more robust, flexible and minimise risk in response to deep uncertainty.

5.2.4. Flood reports and information

The flood risk assessment presented in this report is high level in nature. A more detailed description of the nature of flood risk due to regional scale flood events emanating from the Logan and Albert Rivers is provided in the Logan and Albert River Floodplain Management Study and Plan (Engeny, 2017). The report includes an assessment and mapping of:

- Historical and design flood events;

- Flood risk exposure;
- At risk critical infrastructure;
- Isolation and evacuation;
- Flood travel times;
- Demographics and vulnerable communities;
- Current flood response and flood warning systems;
- Flooding hotspots; and
- Flood risk management opportunities.

For a more detailed understanding of the nature of flooding across City of Logan (including riverine, local creek and overland flow), please refer to City of Logan's online flood information and flood hazard overlay located here:

- **Types of disasters – Logan City Council (https://www.logan.qld.gov.au/disasters-and-emergencies/types-disasters**
- **Logan PD Hub (loganhub.com.au)**

Appendix A

QERMF Tool - City of Logan AHRA

The QERMF tool exists as separate Microsoft Word documents held separately for each of the following hazards:

- Severe Tropical Cyclone – Category 3-5
- Severe Thunderstorm Event
- Bushfire
- Earthquake (Magnitude 5.35 similar to 1989 Newcastle)
- Heatwave
- Pandemic / Epidemic
- Exotic Animal / Plant Disease
- Major Accident (Air, Road or Rail Transport, Urban Fire, Hazardous Materials)
- Terrorism / Cybersecurity Attack