CLONCURRY SHIRE BUILDING RESILIENT LOGISTICS CHAINS

PROJECT COMPLETION REPORT

July 2021

Acknowledgements

This report was created by Resilient Projects for Cloncurry Shire Council as part of the Building Resilient Logistics Chains project (CSC 2020-02).

The project was jointly funded by the Commonwealth and Queensland Governments under the Disaster Recovery Funding Arrangements (DRFA).

Although funding for this product has been provided by both the Australian and Queensland Governments, the material contained herein does not necessarily represent the views of either Government.

#DRFA-Qld

This project is part of the Flexible Grants Program administered by the Department of Communities, Disability Services and Seniors.

Expenditure for this service is undertaken within Disaster Recovery Funding Arrangements 2018 and is managed by the Queensland Reconstruction Authority (QRA) according to the Queensland Disaster Relief and Recovery Arrangements Guidelines (http://www.qldreconstruction.org.au/u/lib/cms2/NEW-Qld-Disaster-Relief and-Recovery-Arrangements-Guidelines-February-2016-added-2nd-march.pdf).

Executive Summary

Mayor Gregory Campbell – Chair, CSC LDMG

The Cloncurry Shire is not immune to disasters. Whilst these types of events are infrequent, we cannot afford to be complacent. Disaster events have the potential to significantly affect our communities and disrupt our infrastructure, our economy and our environment.

During 2019, the monsoon delivered unprecedented amounts of rain to Cloncurry Shire and neighbouring shires, and caused major disruption to our community.

In response to this event, funding was sought from the Queensland Government to assist Cloncurry Shire to respond to and recover from the next interruption even more strongly. The result was Cloncurry Shire Council's Building Resilient Logistics Chains Project.

This project has delivered:

- Cloncurry's Community Dashboard (https://dashboard.cloncurry.qld.gov.au/), which provides the community and visitors up-to-date information that will help decision-making not just during emergencies, but year-round;
- An online Incident Management System for Cloncurry Shire Council's Local Disaster Management Group (LDMG);
- Enhanced mapping for Cloncurry Shire Council centred around our logistics chains;
- Updated Local Disaster Management Plans for Cloncurry Shire;
- An analysis of the Goods and Services that allow Cloncurry to continue operating (this report); and
- A report that provides recommendations on how to improve Cloncurry's Community Continuity – the ability of Cloncurry to continue operating or recover from disruptions such as the 2019 monsoon flooding

Cloncurry Shire Council, along with our partners in the Local Disaster Management Group, is committed to stronger, more resilient communities, not just in Cloncurry Shire, but throughout Queensland and Australia.

As an active participant in the project, North West Hospital and Health Service has committed to use of the Community Dashboard to assist staff with planning their journeys during storm season or other incidents: "A central repository of the latest and local emergency news will enhance the community's disaster preparedness and resilience."

We as a Council are very proud of what we have delivered through this project. We thank our partners in the State and Commonwealth governments for their support throughout the project.

1 Table of Contents

Abbreviations & Glossary

A Disaster Management glossary of terms and acronyms is published as part of the Prevention, Preparedness, Response and Recovery Disaster Management Guideline

A Disaster Management Lexicon is also provided by the Office of the Inspector General Emergency Management (IGEM).

The following acronyms are not contained in the links above but are used by CSC in their logistics, community continuity and disaster management arrangements:

ACRONYM	MEANING
AEP	Annual Exceedance Probability: the probability of an event occurring in any one year
AHD	Australian Height Datum
AIIMS	Australasian Inter-service Incident Management System
ARI	Annual Recurrence Interval
DRFA	Disaster Recovery Funding Arrangements (formerly known as NDRRA)
EAP	(Dam) Emergency Action Plan
GIS	Geographic Information System
IMT	Incident Management Team
JIC	Just In Case Logistics – logistics chains that include some capability for disruption of supply, and provide for a level of disruption.
JIT	Just In Time Logistics – logistics chains that provide goods or services just in time for their intended need. Efficient during normal operation, these logistics chains can be susceptible to disruption.
LDMP	Local Disaster Management Plan
LGA	Local Government Area
QDMA	Queensland Disaster Management Arrangements
RFB	Rural Fire Brigade - QFES
RFS	Rural Fire Service - QFES
CSC	Cloncurry Shire Council

1 Introduction

1.1 Project Background

The Building Resilient Logistics Chains project (CSC 2020-02) was identified by Cloncurry Shire Council staff as a way to enhance the resilience of the Cloncurry community to future hazard events following significant flooding caused by the 2019 North and North West Queensland Monsoon.

The project was jointly funded by the Commonwealth and Queensland Governments under the Disaster Recovery Funding Arrangements (DRFA).

1.2 Project Approach

The project team chose a community continuity approach to delivering the objectives of the project.

Community continuity is an adaptation of business continuity, and revolves around keeping the community running, or returning critical community functions as soon as possible, whatever the disruption.

The process of community continuity follows a similar process to business continuity where:

- A **Community Profile** is developed, to better understand the needs of the community

A vulnerability analysis (see Risk, Hazards and Vulnerabilities) is undertaken

- A study of Cloncurry's logistics chains is completed, focussing on the most vital commodities that promote community continuity for Cloncurry
- Mitigations and contingencies are identified to improve community continuity and resilience. (companion report at Appendix: Companion Report: Recommendations for Improving Community Continuity from the Building Resilient Logistics Chains Project)

Key to the concept of community continuity is the idea of resilience as a system, interlocking sets of different types of resilience. The three types of resilience in this system are:

- Community resilience
- Organisational resilience
- Infrastructure resilience

Where improvements are made to any type of resilience, the interconnections between all the systems that allow Cloncurry to operate, will necessarily improve the resilience of the system as a whole.

Figure 1: Community Continuity: A System to Build Resilience

1.3 Project Objectives

Overall project objectives as stated by CSC and grant funding requirements included:

- The project contributes to disaster recovery and the future disaster preparedness of the community
- Vulnerability analysis of logistics chains and critical infrastructure of Cloncurry and to identify pre- and post-disaster countermeasures

This included a requirement to supply an online tool that could be used to:

- Plan responses to disasters
- Mobilise community assets for recovery and response in disasters
- Used by the community to prepare for disasters

The project objectives have all been met, and this recommendations report is the tool to identify and advise on the countermeasures to further improve the disaster resilience of Cloncurry.

1.4 Project Inputs

1.4.1 Links to Local, State and Commonwealth Government Policy

Key inputs to the project were the local, state, and Commonwealth government policies relevant to both general resilience and recovery, but also to the specific event that led to the funding for this project, the 2019 North and North West Queensland Monsoon Flooding.

1.4.1.1 Cloncurry Shire Council Local Monsoon Trough Recovery Plan

Cloncurry Shire Council, along with the Queensland Reconstruction Authority, produced the Cloncurry Shire Council Local Monsoon Trough Recovery Plan in 2019. Now in 2021, the recovery is well advanced, with a predicted transition to business-as-usual date of 1 March 2022.

The graphic below shows the intended progress toward recovery with the transition outcomes to the right. In identifying and assessing the recommendations, these transition outcomes have been front of mind for the project team, representing the local objectives for a more resilient community, and enhanced community continuity.

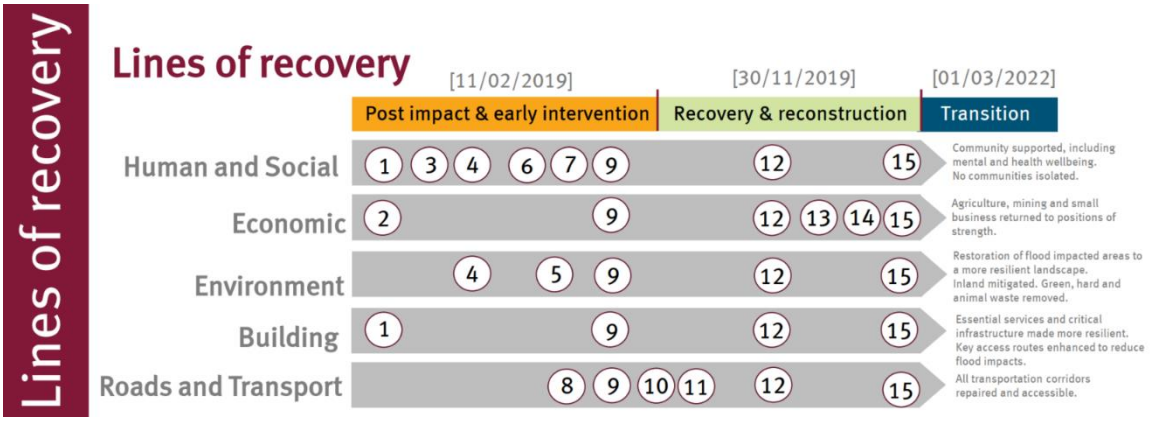

Figure 2: Cloncurry Shire Council's Lines of Recovery

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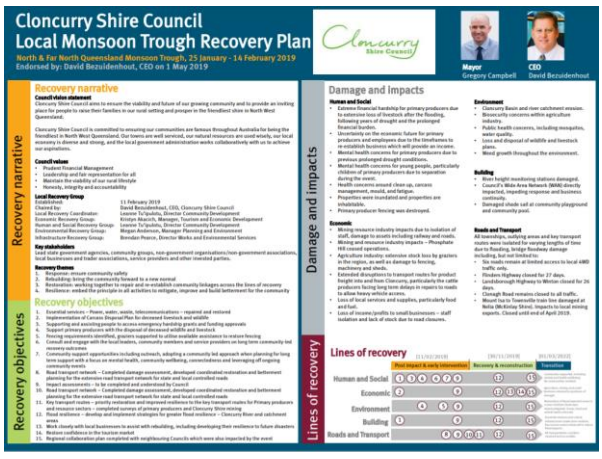
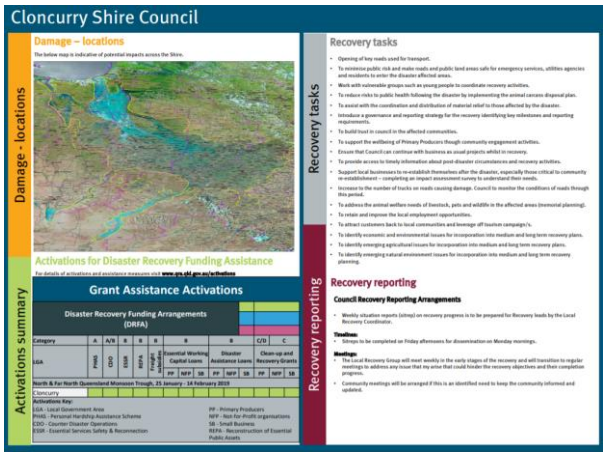




1.4.1.2 North and Far North Queensland Monsoon Trough State Recovery Plan 2019-2021

The state recovery objectives are reflected strongly in the *North and Far North Queensland Monsoon Trough State Recovery Plan 2019-2021*. [2].

As the end of the recovery plan period approaches, the focus becomes the outer edge of the recovery diagram[3] represented in the plan where progress along the recovery lines is represented by:

Recovery Line	Resilience Building Objective
Human and Social	Community has improved capability to respond to future disasters
Building	Infrastructure rebuilt to reduce the impact of future disasters
Roads and Transport	Infrastructure rebuilt to reduce the impact of future disasters
Economic	Economy sufficiently adaptable to future shocks
Environment	Flood impacted areas restored to a more resilient landscape

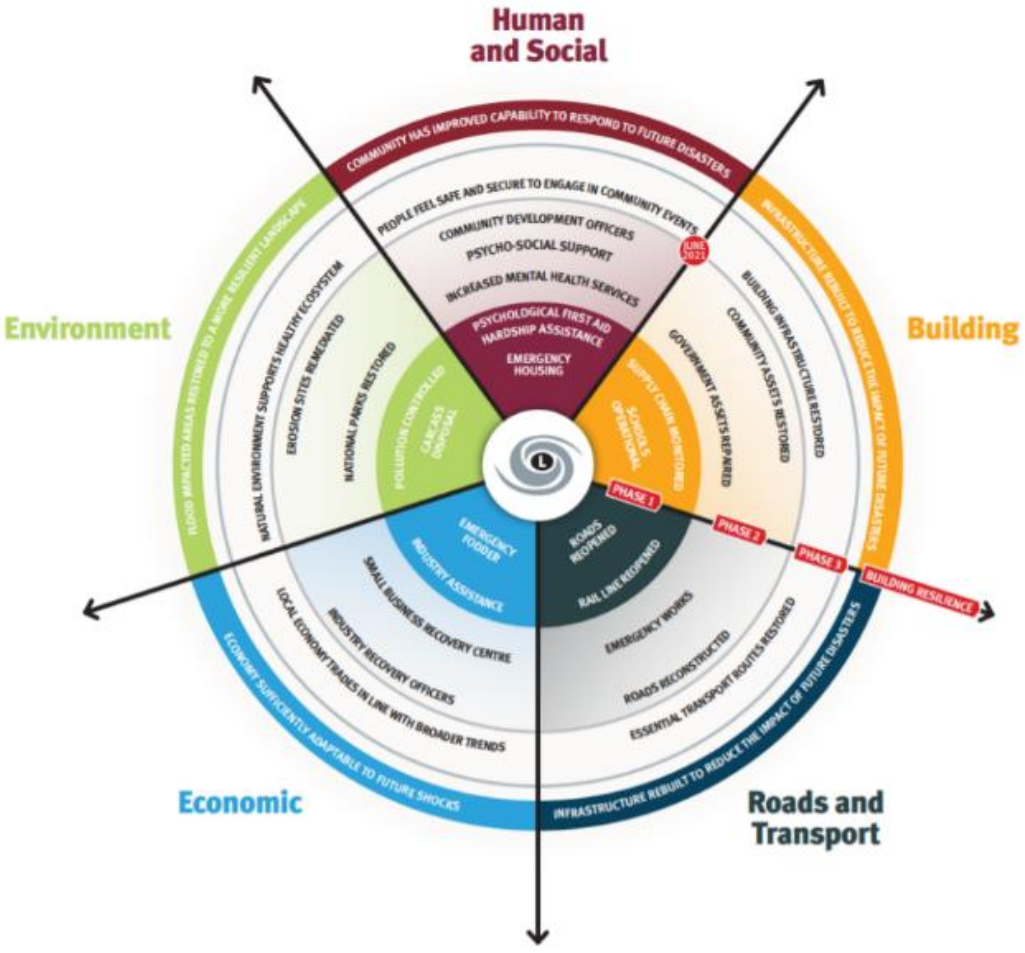


Figure 3: Queensland Lines of Recovery

1.4.1.3 Queensland Strategy for Disaster Resilience

The *Queensland Strategy for Disaster Resilience* [4] provides an overarching framework to empower Queenslanders to factor in resilience measures and activities as they anticipate, respond to and adapt to changing circumstances.

The *Queensland Strategy for Disaster Resilience* is underpinned by the four key objectives in the table below.

Each of these objectives has been considered and identified in the recommendations, in this report. [5]

Figure 4: Qld Strategy for Disaster Resilience Objectives

1.4.1.4 2019 Queensland Monsoon Trough. After the Flood: A Strategy for Long-term Recovery

The Australian Government's National Recovery and Resilience Agency (previously the National Drought and North Queensland Flood Response and Recovery Agency), published their strategy for long-term recovery in 2020[6].

The strategy is built on the five pillars below:

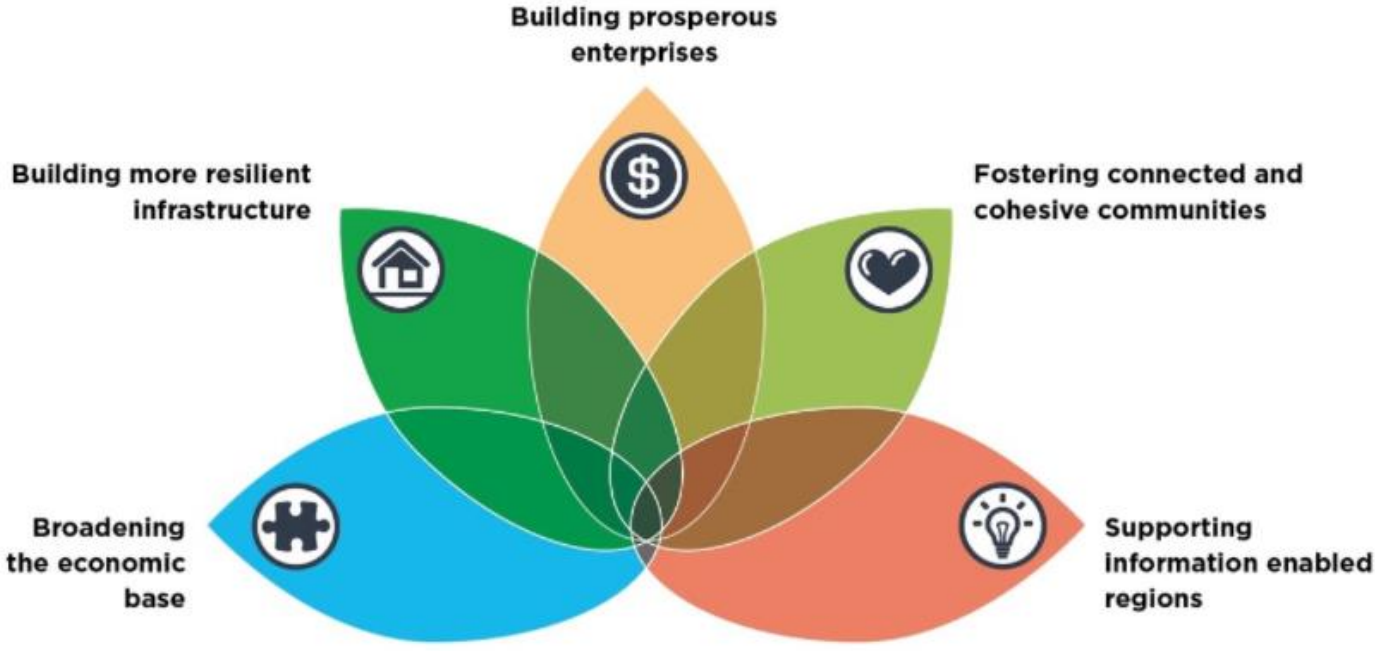


Figure 4: National Resilience and Recovery Agency five pillars of recovery

The recovery pillars [7] have also been identified in the recommendations within this report.

1.5 Project Outcomes

The project outcomes included:

- Project Requirements Report
- Project Consultation Report (Workshops and Interviews)
- GIS Mapping
    - Road Network including known trouble spots
    - Airfields within CSC
    - Mobile communications coverage within region
    - Resupply map for 2019 flood event
- GIS inputs into online tool that also includes council assets such as water and sewer, and state-owned assets including roads and electricity supply
- Online tool for Emergency and Disaster Management
- Online tool for community – the Cloncurry Community Dashboard

Additionally, the project funds were stretched to provide additional value via:

- Update to Cloncurry Local Disaster Management Plan (LDMP)
- Additional Sub Plans to LDMP including Emergency Resupply and Logistics Sub Plan
- Role Cards for LDMP and CSC roles to better prepare staff for emergency and disaster events

Outcomes are either live (online systems for CSC and community), accepted, or with Council for final review. Details of each project output are included in sections below.

1.5.1 Project Requirements Report

A report detailing:

- Record of initial requirements meeting in February 2021
- Project action plan
- Initial workshop and stakeholder engagement plan

1.5.2 Project Workshops and Engagement Report

A report detailing:

- Project status update
- Project organisation chart including CSC project team
- Record of workshops and interviews conducting in Cloncurry Shire from 15th to 19th March 2021

Figure 5: LDMG Workshop 17 March 2021

Figure 6 Workshop at the Four Ways (Burke and Wills Roadhouse)

1.5.3 GIS Mapping

Mapping and Geographical Information Systems work within this project included:

- Attendance at workshops and interviews to gain data for mapping (e.g., known trouble spots in road network)
- Production of four maps including at ***Appendix: Maps***
    - Road Network including known trouble spots
    - Airfields within CSC
    - Mobile communications coverage within region
    - Resupply map for 2019 flood event

    These maps were produced as separate PDFs and designed to be printed at A3 resolution. High resolution mapping files have been provided separately outside of this report.
- Creation of data sets with data sourced during project (e.g., airstrips within Cloncurry Shire Council information sourced through Royal Flying Doctor Service)
- Selection of most useful existing GIS data sets into an online tool that also includes council assets such as water and sewer, and state-owned assets including roads and electricity supply

GIS data sets, including sources, are included within the table below. All datasets supplied to QIT+ in WGS84 (EPSG: 4326). Data provided in SHP, Geotif and GeoPackage formats.

Table 1: Datasets supplied into Guardian IMS as part of Resilient Logistics Chain project

Supplied Data	Dataset Description	Date Sources
Watercourse	Watercourse centreline data to identify river channels etc., with watercourse name	Qld Spatial Catalogue
Stormwater_Points	Stormwater drainage infrastructure	Cloncurry Shire
Stormwater_Lines	Stormwater drainage infrastructure	Cloncurry Shire
Rail	Centreline of each railway track and siding. Includes track name.	Qld Spatial Catalogue
QLD_ADDRESS_QAMF	Point data to label the centre of each cadastral land parcel (e.g., property) with street address. Excludes water, road and intersection parcels	Qld Spatial Catalogue
Populated Place	Location where multiple households reside and commonly known public reference points.	Qld Spatial Catalogue
Local Government Areas	Boundary data for Local Governments	Qld Spatial Catalogue
LGA Mask	Opaque polygon to partially 'mask' surrounding Local Government Areas with a translucent shape, helping to improve contrast between Cloncurry Shire and neighbouring LGA's.	Mangoesmapping
Homesteads	Location of homesteads within Cloncurry Shire. Includes station name.	Qld Spatial Catalogue
Floodways_Centroids	The geographic centre for floodways mapped and supplied by Cloncurry Shire. Handy for highlighting areas vulnerable to road closure following high-rainfall events.	Mangoesmapping
Floodways	Line features describing the location and extent of floodways on the road network within Cloncurry Shire. Handy for highlighting areas vulnerable to road closure following high-rainfall events.	Cloncurry Shire
Flood_extent_polygon___February_2019___Flinders_River_dissolved	The mapped extent of water inundation within Flinders River catchment, following the 2019 monsoonal flood event. Data limited to mapped extent. Some inundation may not be mapped, upstream of mapped areas.	Qld Spatial Catalogue

Supplied Data	Dataset Description	Date Sources
Flood_extent_polygon___February_2019___Diamantina_River_dissolved	The mapped extent of water inundation within Diamantina River catchment, following the 2019 monsoonal flood event. Data limited to mapped extent. Some inundation may not be mapped, upstream and downstream of mapped areas.	Qld Spatial Catalogue
CSC_Water_Points	Reticulated water infrastructure	Cloncurry Shire
CSC_Water_Lines	Reticulated water infrastructure	Cloncurry Shire
CSC_Sewer_Points	Reticulated sewer infrastructure	Cloncurry Shire
CSC_Sewer_Lines	Reticulated sewer infrastructure	Cloncurry Shire
CSC_Roads	Road network infrastructure, mapped as polylines. Generally a very poor dataset, so not used in Guardian.	Cloncurry Shire
Baseline_roads_and_tracks	Road centreline dataset for road infrastructure within Cloncurry Shire. Topologically fairly reliable. Used in Guardian, in preference to Council's own road data.	Qld Spatial Catalogue
CSC_Cadastral_data_QLD_CADASTRE_DCDB - Tenure	Property boundary data	Qld Spatial Catalogue
CSC_Cadastral_data_QLD_CADASTRE_DCDB - Parcel Type	Property boundary data	Qld Spatial Catalogue
CSC_Boundary	Cloncurry Shire Boundary	Qld Spatial Catalogue
Buildings	Cloncurry Shire Council owned buildings	Cloncurry Shire
Airfields	Dataset contains building footprint or land parcel polygons, identifying the location of Council Owned buildings. No useable identifying attribute contained in this dataset with a common name for labelling facilities	Mangoesmapping (sources include: QG, GA & RFDS)
Emergency_services_facilities	Locations of Police, Ambulance, Fire and SES	Qld Spatial Catalogue
Community_Facilities	Locations of community facilities such as council offices, libraries, tourist information centres, churches, post offices, courthouses, museums etc. Labelled with name of facility - apparent when moving cursor over feature	Qld Spatial Catalogue
QLD Layers > State Controlled Roads	Subset of road centreline dataset for State Controlled Road infrastructure within Cloncurry Shire. Topologically fairly reliable. Used in Guardian, in preference to Council's own road data.	Qld Spatial Catalogue
Telstra 3G & 4G mobile coverage	Telstra mobile coverage extents. Note - modelled extents not validated with field tests. Includes the 3G/4G Outdoor feeds, without external antenna or booster	Telstra -downloaded from WMS feed as geotiff. See metadata file that was supplied with the data in https://drive.google.com/drive/u/0/folders/14OB_XhDUKAxYwf_Msf0xRza1JrMTjW8X and also email that was sent with the geopackage.
QLD Imagery - Latest State Imagery - not loading in Live or Training environments	Qld Government public web-feed for aerial and satellite imagery. Images are a minimum of 3 years old.	Qld Spatial Catalogue - via QIT+

1.5.4 Online tool for Emergency and Disaster Management

As part of this project, the Guardian Incident Management System (IMS) For QIT Plus was provided to Cloncurry Shire Council.

Guardian is in use in many councils within Queensland and interfaces with District and Sate Disaster Management Group functions.

CSC were particularly interested in the road closure management system, and in a first for Queensland local governments, are also using the system to provide public information on other types of outages, including camping grounds and water outages.

Guardian integrates with the Queensland Disaster Management Arrangements (QDMA) and also provides for Australasian Interservice Incident Management System (AIIMS) functionality, which allows interfacing with emergency services organisations, but also allows Local Disaster Management Groups (LDMGs) to have a scalable and flexible structure.

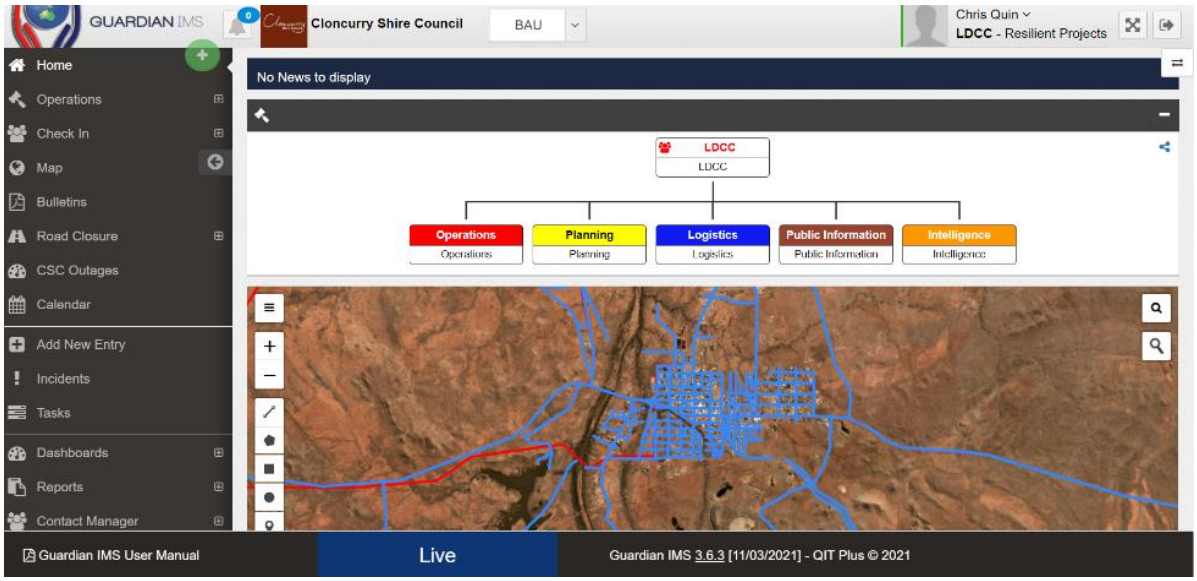


Figure 7: Cloncurry's Guardian Incident Management System

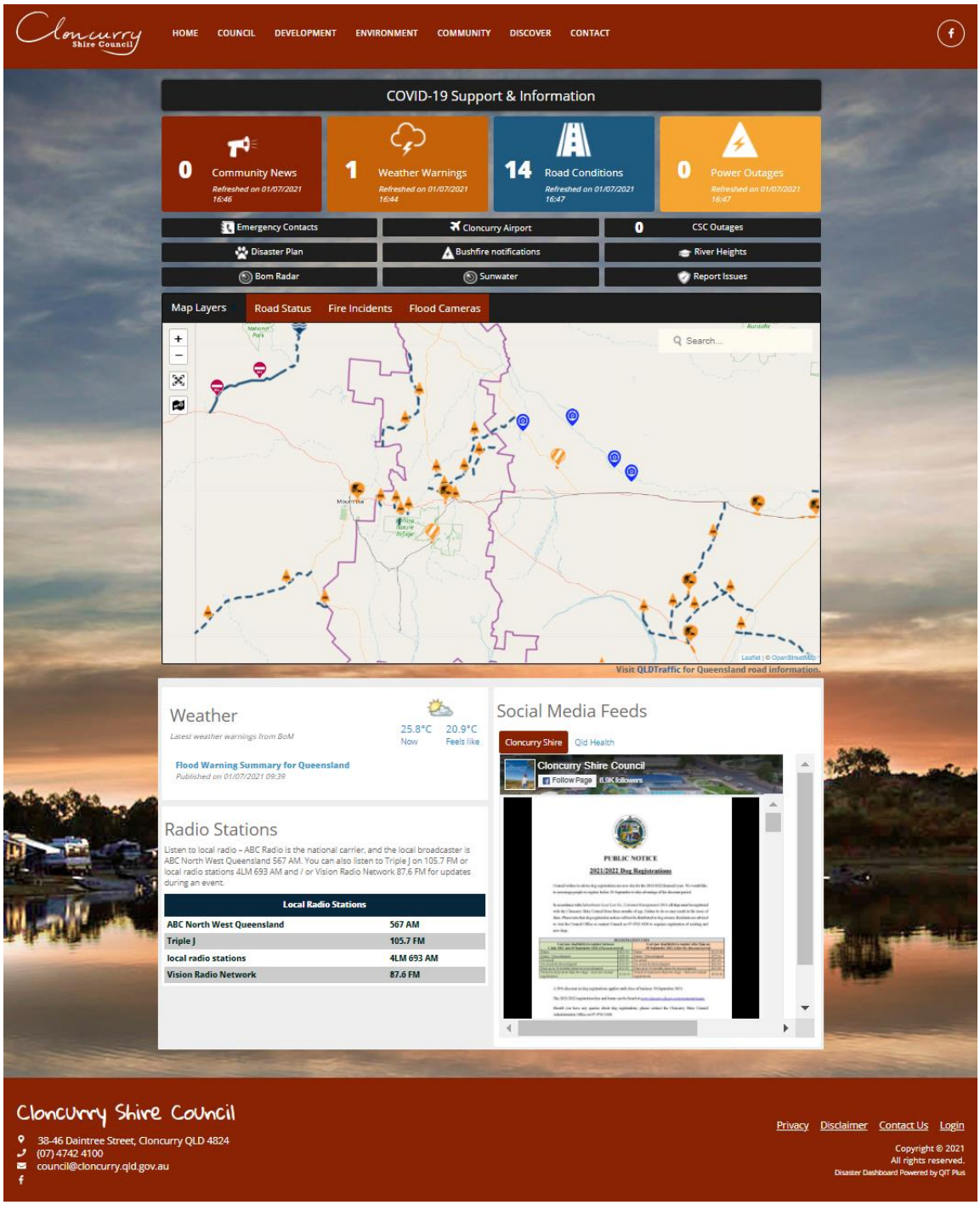
1.5.5 Online tool for community – the Cloncurry Community Dashboard

Cloncurry's Community Dashboard is a website, delivered as a flexible, scalable and secure, software as a service (SaaS) through Amazon Web Services.

It looks and feels like a part of Cloncurry Council's website (www.dashboard.cloncurry.qld.gov.au).

It pulls information from Guardian IMS on local road closures and utilises information from other sites, such as the Bureau of Meteorology, Queensland Fire and Emergency Services, Qld Traffic, and Ergon Energy, on outages to essential services and logistics routes.

The dashboard allows CSC and the LDMG a direct line of contact with residents and visitors to Cloncurry Shire, to provide timely emergency, disaster and community information.



1.5.6 Project Completion Report (this report)

This report details the engagement, research, actions, and recommendations for further action that the project team completed during the project term.

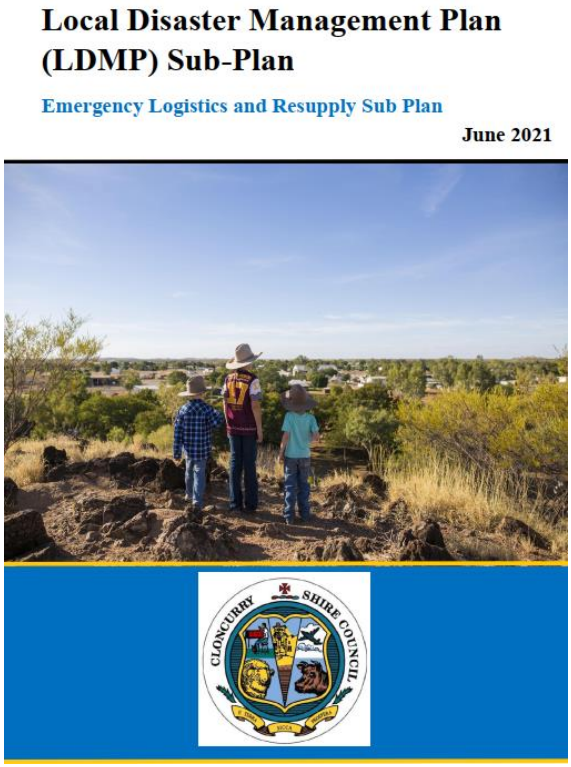
Mitigations and contingencies to improve Cloncurry Shire's Logistics Chains have been included within the standalone Project Recommendations Report. While mitigations and contingencies have not (and could not have) been listed for every single function of every single organisation or function within Cloncurry Shire, the set of Recommendations in the detachable recommendations report at ***Appendix: Companion Report: Recommendations for Improving Community Continuity from the Building Resilient Logistics Chains Project,*** can be viewed as effective measures to mitigate, or respond to, disruption to Cloncurry's Community, Organisations, and Infrastructure.

1.5.7 Update to Cloncurry Local Disaster Management Plan (LDMP)

In addition to meeting the objectives of the project brief, additional value for Cloncurry Shire Council was provided by updating the Local Disaster Management Plan and providing supporting tools for disaster management, including sub-plans and role cards. This is a key component in community continuity and helps ensure that Cloncurry can increase the resilience of its logistics chains.

This work included:

- Update to Local Disaster Management Plan
- Additional Sub Plans to LDMP including Emergency Resupply and Logistics Sub Plan
- Role Cards for LDMP and CSC roles to better prepare staff for emergency and disaster events



Cloncurry Shire Council Local Disaster Management Plan (LDMP)
Role Cards

DUTY CARD	LOGISTICS OFFICER	
Reports to:	Local Disaster Coordinator	Tick
RESPONSIBILITIES		
• Maintain watching brief / state of readiness and receive initial information regarding disaster event from Local Disaster Coordinator (LDC).		
• Commence operations log in Guardian IMS. Maintain adequate records of all logistics activities.		
• Regularly review Guardian IMS for tasks and to maintain situational awareness.		
• Implement Logistics Sub Plan.		
• Implement systems to obtain, record, manage and track the movement of human and physical resources, facilities, services and materials assigned to the event.		
• Undertake staff rostering as required.		
• Determine what premises are suitable for use as warehousing and storage (if required).		
• Identify specific transportation resources required (i.e. forklifts, EWP's).		
• Monitor fuel stocks and instigate priority fuel supply planning to ensure continuity.		
• Capture all expenditure associated with the operation to ensure maximum reimbursement under DRFA.		
• Prepare Requests for Assistance to the DDMG for authorisation by the LDC.		
• Purchase equipment and supplies and organise catering as required.		
• Coordinate resupply operations – refer section 4 Logistics Sub Plan.		
• Manage personnel assigned to the Logistics Team (briefings, debriefings, welfare requirements). Potential units might include Supply, Communications Support, Finance, Facilities, Catering).		
• Contribute to Incident Action Plan and Situation Reports (SITREPS) as required.		
• Participate in debriefs as required.		

2 Community Profile

This community profile was assembled from workshops and interviews in Cloncurry with many stakeholders during February and March 2021, and follow-up interviews via phone and videoconference from April through June 2021.

2.1 Community statement

Cloncurry Shire is rich with a diversity of people whom are committed to their town and region. Its people have a strong sense of identity and are proud of what their region offers to visitors and newcomers. This is a place that offers a prosperous future for anyone willing to "give it a go". [8]

2.2 Strategic Vision

Cloncurry Shire has a dramatic rural landscape, characterized by natural outback beauty, its strong pioneering history and an indelible community spirit. Cloncurry sustains economic prosperity predominantly through tourism, mining, transport, beef and agricultural industries, yet continues to diversify and expand on new economic opportunities. Its strategic location at the intersection of state-significant rail and road links, and the Cloncurry Airport, underpins its long-term economic role.

Cloncurry's Indigenous and multi-cultural heritage continues to define the Shire's cultural identity.

The residential communities of Cloncurry Shire are contained within the Cloncurry Township, and the smaller settlements of Kajabbi and Dajarra. The Cloncurry Township is a prosperous major rural activity centre that supports the history, culture and livelihood of the Shire and plays a central role in servicing North West Queensland.

Cloncurry achieves sustainable growth with development supported by appropriate infrastructure, equitable access and proximity to essential services. Such growth ensures the sustainable use and protection of the region's natural resources, including Cloncurry's agricultural, landscape, natural and heritage assets. [9]

2.3 Community Profile

This community profile highlights those areas within a community that are most important to protect from disruption and is a key part of the process in community continuity.

2.3.1 Environment

2.3.1.1 Geography

Affectionately known as the "Curry", Cloncurry is a rural shire area located in the heart of North West Queensland on the Flinders Highway, approximately 118km east of Mount Isa, 400km south of the Gulf of Carpentaria and 783km west of Townsville. The Shire covers an area of 48,112 square kilometres.

Cloncurry is the administrative seat for the Cloncurry Shire Council and the gateway to North West Queensland. Cloncurry Shire also includes the smaller communities of Duchess and Dajarra approximately 121km and 179km from Cloncurry respectively.

The area is bounded by the Boulia Shire Council in the south, the Carpentaria Shire Council in the north, Mount Isa City to the west and McKinlay Shire to the east. Good working relationships exist with all neighbouring Shires.

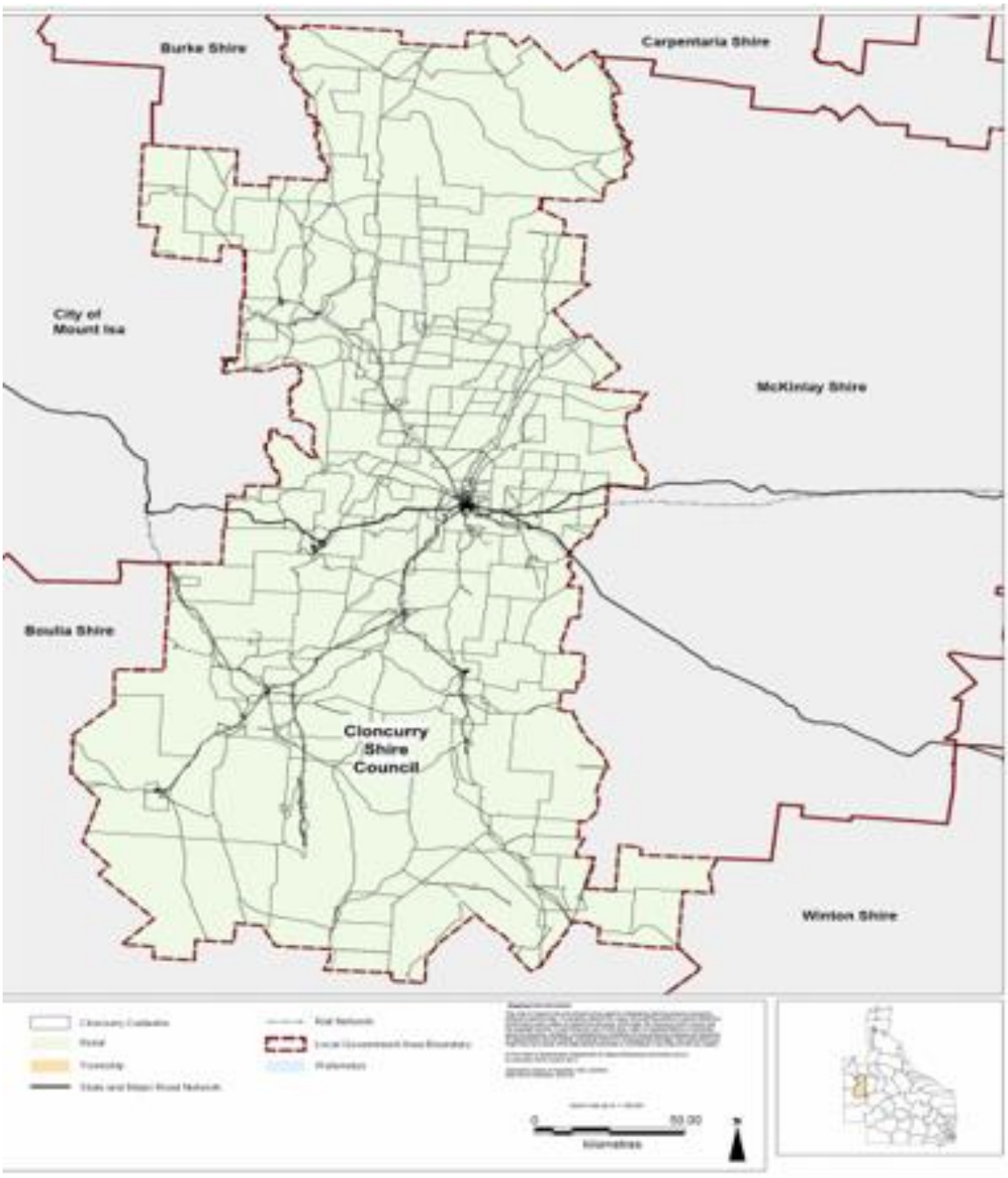


Figure 8: Cloncurry Shire,
(Extract from Cloncurry Shire Planning Scheme 2016 Local Government Area Context Map)

2.3.1.2 Landscape

Cloncurry is nestled on a series of hills adjacent to the Cloncurry River. The area to the south and west is undulating to rugged hills, and to the north and east the country is generally flat and undulating. The area is generally sparsely vegetated, criss-crossed with broken gullies and rocky outcrops.

The Shire has a number of river systems and major tributaries, which form part of the Diamantina, Flinders, Georgina and Leichardt drainage basins, as highlighted in Figure 2 below. Major tributaries include the Cloncurry River, the Corella River, the Fullarton River and the Hamilton River.

Figure 9: River systems, major tributaries and river basins – Queensland Globe

2.3.1.3 Climate and Weather

The Cloncurry Shire has a subtropical, semi-arid, hot climate. The weather is predominantly dry with daily average temperatures in the range of 19 to 33.4 degrees Celsius. The highest recently recorded high temperature was 46.9 on 1 December 2006. Anecdotal evidence suggests temperatures have reached as high as 53.1 degrees Celsius. Extended periods of heatwave conditions occur.

Seasonal rain is experienced during the warmer months (November to April) with an average annual rainfall of 495mm. The highest recorded annual rainfall was 996.8mm in 1999. Historical data exists for just over 30 years due to the monitoring station at Cloncurry having only been in place since 1988.

2.3.2 Human-Social

2.3.2.1 Population

The Cloncurry Shire Council Estimated Resident Population for 2019 was 3,047 with a population density of 0.06 persons per square kilometre. The main permanent population is distributed as follows:

- Cloncurry: (approx. 2719)
- Dajarra: (approx. 191)
- Duchess: (approx. 23)

Mine sites, large stations and settlements can host large and fluctuating numbers of both permanent and temporary residents.

Population growth assumptions from the Cloncurry Shire Planning Scheme indicate that the population could grow to 3,844 by 2031.

At the 2019 census, 57.4% of the Cloncurry Shire population identified as male and 42.6% as female. This is a higher proportion of males than Queensland's 49.4%. The median age in the Shire was 36.4 years old, compared to 37.4 in Queensland. Children aged 0-14 years made up 20% of the population, people aged 65 years and over made up 9.8% of the population and the remaining 70.2% of the population were aged between 15 and 64 years old. The largest represented age group was 30- to 34-year-olds.

The shire is an access point for travelling west to the Northern Territory, North to the Gulf area and tourists continuing south to the channel country. The Shire sees an influx of tourists during the cooler months of the year.

2.3.2.2 Cultural Diversity

The original inhabitants of the Cloncurry Sire Council area are the Kalkadoon, Mitakoodi and Pitta Pitta Aboriginal people. At the 2016 Census, 22.8% of the population of the Cloncurry Shire identified as being of Aboriginal or Torres Strait Islander descent.

At the 2016 Census, 76.4% of people in the Cloncurry Shire indicated they were born in Australia. The most common other countries of birth were New Zealand, England, Philippines, India and Sri Lanka.

At the time of the 2016 Census, 81.9% of people spoke only English at home. Other languages spoken at home included Tagalog, Sinhalese, Mandarin, Punjabi and Filipino.

2.3.2.3 Households

Of the households counted in the Cloncurry Shire at the 2016 Census, 63.9% were family households, 31.4% were lone person households and 4.7% group households. Family households include couple families with children, couple families without children and one parent families.

2.3.2.4 Dwellings

There were 923 private dwellings in the Cloncurry Shire at the 2016 Census. Of these, 79% were separate, detached houses, 2.2% were semi-detached row, terrace or town houses, 9.2% were flats, units or apartments and 6.7% were other dwellings such as caravans, tents, sheds etc.

At the 2016 Census, 24.5% of private dwellings in the Cloncurry Shire were owned outright, compared with 28.5% in Queensland and 31% in Australia. A further 16.8% of Cloncurry households were purchasing their house with a mortgage. The median monthly mortgage repayment in the Shire was $1,510, lower than the Queensland monthly repayment of $1,733.

At the 2016 Census, 52.2% of households in Cloncurry Shire were renting, compared with 34.2% for Queensland and 30.9% for Australia. The median weekly rental payment for Cloncurry was $150 per week, compared with a $330 average for Queensland.

2.3.2.5 Socioeconomics

The Australian Bureau of Statistics Index of Relative Socio-economic Disadvantage (IRSD) is an index that summarises the relative disadvantage of a range of economic and social conditions of people and households within an area. The variables used in determining the index include indicators such as the percentage of population who are on low income, are unemployed, without internet, have no/low educational attainment, undertake low skilled employment, have health conditions, no personal transport, poor English, or are one parent families. A low score is indicative of relatively greater general disadvantage in the population when compared with other areas.

In 2016, the Cloncurry Shire LGA received a relative disadvantage score of 958. When compared to all Queensland LGAs, this score placed Cloncurry Shire in the 54th percentile, meaning the level of relative disadvantage was representative of the State's median.

2.3.2.6 Vulnerable Persons

People aged 65 years and over make up only 9.8% of the Cloncurry Shire population. Elderly and infirm individuals and others who may be highly vulnerable to the impacts of disasters in the Cloncurry Shire Council community (e.g., dialysis, etc.), are minimal and these individuals are generally known to care providers.

In 2016, 52 people (or 1.72% of the population) reported needing assistance with core activities due to disability. Twenty-five of these persons were aged over 70 years and over, eleven of them were under 14 years old and the remaining sixteen were aged 15 to 69 years.

There is a 10-bed aged care facility located at Cloncurry Hospital.

2.3.2.7 Community Preparedness and Capacity

Residents of the Cloncurry Shire are resilient and accustomed to the regular isolation that accompanies the wet season in the area. The community is essentially regarded as having the capacity to respond to and recover from most predictable hazard situations. The pragmatic and practical rural values in the community engender a significant degree of self-reliance, which brings stability, capability and sustainability.

2.3.2.8 Emergency Services

Table 2: Emergency Services within Cloncurry Shire

Emergency Services	Locations
Queensland Police Service	Police stations at Cloncurry and Dajarra.
Queensland Ambulance Service	QAS Station located at Cloncurry.
Queensland Fire & Emergency Services (Fire & Rescue)	Auxiliary Fire and Rescue Station at Cloncurry.
Queensland Fire & Emergency Services (Rural Fire)	Rural Fire Service maintains brigades at Dajarra and Duchess. Area Director is located at Mt Isa, and Area Training is delivered out of Charters Towers.
Queensland Fire & Emergency Services (SES)	SES facilities and depots are located at Cloncurry and Dajarra.

2.3.2.9 Medical Facilities

The Cloncurry Hospital is a rural multi-purpose health facility with 15 beds. It provides primary and secondary healthcare services including an emergency department service.

2.3.2.10 Primary Health Care

The co-ordination of primary health care delivery in Cloncurry Shire is undertaken by the North West Hospital and Health Service from Mt Isa. The Ramsey Street General Practice is the only GP in Cloncurry. There is a Community Health Centre based at Dajarra.

A Health Services Directory for Cloncurry Shire is available online.

2.3.2.11 Education

CSC lists a number of education and training services from pre-school to TAFE on its website.

2.3.2.12 Social Support

There are a variety of government and not-for-profit social support services available in Cloncurry Shire providing a range of essential and specialist health, hospital and medical facilities, education and family services and community facilities. Most/all of these are included in the directory on the CSC website.

2.3.2.13 Recreation

The Cloncurry Recreation Grounds hosts a large array of local sporting organisations throughout the year. The facility encompasses a skate park, netball courts, tennis courts, soccer fields, football oval, gym, activity hall and toilets, shower and bar facilities. Cloncurry Shire Council is currently undergoing Stage 2 of the Recreation Grounds Redevelopment which will see the facility undergo major changes for the benefit of the Cloncurry community.

2.3.2.14 Annual Community Events

Community events can support preparation and recovery activities. The Cloncurry Shire hosts several annual community events that celebrate outback life including:

- Cloncurry & District Annual Show - June
- Cloncurry Stockman's Challenge- July
- Quamby Rodeo - July
- Cloncurry Merry Muster (Rodeo) - August
- Dajarra Camp draft, Gymkhana and Rodeo- September
- Cloncurry Beat the Heat Festival – September

2.3.3 Economy

The Cloncurry Shire is rich in minerals and relies on mining, agriculture, transport and logistics, and tourism services for its economic viability. Strategically located, with established transport infrastructure, access to major transport routes, and land available for commercial and industrial purposes, the area has potential for future development and growth. Refer to the Cloncurry Shire Council Economic Development Strategy 2019-24.

2.3.3.1 Workforce

At the 2016 Census, 52.6% of the Cloncurry Shire population reported being in the labour force. Of these, 75.2% were employed full time, 14.2% were employed part-time and 4.7% were unemployed. The median weekly income for people aged 15 years and over was $1,022, which is significantly higher than the Queensland weekly median of $660.

The top industries of employment were copper ore mining, beef cattle farming, local government administration and road freight transport. The most common occupations included machinery operators and drivers, technicians and trades workers, labourers and professionals.

Of people aged 15 and over in 2016, 14.6% reported having completed Year 12 as their highest level of educational attainment, 19% had completed a Certificate III or IV, 5.2% had completed an Advanced Diploma or Diploma and 11.1% had a Bachelor degree level or above qualification.

2.3.3.2 Mining

Cloncurry was founded on the discovery of copper in 1867 and continues to centre around this resource. In addition to copper, the area is mined for zinc, gold, other mineral deposits and rare earth elements in open cut, underground and sub level mining operations.

Existing operational mines, include Ernest Henry, Dugald River, Osborne, Phosphate Hill, the Great Australia Mine and associated ore sources, and Cannington. These mines have varying remaining lifespans and new operations are being investigated for feasibility. Exploration activities can also be expected in the region regularly.

In addition to being the main employment provider, the mining industry supports the provision of other services in the Shire, including transport, construction and accommodation, and several of the mines in the area partner with the community to deliver community events, and grants to improve social outcomes within the community.

2.3.3.3 Agriculture

The Shire has large tracts of highly productive pastoral land, used primarily for grazing beef cattle.

With approximately 300,000 head of cattle passing through the area annually, the Cloncurry Saleyards is the second-largest cattle handling facility in Queensland. Incorporating livestock inspection and dipping, this facility is pivotal in maintaining Queensland's tick-free and control zones.

The viability of various crops, including bio-fuel cropping, is being investigated in partnership with the Department of Agriculture and Fisheries (DAF) and the Mt Isa to Townsville Economic Development Zone (MITEZ).

2.3.3.4 Transport

Cloncurry is in a strategic location, connecting broader regional destinations of Townsville, Mt Isa, and the Gulf of Carpentaria, and intersecting major transport routes between the capital cities Brisbane and Darwin. Accessible by road, rail and air, Cloncurry is a vital link between regional economies, capital cities, and export markets.

As industries in the area rely heavily on transport, there are various companies providing logistic and specialised haulage services in the Shire.

2.3.3.5 Tourism

The Cloncurry Shire Council Tourism Strategy identifies the vision for tourism in the Cloncurry Shire. Although tourism is not the main industry, the area boasts a vast landscape, abundant wildlife, rich history and friendly locals. There are a number of attractions including:

- Chinaman Creek Dam
- Cloncurry Lookout
- The John Flynn Place Museum and Art Gallery in tribute to the service and founder of the Royal Flying Doctor Service;
- Cloncurry Unearthed Museum including Burke and Wills water bottle, gem and mineral display and aboriginal artifacts;
- Mary Kathleen, the deserted mining town; and
- The Heritage Walk

More tourist information can be found in the Cloncurry Tourism Booklet, including a calendar of annual major events on page 30

There is an abundance of accommodation available in Cloncurry reflective of the fly-in fly-out employment opportunities and its location between regional centres.

2.3.3.6 Retail

The Cloncurry business district provides residents with access to essential shopping requirements, such as food and groceries, baked goods, hardware and general items, vehicles services, fuel and dining and takeaway food. Some commodities are purchased from outside the area.

2.3.3.7 Key Community Facilities

Throughout the Shire there are a number of key community facilities and large public spaces including:

- Community Precinct with indoor and outdoor function areas, kitchen, and bar facilities
- Parks and recreation grounds, swimming pool, golf course, equestrian and racecourse centre
- Gallery, museums, library, churches, heritage listed buildings, shire hall
- St Andrew's Garden Settlement
- Airport
- Hospital
- Abattoir and saleyards
- Cemetery

2.3.3.8 Proposed Future Township Development

The Town Planning Scheme supports the area's current trajectory, with a focus on sustainable use and protection of the Shire's resources, including its agricultural, landscape, mining and heritage assets.

Mining development is expected to continue resulting in moderate growth in infrastructure and housing over the next 5 years. The Shire's mineral deposits will be appropriately managed to ensure that these finite natural resources can be sustainably extracted into the future.

The Cloncurry Shire Council lists details of its current and future projects on its website.

3 Risk, Hazards and Vulnerabilities

Assessing risk, hazards and vulnerabilities is a key part of understanding a community and the challenges it faces in maintaining community continuity.

Much of the information within this vulnerability analysis has been sourced from Cloncurry's recently updated Local Disaster Management Plan, and applied to the task of keeping Cloncurry running, or returning it to running, as soon after disruption as possible.

3.1 All Hazards, All Disruptions Approach

Although specific hazards have been listed for Cloncurry Shire above, it is also important to take an all-hazards approach to improving Cloncurry's supply chain resilience and community continuity. It may well be a disruption that occurs outside of Cloncurry that the Shire has no ability to mitigate that could disrupt the community's functioning.

Some of the recommendations from this project are hazard-specific, but many take the all-hazards approach of improving Cloncurry's ability to recover from disruption whatever the hazard.

The list of recommendations for improving resilience via mitigations and contingencies, can be found at Appendix 7 Appendix: Companion Report: Recommendations for Improving Community Continuity from the Building Resilient Logistics Chains Project

3.2 Specific Hazards

There are a number of natural and non-natural hazard events which may impact the Cloncurry area. The order in which hazards are listed does not indicate likelihood, but a related project (Queensland Regional Resilience Strategies via the QRA) is underway to do first stage assessment under the Queensland Emergency Risk Management Framework (QERMF). Likely consequences (e.g., risk to life, livelihoods, property, or environment) are listed within the hazard descriptions.

3.2.1 Natural Hazards

3.2.1.1 Heatwaves

The Cloncurry Shire is vulnerable to severe and long-lasting heat waves. In the last 200 years, severe and extreme heatwaves have taken more lives than any other natural hazard in Australia (BoM, 2013). The National Heatwave Forecasting and Assessment Service is a Bureau of Meteorology (BoM) product, which operates from the start of November to the end of March. It provides warning of unusually hot conditions allowing government, emergency services and communities' time to adopt measures to reduce the impact.

During the summer of 2018/19, Cloncurry recorded 43 consecutive days of 40 degrees Celsius or above. Studies have been done on future heatwave risk assessment based on multiple temperature warming scenarios, and it is likely that Cloncurry will face a warmer and more heatwave-prone future. This is a growing threat to Cloncurry.

HWAt	Temperature of heatwave amplitude (˚C)	31.8	32.4	33.0	34.0	35.0
Hot Days	Days >35˚C	91	112	152	185	213
Hot Nights	Nights >20˚C	159	192	224	259	295

MOUNT ISA						
Index	Heatwave Index	Reference	2030	2050	2070	2090
HWF	Heatwave frequency (%)	1.6%	3.1%	7.2%	14.7%	22.8%
HWD	Heatwave duration (days)	4	3	7	15	29
HWMt	Temperature of heatwave magnitude (˚C)	34.3	34.6	35.0	35.5	36.1
HWAt	Temperature of heatwave amplitude (˚C)	34.8	35.3	36.0	37.0	38.2
Hot Days	Days >35˚C	148	168	203	223	267
Hot Nights	Nights >20˚C	177	203	228	254	284

LONGREACH						
Index	Heatwave Index	Reference	2030	2050	2070	2090

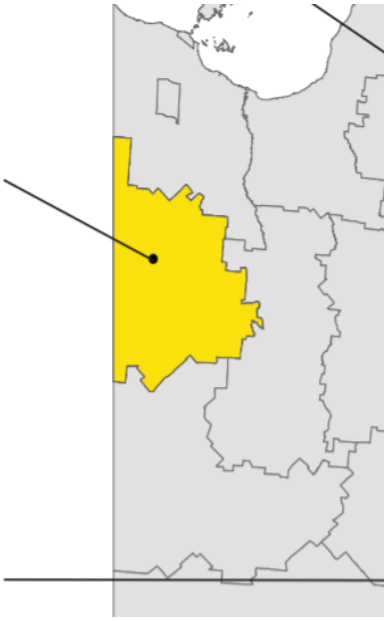


Figure 10: Potential Future Heatwave Frequency for Mt Isa Region

3.2.1.2 Droughts

A drought is a long, dry period when there is not enough water to meet people's (and livestock) needs. Droughts are extreme climatic events that can have long-lasting effects on people, crops, animals and the economy. Cloncurry has been deemed 'not drought declared' since May 2016. This status is reviewed annually by the Local Drought Committee taking into consideration extent of rainfall deficiency, pasture and water availability, frequency of supplementary feeding and stock condition. Drought is not considered a disaster in Queensland and is not managed using the QDMA. A Drought Relief Assistance Scheme for Primary Producers is available through the State.

3.2.1.3 Flooding

The Cloncurry Shire is prone to both slow onset and flash flooding, especially during the wet season from October to April. Localised rainfall, heavy rainfall in the surrounding catchment areas, monsoonal troughs and/or cyclonic influences in the Gulf of Carpentaria can result in flooding in the area. A flood height of the Cloncurry River at Cloncurry of over 3m is classified as a minor flood, over 5m is moderate and over 7m is a major flood. At a flood height of 7.5m the town of Cloncurry will be severely flood affected. It is probable for minor flooding to occur every substantial wet season, moderate flooding to occur once every 2.3 years and major flooding to occur once every 6.5 years. The probability of flood heights above 7.5m is once every 8.6 years. Flooding in the Shire can escalate quickly, be wide-spread, and comparatively long-lasting due to the vast flat topography, and result in rapid flow of the Cloncurry River.

People that live in the flood inundation areas of rivers and creeks are at direct risk. There are approximately 120 people at risk in a major flood of the Cloncurry River with the main areas of impact being on the southern and western sides of Cloncurry. In Dajarra, approximately 32 people are at risk in a major flood of Carbine Creek. The prolonged loss of road access is a major impact of flooding on the community of Kajabbi.

Flood waters, can pose several risks such as: risks to public health, including drowning; inundation and damage to property, possessions, critical infrastructure and the environment; losses to livestock and crops; loss of income; disruption and damage to road and rail networks, critical supply chains, businesses and industry; isolation of individuals and major agricultural activities and the potential for large scale evacuation. Large areas can become cut off for periods of time. The area's major agricultural industry; beef cattle production, is particularly vulnerable to the effects of flooding, including livestock drowning, exposure to elements, isolation, and infrastructure damage, with associated socio-economic impacts..

Both the Cloncurry Shire Town Planning Scheme and the Queensland Flood Mapping Program have identified numerous locations within the Shire that are at risk of flooding. Floodplain extent is also provided within Guardian IMS as a map layer.

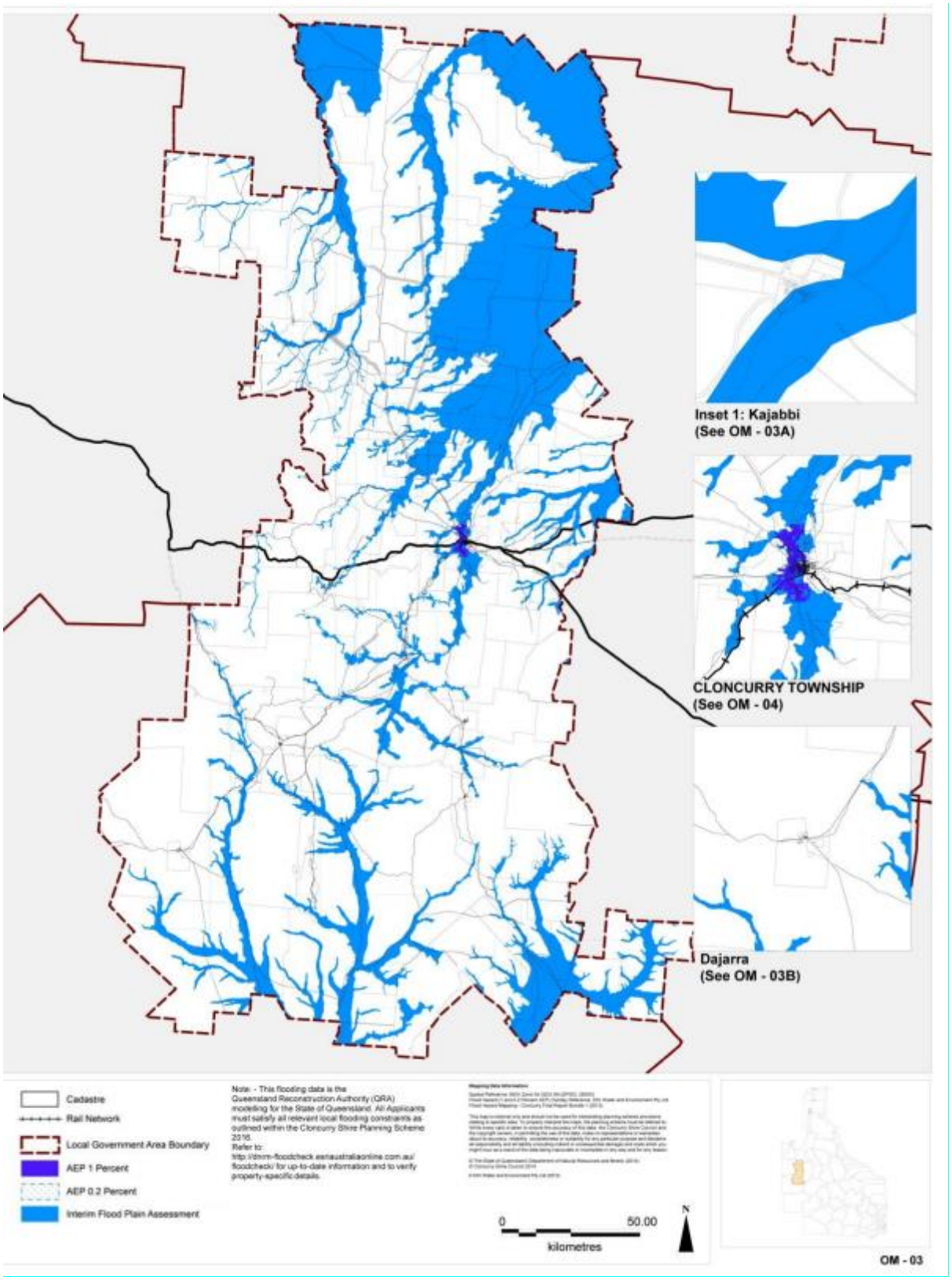


Figure 11: Flood Risk for Cloncurry Shire

3.2.1.4 Severe Storms and Tropical Cyclones

The Cloncurry Shire has been frequently impacted by severe storms, including dust storms, monsoonal depressions and occasionally by tornadoes and tropical cyclones. Most likely to occur between October and April, such storms can bring lightning, hail, dust, destructive winds, high rainfall and flooding.

Cloncurry is also prone to strong isolated wind corridors that can produce damaging winds without warning. The risk of homes and other buildings sustaining damage can be high due to the age of structures.

Each weather event has the potential to cause destruction to property, livestock and the environment while putting lives and livelihoods at risk. It is possible for such storms to cause disruption, damage or loss to power and telecommunication networks, water and sewage treatment plants, road and supply networks and/or other essential services and businesses. There is the potential for both evacuation and the isolation of communities as a result of these weather events. The figures below give an indication of likelihood around extreme wind for both 1% Annual Exceedance Probably (AEP) and 0.2% AEP. Although Cloncurry looks a long way from the coast, it is worth remembering that in 2011 Cyclone Yasi made landfall around Cardwell on the east coast, but winds were at cyclonic speeds when the weather system reached Cloncurry.

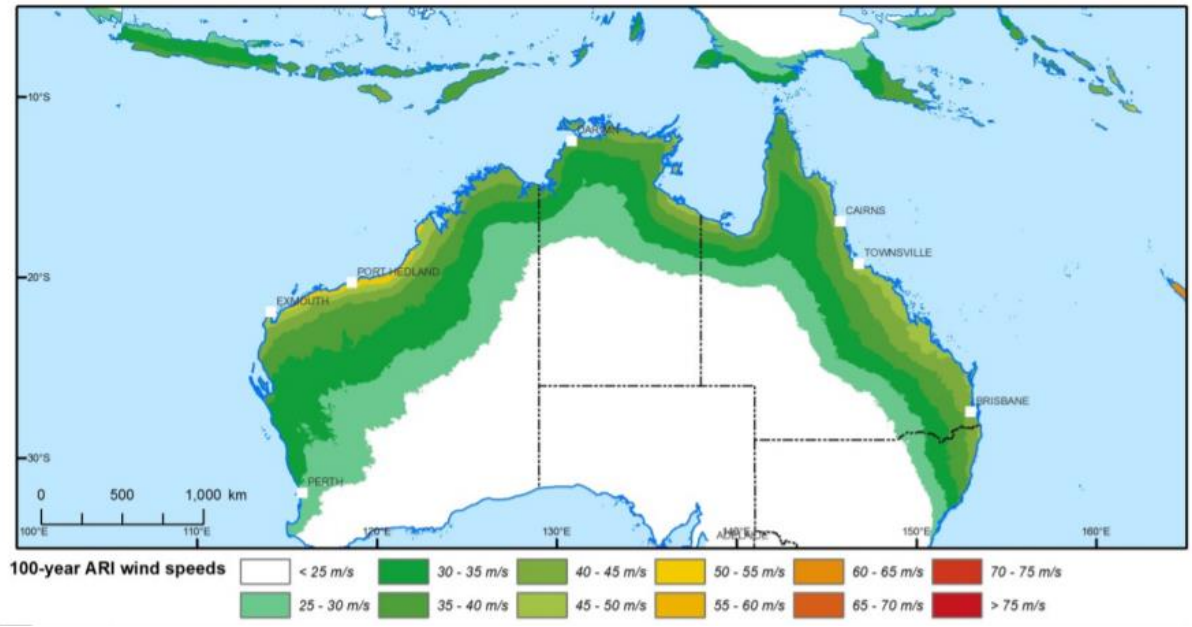


Figure 12: 100-year ARI / 1% AEP gust wind speeds

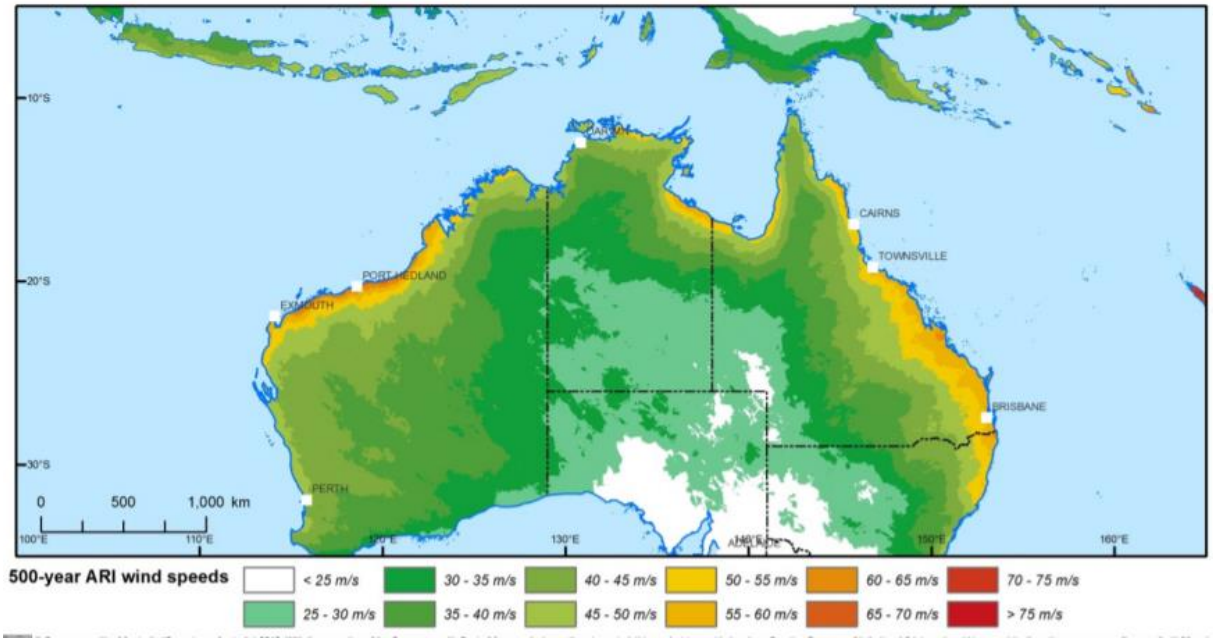


Figure 13: 500-year ARI / 0.2% AEP gust wind speeds [10]

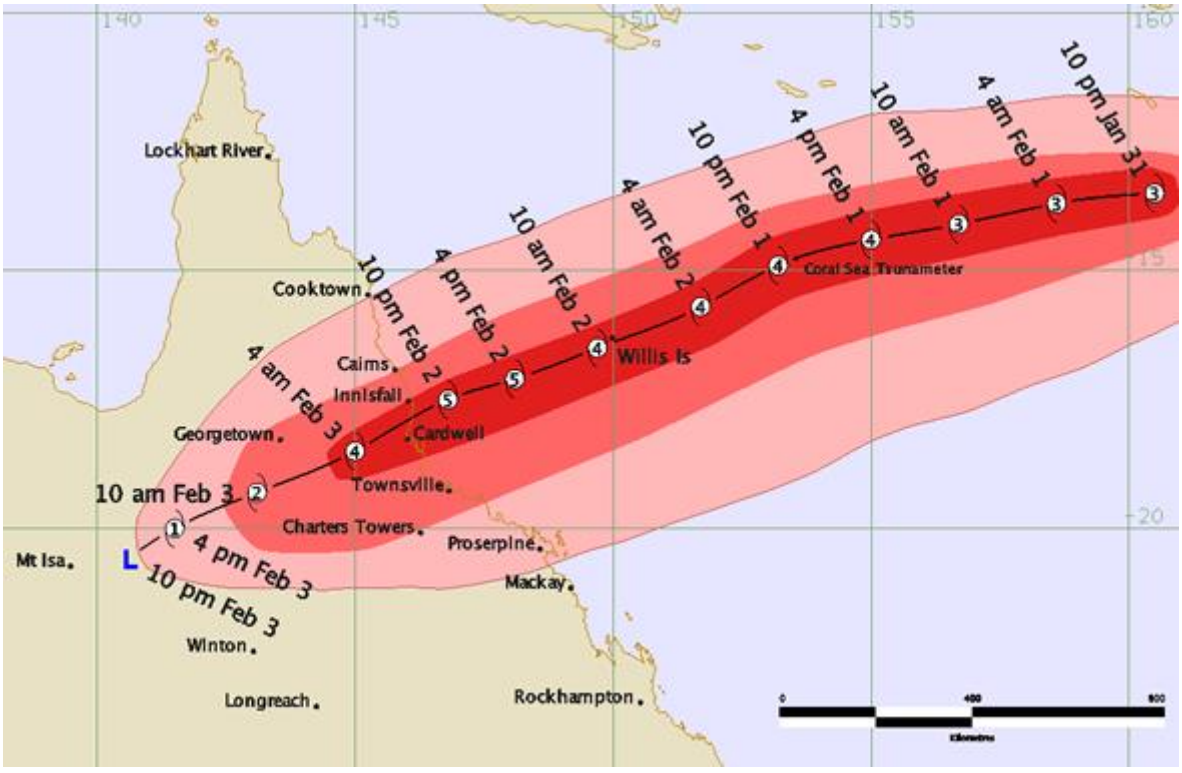


Figure 14: Track and intensity information for Severe Tropical Cyclone Yasi (2011) [11]

3.2.1.5 Bushfire and Grassfire

Wildfire risk in Cloncurry is spread across the shire, with some areas having bushfire and most areas having a grassfire risk.

The threat of bushfire is a seasonal risk, typically occurring from July until the start of the wet season. The threat fluctuates from low to high potential intensity, with some very isolated very-high potential areas within Cloncurry Shire. Season bushfire risk is dependent upon variables such as temperature,

humidity, wind direction, rainfall, vegetation growth, topography and existing fuel load. While bushfires can be accidental, or caused by deliberate acts of arson, the frequency of dry electrical storms within the Shire heightens the risk of starting by lightning strike.

Both State-wide mapping of Bushfire Prone Areas, and the Cloncurry Town Planning scheme identify areas of bushfire risk within the Shire. State-wide mapping also identifies some areas of Cloncurry Shire as also being Grass Fire Prone Areas.

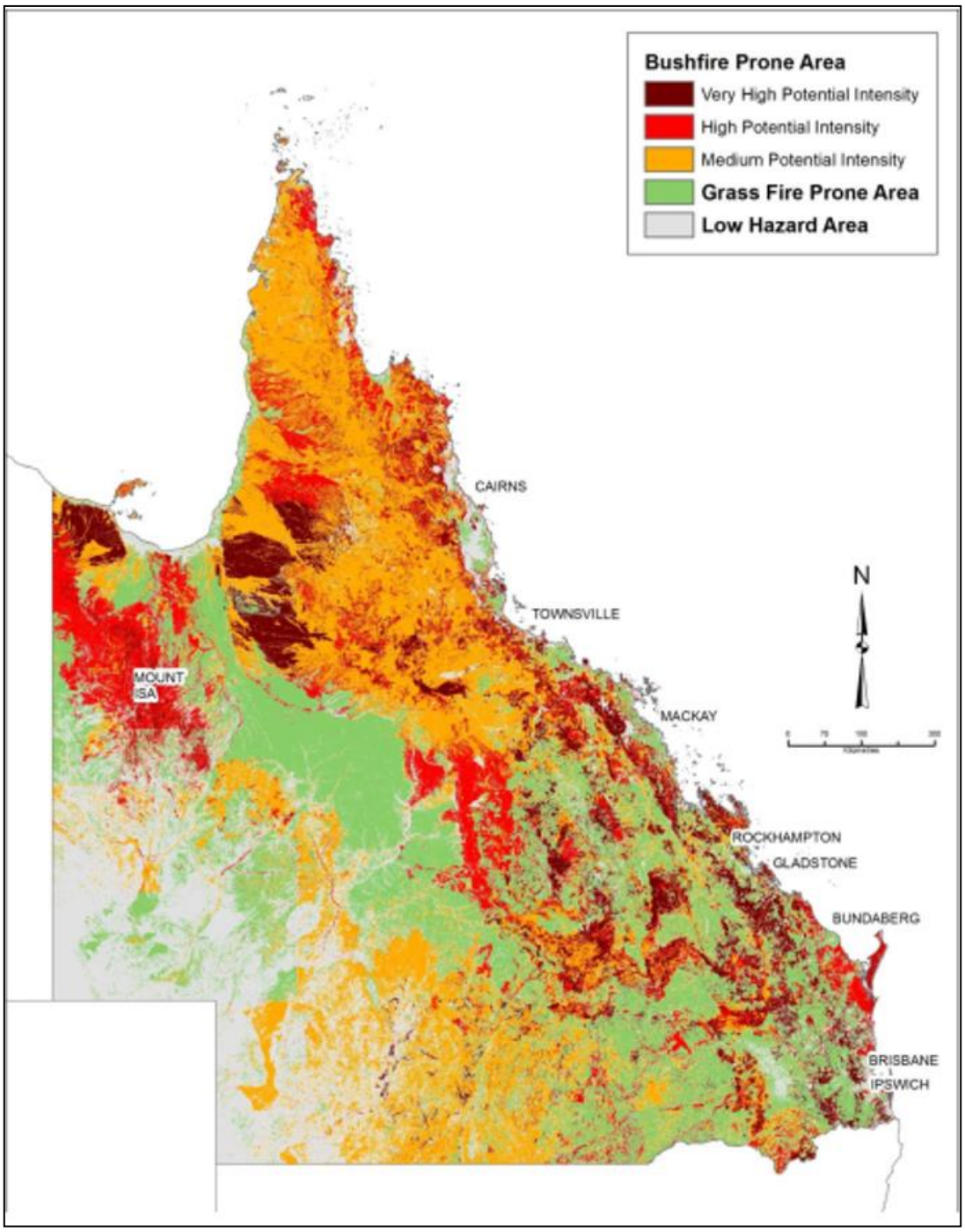
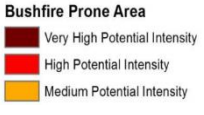


Figure 15: Statewide Mapping of Bushfire and Grassfire Prone Areas

The State wide mapping of Bushfire Prone Areas is reproduced within Guardian IM
below is extracted from the Guardian IMS system and shows that significant propo
are exposed to medium bushfire intensity risk.



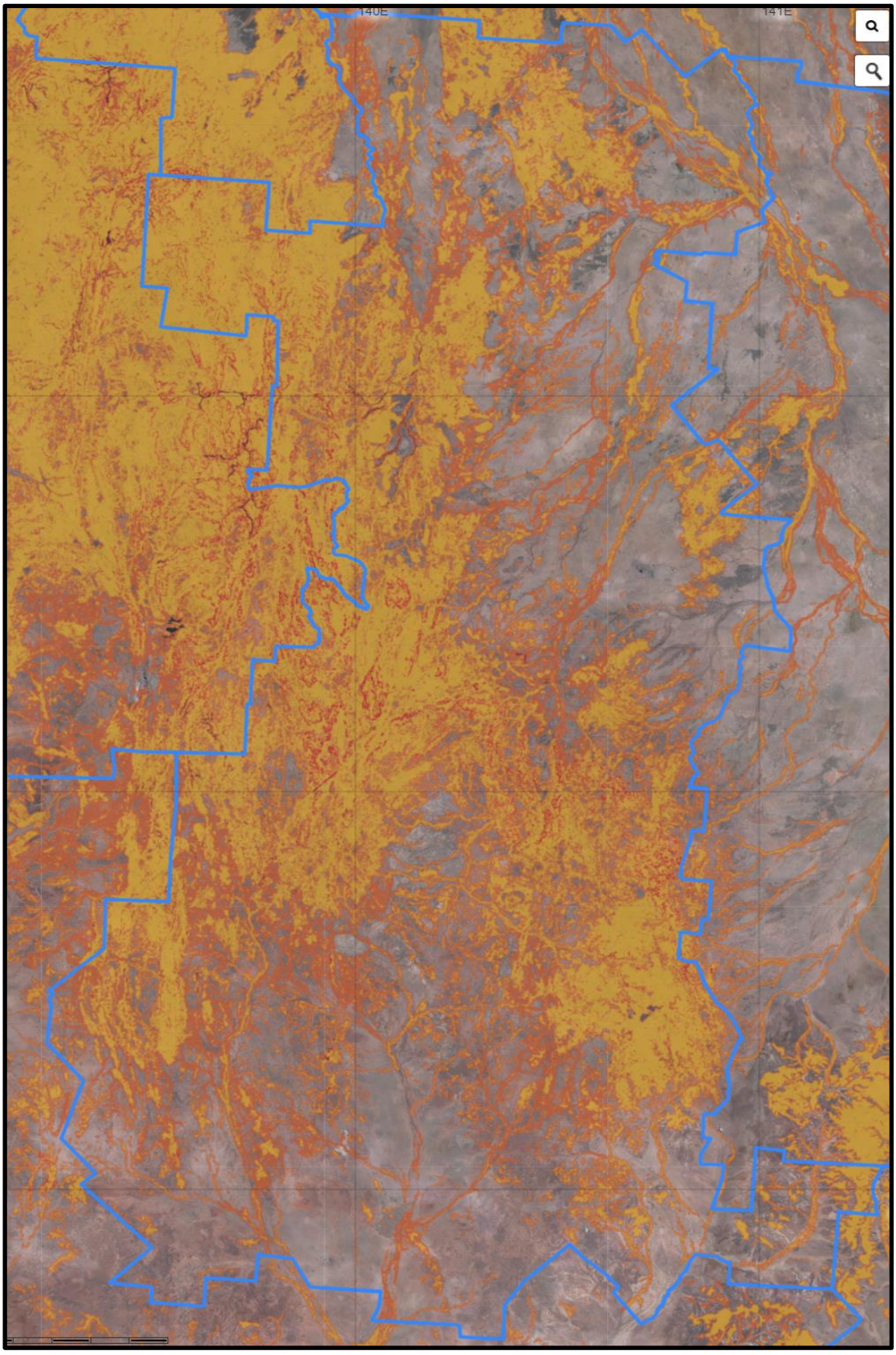


Figure 10: Bushfire Prone Areas for Cloncurry Shire

When viewed within Guardian IMS at higher resolution, there are also isolated pockets of the Shire with high and very high bushfire intensity risk (e.g., Corella Park Road, Gleeson Road, Rifle Creek Dam, etc.).

Bushfire mitigation is important as Cloncurry Shire's medium, high and very high bushfire intensity areas have the potential to support a significant bushfire. Bushfires in these areas have the potential to get out of control and put residences and adjoining properties at risk due to high to extreme levels of flame attack, radiant heat and ember attack as a result of high potentially hazardous vegetation, fuel loads, slope and severe fire weather.

Bushfires are potentially harmful to people, property and livestock through flame attack, radiant heat exposure, ember attack, wind attack, smoke hazard and convective heat exposure. Bushfire impacts can include possible injury or death to people, animals and livestock; loss, disruption or damage to property, buildings, critical infrastructure, essential services, businesses, agriculture and vegetation; blocked road and supply networks; loss of income; isolation of communities; and potential for evacuation. Fighting fires can pose additional hazards and concerns due to conditions, terrain, difficult access and water scarcity.

3.2.1.6 Landslides

A landslide is the movement of a mass of rock, debris or earth down a slope due to forces of gravity overcoming the slope's stability. Landslides can be triggered by both natural causes, such as rainfall saturation, erosion or earthquakes, or by human activity, including slope modification, interference with natural drainage, removal of vegetation or mining activities. Cloncurry's risk factors include its hilly terrain, rainfall and mining operations. The area has experienced rock falls and washouts in the past, predominantly following rain and on roadsides where vegetation has been removed.

Mining can increase the risk of landslides due to human interference with natural slope, drainage, and vegetation. Additionally, blasting techniques and other operations which cause underground vibrations can trigger a landslide. Given the area's mining dominance, combined with rainfall, such threats should be considered.

Landslides can cause injury or death; damage property, buildings, roads, railways, pipelines, communication networks, agricultural land and the environment; interfere with supplies; and isolate communities. While some landslides can be slow, sudden, rapid events are the most dangerous due to lack of warning and force of impact.

3.2.1.7 Earthquakes

Geoscience Australia mapping shows the Cloncurry area as having a comparatively low chance of experiencing a severely damaging earthquake. Vulnerability to such events is partially due to this rarity: earthquakes are unexpected, can cause panic, disrupt lifelines, damage infrastructure and buildings that are not designed to withstand such events, and pose risk to mining operations and personnel. Given this vulnerability, it is prudent to maintain a situational awareness of the threat, and its possible consequences.

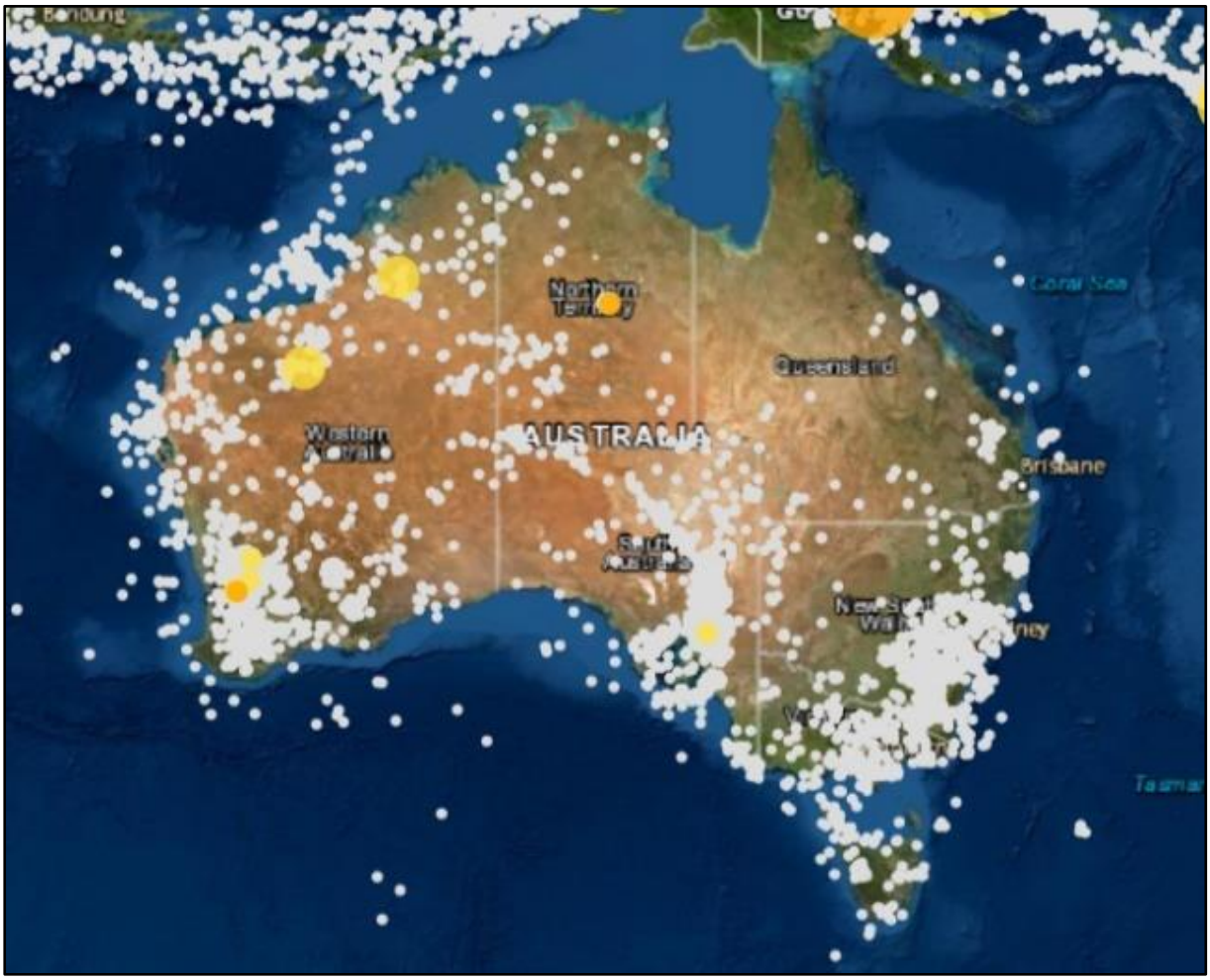


Figure 16: Geoscience Australia Earthquake Mapping for previous 10 years

3.2.1.8 A Changing Climate

A changing climate will likely exacerbate the frequency and severity of most natural hazard events. The Queensland Government publication, Climate Change in the North West Queensland region [12], indicates that the Shire can expect to be increasingly affected by higher temperatures, hotter and more frequent hot days, harsher fire weather, and more intense downpours.

Future climate modelling, particularly suited to agriculture, is available through the Long Paddock website at https://longpaddock.qld.gov.au/qld-future-climate/dashboard/#responseTab6, and details mean climate, heatwave likelihood, extreme temperature likelihood, and extreme precipitation likelihood.

Adaptative measures should be considered to manage future climate risks, and some of the recommendations within the accompanying report at 7 Appendix: Companion Report: Recommendations for Improving Community Continuity from the Building Resilient Logistics Chains Project can help with adaptation measures due to a changing climate.

The range of likely changes to Queensland's climate in the coming years and decades presents opportunities and risks. Extensive work is being done to identify the likely impacts, sector by sector, and how best to respond to them.

Sector	Climate risks ↑ = increase, ↓ = decrease	Impacts	Potential responses
	↑ storm intensity ↑ fire weather ↑ heatwaves	• Increased maintenance costs • Increased disruption to services • Increased energy and water usage	• Consider future climate, bushfire and flood risk when locating and constructing new developments and infrastructure • Increase road heights • Insure public assets
	↑ temperature ↑ storm events ↑ fire weather	• Increased threats to tourism infrastructure • Damage to popular environmental sites • Risks to tourists unfamiliar with conditions	• Consider climate risks in emergency planning for tourist sites • Adopt appropriate cancellation policies for extreme weather • Prepare for changing seasonal demand
	↑ inundation and flooding ↑ fire weather ↑ heatwaves	• Disruption to supply chains • Disruption to workplaces and infrastructure • Loss of customers during emergency recovery	• Business continuity planning • Shift critical infrastructure out of hazard zones • Enable flexible working arrangements • Diversify customer base and products
	↑ temperature ↑ hot days ↑ fire weather	• Changed distribution of pests and diseases • Heat stress on livestock and crops • Farms affected by bushfire • Reduced water security	• Consider diversifying outputs or business • Consider different crop varieties and sowing times • Improve water efficiency
	↑ fire weather ↑ temperature	• Existing threats to flora and fauna are exacerbated • Changes to habitat • Altered disturbance regimes • Changing dynamics of invasive species	• Develop strategies to respond to new and emerging diseases and pests • Link habitats to allow species to move • Consider moving selected populations to new areas
	↑ heatwaves ↑ fire weather	• More stress on health and emergency services • More heat-related deaths, particularly among the elderly and disadvantaged • Mental health effects • Changes in disease occurrence	• Use existing social networks to support vulnerable community members • Implement rural mental health care programs • Consider climate risks when developing emergency planning for schools, hospitals, services • Increase green spaces and cool zones for heat stress
	↑ inundation and flooding ↑ fire weather ↑ heatwaves ↑ rainfall intensity	• Increased fire season duration and fire intensity will affect rural communities • Increased storm intensity will increase flooding risk	• Improve bushfire safety standards for development • Increased focus on community preparedness and prevention • Update risk management standards to account for increased risk from climate change

Figure 17: Potential responses to a changing climate [13]

3.2.2 Non-natural Hazards

3.2.2.1 Transport Incident / Hazardous Materials / Dangerous Goods

Cloncurry Shire is a transport hub, being at the crossroads of National Highways and state roads. Mining and agricultural activity increases the transport flow in and around Cloncurry Shire.

Both of the main industries (by employment) in the Shire employ hazardous materials within their operations (e.g. explosives and chemicals for mining and chemicals for agriculture). Transport accidents involving hazardous materials have occurred several times in the last decade, with both road and rail incidents occurring.

Transport accidents can claim lives, livelihoods, and have significant impacts on property and the environment. Should hazardous materials (HAZMAT) be involved, the potential for people not directly involved in the accident to be at risk can be high, with some hazardous materials requiring up to a 1000m evacuation zone.

Accidents on major routes (especially those involving HAZMAT) can also disrupt those routes and supply chains for lengthy periods.

The Australian Dangerous Goods Code sets out the requirements for transporting dangerous goods by road or rail and the Department of Transport and Main Roads administers this through licensing.

Queensland Fire and Emergency Services (QFES) is the responsible lead agency for operations management of a Chemical / HAZMAT incident. However, QFES is likely to need assistance from CSC and other members of the LDMG (QPS, QAS etc.) to assist with a major incident.

3.2.2.2 Failure or disruption of essential services

The failure of critical infrastructure which provides essential services such as water, wastewater, waste management, power, information and communication, would likely have widespread implications.

There is the potential for a "domino effect", where the failure of one essential service may lead to progressive failures of other essential services – e.g., loss of power could potentially lead to loss of communications, loss of reticulated water supply, loss of sewage treatment capability, etc. This could flow on to services outside of utilities such as retail and Council services.

It is important to note that it is possible that any infrastructure failure affecting the area, could likely have State-wide and possibly national consequences, resulting in a lack of external support capacity to assist in recovery activities. In addition to the human-social and economic impacts, any loss of essential services can impede the ability to respond to an event locally.

3.2.2.3 Infectious Disease Outbreak

Infectious disease is a broad term covering a range of different diseases that can be spread, directly or indirectly, from one person to another. A pandemic is a disease outbreak that occurs worldwide when a new strain of easily transmitted virus emerges to which no-one is immune. In recent times, at least three pandemics have posed a threat to Australia; avian influenza outbreak in 2003, swine flu influenza in 2009 and the coronavirus COVID-19 pandemic in 2020 (ongoing). Such outbreaks can challenge or overwhelm the health system, can involve the isolation and quarantine of large numbers of people for a protracted period, and may result in large numbers of fatalities or people with serious illness.

3.2.2.4 Animal Diseases

The social, economic and environmental consequences of an infectious disease outbreak in animals could be catastrophic to the Cloncurry Shire. Although Australia is currently free of many of the world's worst animal diseases including Foot-and-mouth disease, Bovine Spongiform Encephalopathy (BSE) and African Swine Fever, it has recently been threatened by other diseases, such as Equine Influenza, Avian Influenza, Australian Bat Lyssavirus, Anthrax and Hendra Virus. Foot-and-Mouth disease has been identified as the single biggest threat to Queensland's livestock industry. Some diseases, known as Zoonoses, can spread from animals to humans.

Sever animal disease outbreaks could cause serious and prolonged social and economic impacts to primary producers, supply chain businesses, transporters and other industries such as food and tourism.

3.2.2.5 Pests, Weeds & Plant Diseases

With agriculture the predominant industry in Cloncurry, and property size averaging 55,000 ha, pest and disease management is a critical challenge. Pests, weeds and plant diseases have the potential to damage natural environment eco-systems, increase fire risk and infrastructure maintenance costs, reduce productivity and profitability, limit the long-term sustainability of the State's agricultural and natural resources and potentially affect human health and peoples' livelihoods. The Cloncurry Shire Area Biosecurity Plan 2019-2023 provides strategic direction for the control of invasive biosecurity

matter and weeds declared under local laws. Emergency responders expect agriculture workers to have their own awareness of hazardous materials / chemicals used at their facilities.

3.2.2.6 Vector Borne Disease

Vectors are living organisms that spread infectious diseases from one host to another. Many vectors are bloodsucking insects (e.g., mosquitoes, ticks, sandflies, etc.) which ingest disease-producing microorganisms during a blood meal from an infected human or animal host and then inject it into a new host during a later blood meal. Some vectors may transmit pathogens through other bodily fluids. With the combination of climate change, increasing globalisation, international travel and transport of goods, disease vectors have moved across boundaries into new territories. A major health threat globally, some vector-borne diseases are notifiable under the Public Health Act 2005.

3.2.2.7 Referable Dams

Within the Cloncurry Shire there are three referable dams whose failure would put 2 or more people at risk:

Chinaman Creek Dam is located to the southwest of the Cloncurry Township on Chinaman Creek, a tributary of the Cloncurry River and upstream of Cloncurry township. Constructed in 1993, the 13.5m high concrete gravity dam is owned and operated by Cloncurry Shire Council and supplies both town water and recreational activities for Cloncurry residents. The EAP has calculated a maximum incremental PAR of 197 for a Probable Maximum Flood (PMF) event at the dam coupled with a 2% AEP (Q50) event in the Cloncurry River. The PAR does not account for transient visitors who must also be considered. During the flooding of March 1997, the fuse plug washed out resulting in a loss of water storage and increased floodwaters in the Cloncurry River. The dam's fuse plug is designed to wash away in a 1% AEP (Q100) flood event.

Corella Dam is located on the Corella River, west of the Cloncurry township and south of the Barkly Highway. The concrete faced (gunite) rockfill dam was built in the 1950's to provide town water for the now abandoned Mary Kathleen Uranium Mine. Owned by the State and managed by Department of Resources, it is now a popular recreation and camping area for locals and visitors as well as water supply for stock. The access road to Corella Dam is crossed by an auxiliary spillway of the dam, and this must not be crossed when in flow. There is an EAP in place which estimates the Population at Risk (PAR) to be up to 144 persons (between 10-24 residents within 3 hours' downstream on the Corella River, and up to 120 campers onsite at Corella Dam campgrounds).

Chinaman Creek Dam is located upstream to the southwest of the Cloncurry Township on Chinaman Creek. Constructed in 1993, the 13.5m high concrete gravity dam is owned and operated by Cloncurry Shire Council and supplies both town water and recreational activities for Cloncurry residents. The EAP has calculated a maximum incremental PAR of 197 for a Probable Maximum Flood (PMF) event at the dam coupled with a 2% AEP (Q50) event in the Cloncurry River. The PAR does not account for transient visitors who must also be considered. During the flooding of March 1997, the fuse plug washed out resulting in a loss of water storage and increased floodwaters in the Cloncurry River. The dams fuse plug is designed to wash away in a 1% AEP (Q100) flood event.

Rifle Creek Dam is located 28km south east of Mt Isa and 98km west / south west of Cloncurry, on the border of Cloncurry Shire with Mt Isa City and Boulia Shire. Originally built in 1929 and upgraded in 1950 and 2015, the concrete gravity/arch dam is owned and operated by Glencore Mount Isa Mines. The Dam provides one of two cooling water supplies to Diamantina Power Station while also supplying stock water to downstream properties. The EAP calculates the PAR to be 698 persons, almost all of which reside in the Mt Isa City Council Local Government Area, along the Leichhardt River.

In addition to the above, failure of referable dams in the surrounding areas could exacerbate flooding in the Cloncurry area, including Leichhardt River Dam, Julius Dam, and East Leichhardt Dam.

There are also a number of hazardous waste dams and storage facilities in the Cloncurry Shire, including Tick Hill Tailings Storage, Phosphate Hill Gypsum Stack, Phosphate Hill Slimes Dam, Osborne Mine Tailings Storage (x 2), Osborne Mine Reclaim Water Storage (x 2), Ernest Henry Mine Tailings Storage, Dugald River Tailings Storage, Selwyn Mine Heap Leach Storage, Selwyn Mine Tailings Dams (x 2) and Great Australian Copper Mine Pregnant Ponds. Mine operators are responsible for the care and maintenance of these dams. These could pose environmental and health risks to the Shire. For example, on two occasions during flooding in the last 12 years, acid water was released from the pregnant ponds of the Great Australian Copper Mine into the flooded Copper Mine Creek.

3.2.2.8 Mining Incident

Due to the considerable mining industry in the Shire, an incident at any mining site could have wide-reaching socio-economic and environmental implications for the surrounding areas. Mining operations and the corresponding critical supply chain network could be vulnerable to hazards listed above, including flooding, severe storms, heatwaves, infectious diseases and disruption of essential services, as well as a cohort of risks specific to mining, such as collapse, underground fires, explosions, loss of ventilation, contaminated atmospheres and inrush. In addition, mining's necessity for the storage and transport of hazardous chemicals can pose risks both onsite and while in transit. Many of the mines play an active role in the disaster response and recovery efforts of the Cloncurry Shire.

3.2.2.9 Other Major Incidents

Major or unusual incidents could occur in any number of settings and are difficult to foresee or predict. Such events have the potential to happen quickly with little to no warning and could potentially require a protracted response by LDMG agencies and have serious consequences for supply chains. Some examples include a structural collapse, a critical incident at a mine site, a release of hazardous or toxic materials, a mass casualty event, an act of terrorism or the risk of space debris entering the atmosphere.

It is important to be aware of events happening in other areas which may impact the Cloncurry area, particularly given its pivotal location intersecting major transport routes between capital cities and broader regional destinations. Additionally, cooler months and certain local events see a larger influx of people from outside the Shire which may impact the response to the above hazards.

4 Cloncurry Shire and Supply Chains

Community wellbeing relies upon goods and services. Regardless of the specific good or service, they are all supplied via supply chains.

Community wellbeing rapidly decreases, and lives and livelihoods can be put at risk, without access to safe and secure drinking water, food, health services, energy, communications, transport, freight, and many other goods and services provided within, and available to, Cloncurry Shire.

4.1 Community Wellbeing, the Economy, and Supply Chains

Many goods and services are essential. The meaning of essential varies from one community to another. The narrow view of essential includes the goods and services that meet primary needs such as food and water. Lives and livelihoods rely on so many more goods and services, and within this project, the view of essential is expanded to include goods and services that provide not just primary needs, but also material support to livelihoods within Cloncurry Shire.

The Productivity Commission highlights the relationship between supply chains and Australian wellbeing below:

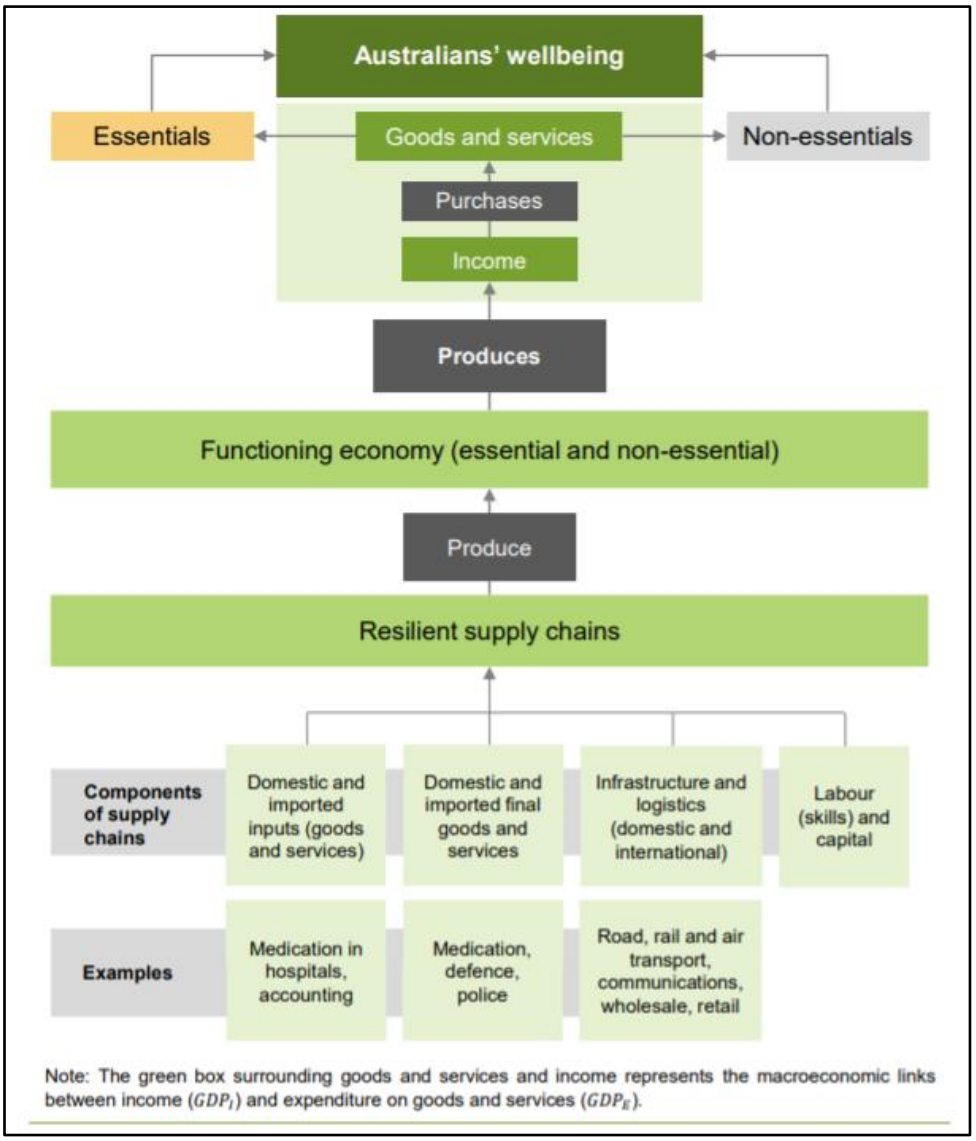


Figure 18: Relationship between wellbeing, the functioning of the economy, and supply chains [14]

Figure 18: Relationship between wellbeing, the functioning of the economy, and supply chains shows the importance of resilient supply chains. It illustrates the components of supply chains – the unfinished commodities / imports, the finished goods and services, the infrastructure and logistics that supports the movement of the commodities, goods and services, and the labour required to keep the supply chains operational. The supply chains support a functioning economy, which in turn supports Cloncurry residents and guests through their ability to purchase goods and services to support their wellbeing, and also support their livelihoods through the production of commodities, goods and services within Cloncurry Shire.

Cloncurry Shire is no stranger to supply chain disruption, with the latest major disruption being the 2019 Monsoon event that caused major supply chains to the East and South of the Shire to be cut for weeks, or in the case of the rail line, for months.

This has a material impact on the wellbeing of Cloncurry Shire, and this project, including the Recommendations Report at **Appendix: Companion Report: Recommendations for Improving Community Continuity from the Building Resilient Logistics Chains Project**, is designed to assist Cloncurry Shire to mitigate or adapt to future supply chain disruption in the face of all hazards, in an effort to protect and maximise community wellbeing. This is the essence of community continuity.

4.2 Supply Chains

Supply chains are actually networks[15]. At their simplest, a supply chain takes a raw material (commodity) and produces a finished product (good or service) that is delivered to a final user (industry or consumer). But most supply chains are much more complex than that, with a network of firms supplying inputs, that are combined to produce the output that is consumed.

Supply chain components are outlined in **Figure 18: Relationship between wellbeing, the functioning of the economy, and supply** chains and are explained in more detail below.

This report is primarily focussed on last mile supply chains – in general this is the term for final delivery of a good or service between a distribution hub and the recipient.

This focus has been chosen because this is generally the link that is most important for community continuity, but also because many modern supply chains are long and complex. Consider an everyday item such as coffee, which has incredibly long supply chains that start on the other side of the world, cross many oceans and countries, before arrival at an east coast distribution point, and then into Cloncurry. Tracing the full supply chain of coffee would not have a material effect on the resilience of Cloncurry's supply chains.

This focus on the last mile is a project decision to maximise Cloncurry's supply chain resilience and improve Cloncurry's community continuity.

Where feasible, the report delves deeper into the supply chain. This is the case when actions by, or within, the Cloncurry community can have an impact on the reliable functioning of the supply chain.

4.2.1 Domestic and Imported Goods and Services

For the purposes of this report, no distinction is made between domestic and imported goods and services.

This is because many, if not most, of the supply chain disruptions that Cloncurry has been impacted by have happened in the last mile. The last mile for Cloncurry (as a community) is very long with typical "last mile" distances recorded in the table below.

Upstream or Downstream Node	Method	Distance (approximate)

Townsville	Road, Rail, Air,	783 km
Roma	Road	1,227 km
Brisbane	Road, Air, Intermodal	1,700 km
Darwin	Road	1,721 km

Upstream or Downstream nodes in the supply chain refers to the next source or destination in long supply chain links. Examples include:

- Townsville Port for receiving mineral ore or mining product for export, or being the "last mile" source for finished goods from overseas that become end-user goods in Cloncurry
- Roma Saleyards as a destination (along with feedlots in the Roma area) for cattle produced within the Cloncurry Shire and surrounds
- Brisbane Port, generally for finished goods coming into Cloncurry Shire
- Darwin, generally as an alternative supply chain for inbound finished goods

Sometimes the last mile occurs within the bounds of Cloncurry Shire. For example, where cattle are sold for live export and delivery occurs at Cloncurry Saleyards. For the producer in Cloncurry this is the final mile, but for the exporter, the cattle are loaded on to trains, then ships, and then may be transferred several times before the final destination and end user is reached.

4.2.2 Labour

Local labour is again the focus for this project, rather than mapping labour right throughout the supply chain. Should airports / airfields be open, most of Cloncurry's normal labour requirements will be met, including mining fly-in, fly-out (FIFO) requirements.

Maximising local labour is also about ensuring that critical services are provided to the Cloncurry community, and enabling labour to be available for organisations for response and recovery from emergency events. This also meets the overall project approach of community continuity. For example, during natural hazard events, if worker's houses and families are safe and secure, workers are generally able to attend their work. If these workers provide enabling infrastructure (e.g. energy, water, roads, education, childcare), this then enables more workers within the community to attend work.

4.2.3 Infrastructure

Infrastructure, and particularly critical infrastructure, is part of what allows supply chains to function. To maintain a community's wellbeing, both supply chains for essential commodities, and well-functioning and resilient infrastructure are required. More details on Cloncurry's infrastructure is provided below.

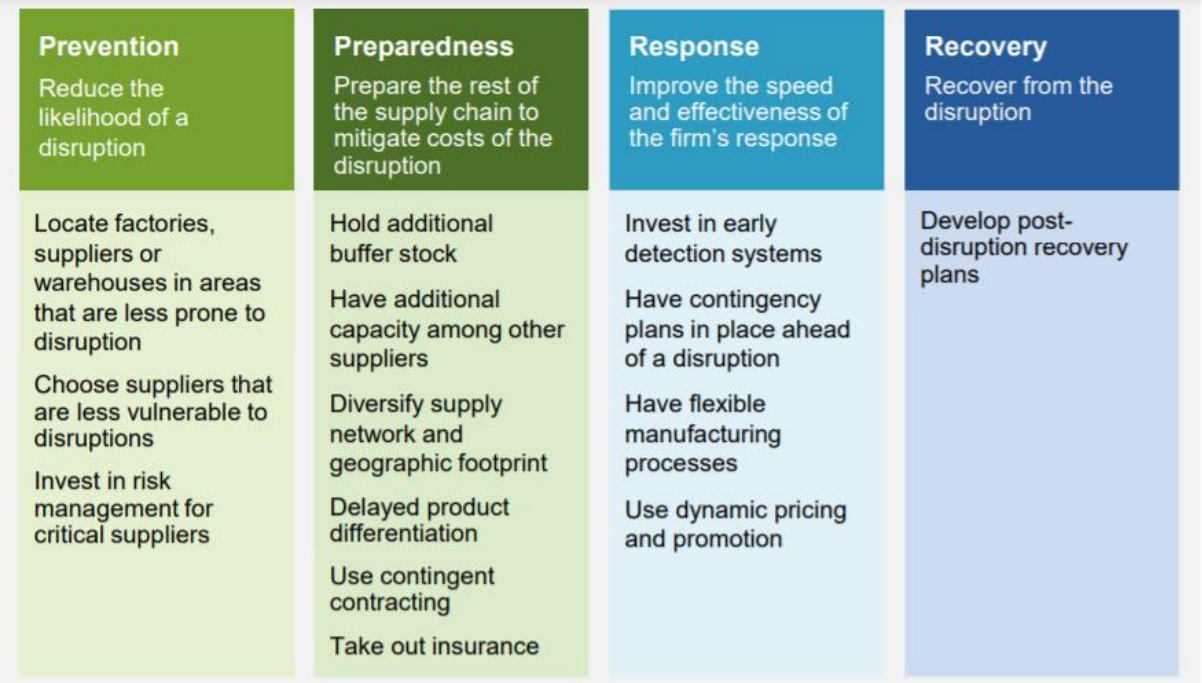
4.3 Managing Supply Chain Risk

Effective supply chain risk management balances the costs of disruption with actions taken to prevent, prepare, reduce response time or effort, or reduce recovery time or effort in the event of disruption.

4.3.1 Prevention, Preparedness, Response & Recovery (PPRR)

Managing supply risk aligns well with the comprehensive approach to disaster management that is part of the Queensland Disaster Management Arrangements (QDMA). Prevention, Preparedness, Response and Recovery (PPRR) can all play a part in managing supply chain risk, as shown in the table below:

Table 3: Supply Chain Options within PPRR framework [16], [17]



4.3.2 Risk Management Techniques

Different supply chain disruption management techniques have different impacts dependent on the type of disruption to the supply chain. Techniques include those in the table below, but the most important element is that communities and organisations plan for supply chain disruption and act accordingly. Early warning systems, such as the information supplied via Cloncurry's Community Dashboard, can assist in decision-making around risk management techniques and timing.

Table 4: Supply Chain Disruption Management Techniques

Action	Description
No Action	Accept the risk of disruption and respond accordingly if a disruption occurs. In practice, this may not be the best course for critical goods or services such as drinking water.
Stockpiling	Stockpile critical resources ahead of any disruption. For drinking water, this may be increasing the stockpile of water treatment chemicals.
Supplier Diversification	Obtain goods or services from multiple supplies or suppliers. For drinking water, this may mean multiple sources of raw water (e.g., pipeline, dam, spears in Cloncurry River).
Alternate Route	Closely aligned to supplier diversification, this might be changing the route or method of transport for a particular good or service, while maintaining the same supplier.
Supplier Service Levels	Again, closely aligned with supplier diversification, organisations can have contracts with multiple service level agreements (SLAs), including for business as usual, with enhanced SLAs for times of peak disruption, such as when a natural hazard impacts.
Increase Local Capability	Increase local capability to produce the good or service. For drinking water, this may be increasing the number or size of the reservoirs in Cloncurry, to prolong the amount of time that drinking water is available before it needs to be produced.

In reality, organisations will use some, or all of these, often in combination, to manage their supply chain risk. E.g., Cloncurry Bakery stockpiles flour before each wet season and produces bread locally. This ensures Cloncurry maintains the capability of obtaining fresh bread. Cloncurry Food Works warehouses non-perishable items and has alternate routes for perishable items (e.g. transitions from road transport to air transport for last mile supply).

4.3.3 Just-in-Time vs Just-in-Case Logistics

Just-in-Time (JIT) logistics is the primary method of logistics thinking within most organisations today. The primary reasons are that it is efficient, cost-effective and in a highly-connected environment, works very well. The thinking is that you shouldn't pay for storage space when you don't need it. The big weakness with JIT logistics is that it ignores the threat of unexpected disruption.

Just-in-Case (JIC) Logistics is more expensive but can handle disruption better because a level of redundancy is built into the system. This might cost more, and it may lose some efficiency (e.g. doublehanding stock), but JIC logistics handles unexpected disruption better than JIT logistics. [18]

Again, in reality, organisations will use a mixture of JIT and JIC logistics to fulfil their needs.

4.3.4 Community Continuity

The project's approach to managing risk, for all types of disruption including supply chain disruption, is community continuity. This addresses all elements of the supply chain in a systemic way.

Figure 19: Community Continuity: A System to Build Resilience

The focus on community improves the ability of Cloncurry to supply labour.

The focus on organisational resilience improves the ability of organisations to provide goods and services.

The focus on infrastructure resilience improves the physical capabilities of the supply chain.

4.4 The importance of logistics for Cloncurry

Cloncurry is a source, destination and waypoint for many different logistics and supply chains. This plays a big part in the lives and livelihoods of the people of Cloncurry, and forms a large part of Cloncurry Shire's prosperity.

The key link between Cloncurry's logistics chains and prosperity is reinforced by the two largest industries (by number of jobs) within Cloncurry: mining and agriculture. Both are heavily reliant upon the movement of product and specialised logistics is a large part of both industries, with Transport, Postal and Warehousing identified as the third largest industry in Cloncurry Shire, by number of jobs.[19]

4.4.1 Cloncurry is a Source, Destination, and Key Route

Cloncurry is not simply a destination for goods and services supplied via key supply chains. Cloncurry is a source (e.g. mineral ores, beef) and is a key route for both National and State roads. Cloncurry is a transport hub that caters for the mining and agricultural sectors.

The Mount Isa - Townsville rail line is a key piece of infrastructure which plays a vital and important freight and transport role for mineral resources, and other goods and services for the Cloncurry Shire and its economy.

Cloncurry Airport plays an important role in aviation within the North West Queensland Region and caters for the needs of residents and workers alike.

The figure below shows Cloncurry's key position as a Key Freight Route for Road and Rail.

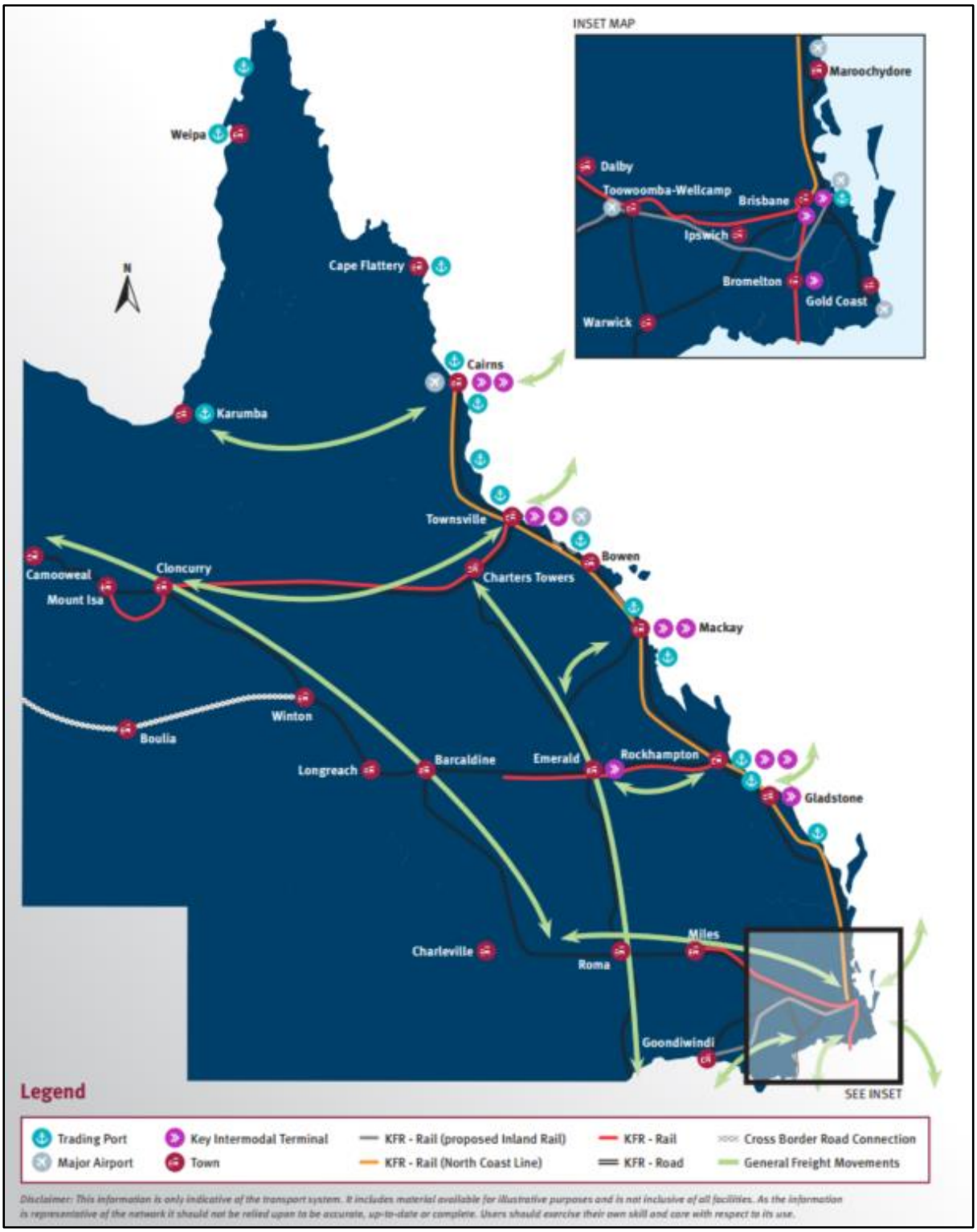


Figure 20: Cloncurry is a Key Freight Route (KFR) for both road and rail [20]

4.5 Logistics Modes

There are seven main types of transport mode in logistics, and Cloncurry Shire is served by, or plays a part in, all of them in some way. While Cloncurry relies on all of them, some play a much greater role in the Cloncurry's logistics chains than others.

The type of goods or service that travels via the logistics mode can also be key in determining the criticality or priority placed upon a particular mode. For example, Cloncurry has drinking water delivered by pipeline, and because human life relies on a supply of drinking water, the priority of this mode of transport is elevated for Cloncurry.

In general, four traits are used to determine which mode of transportation is used: volume, speed, distance and cost. While each organisation responsible for delivery of a product or a service has their own value for these traits, most organisations try to maximise volume and speed, while minimising distance and cost.[21]

When looking to change modes as a contingency, organisations generally look for the next least-cost option to minimise the cost of the contingency measures. The modes are listed below, in least to most-cost transport option.

4.5.1 Network

Network transport is operationally inexpensive, although can be capital cost intensive to establish.

Cloncurry is served by several networks, including an electricity network through Energy Queensland / Ergon Energy, and communications and data from a number of providers (NBNCo, Telstra, Optus satellite). Both electricity and communications are discussed under Goods and Services below.

4.5.2 Pipelines

Pipeline transport is generally the cheapest transport mode for liquid, gas, or semi-solid goods.

Within Cloncurry Shire, significant pipelines exist for water and gas. Both are part of significant potable water and electricity networks that Cloncurry relies upon, discussed under Goods and Services below.

4.5.3 Rail

Rail transport is generally more cost effective for bulk freight, such as mineral ore, than road transport.

The rail network within the Cloncurry region plays a vital role in the freight transport of mineral commodities and goods from the region's mines, and the transport of general freight. The rail network is a significant factor in the economic prosperity of the region and also provides passenger transport.

Figure 21 below shows the vital link the Mt Isa – Townsville Rail Line plays in linking the North West Minerals Province with east coast ports and processing centres.

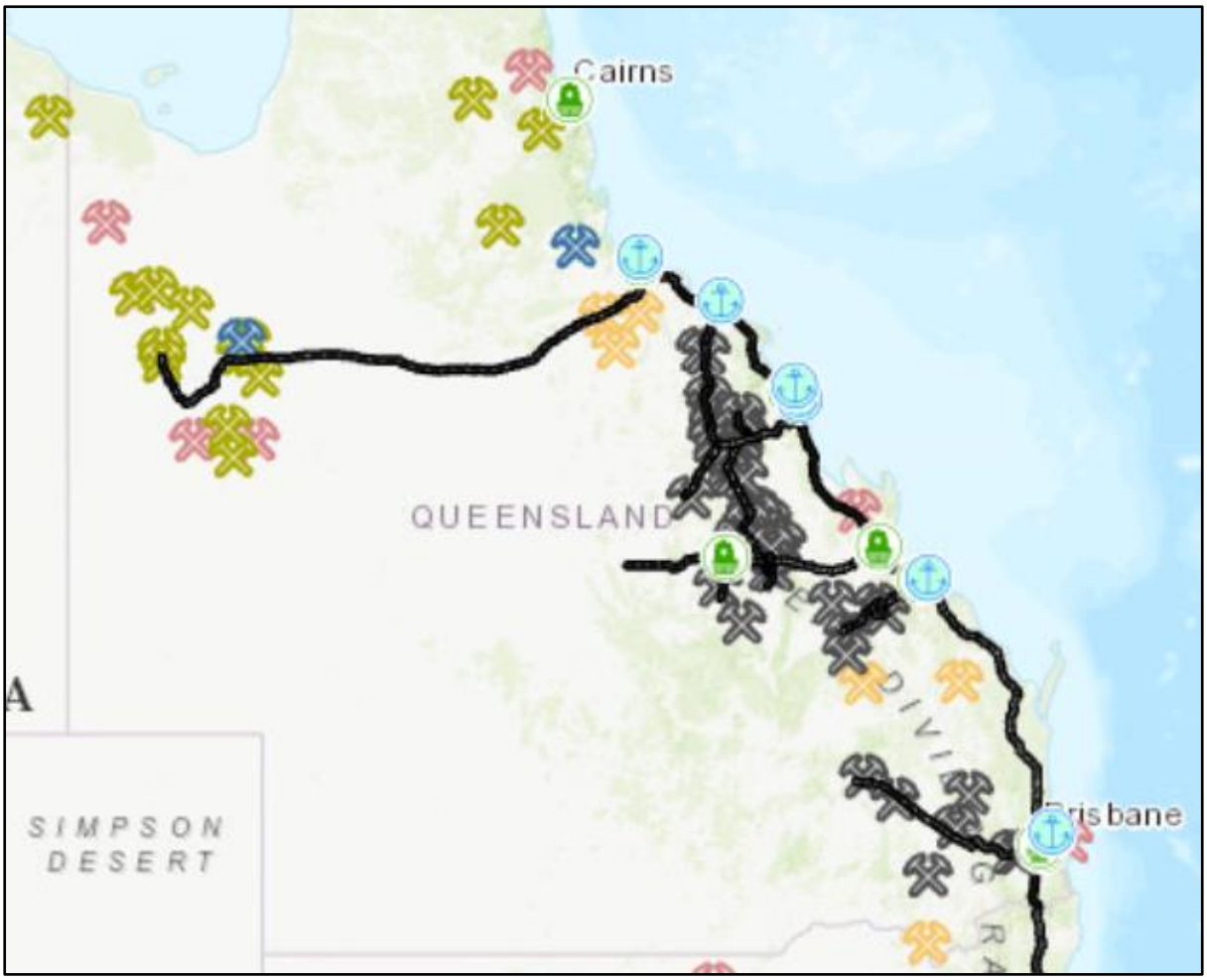


Figure 21: National Key Freight Routes Map – Rail [22]

Queensland Rail (QR) owns the rail line stretching over 1,000 kilometres from Stuart to Mount Isa, including the Phosphate Hill Branch Line.

The 2019 floods resulted in major disruption to this rail line, with damage across 307 km of track and extreme erosion at 204 sites, including 40km of major track washouts, 20 km of track scouring and 16 rail bridges damaged. [23]

Figure 22: 2019 Floods were a significant disruption to Cloncurry's rail (QR Supplied)

Mines within the region overcame the disruption by stockpiling or transporting commodities by road, and other freight was transported via road once the roads were restored.

The importance of rail to Cloncurry is underscored by the 2020 freight statistics. The Mount Isa – Townsville line carried more than five million tonnes of product for freight operators, including mineral concentrates, mining inputs, acid, fertiliser, fuel and livestock.

Queensland Rail has committed $50m over five years from 2020-21 for three projects, including flood resilience works, replacement of ageing rail equipment (sleepers and ballast), and the exploration of double stacked containers to improve the efficiency of intermodal trains (information supplied by QR).

4.5.4 Road (including Stock Routes)

Cloncurry is positioned at the intersection of several major National and State roads, including the Flinders Highway, Landsborough Highway, Barkly Highway, Burke Developmental Road, and Dajarra Road.

It is a key freight corridor, as shown in the National Key Freight Routes Map below, which also highlights the routes that connect the North West Queensland Mineral Province with the transport networks of the east coast.

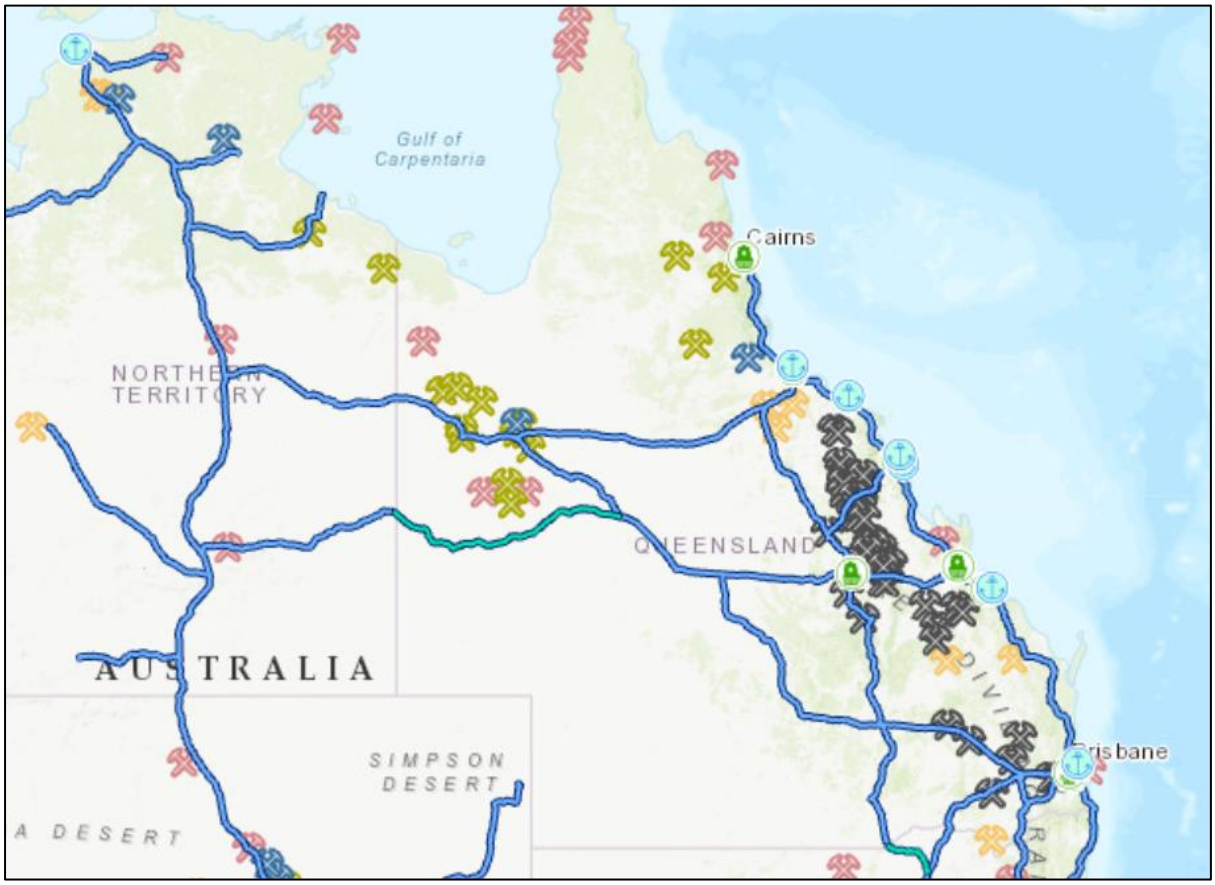


Figure 23: National Key Freight Routes Map – Roads[24]

The Landsborough Highway that runs through the Shire is the primary road connection between Brisbane and Darwin. This results in a significant amount of road traffic travelling through the region on a regular basis.

The major tourist route, the Overlander's Way, runs from Townsville to Tennant Creek, and passes through Cloncurry along the Flinders Highway. These major road transport connections also play an essential strategic role in connecting the Mt Isa region and providing for transportation of extractive mineral outputs from the numerous mines in the Shire, with the coastal cities of Townsville and Rockhampton, and the Port of Townsville, as well as connecting tourists to the region. [25]

4.5.4.1 Stock Routes

Stock routes provide important connections for stock travelling on foot within Cloncurry Shire.

The viability of stock routes is reliant on the protection of the integrity of livestock transport infrastructure including stock routes, cattle tick control facilities, rest stops and spelling areas that are necessary for the movement of livestock within and outside of the Cloncurry Shire Council area.

Approximately 50% of stock routes within Cloncurry Shire are council maintained and 50% are privately maintained.

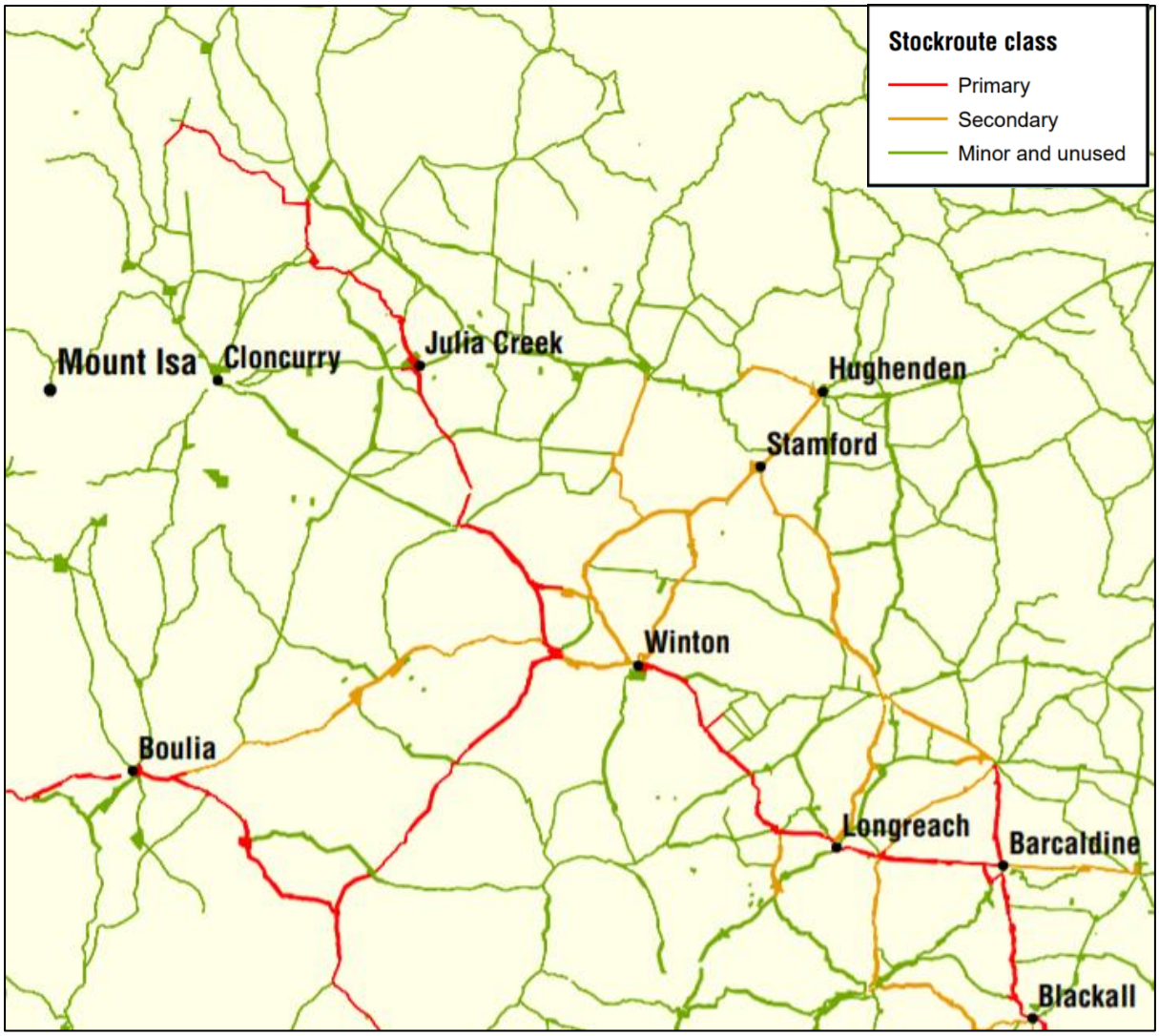


Figure 24: Queensland Stock Route Network (Extract) [26]

4.5.5 Maritime / Ports

Although one of the least expensive modes of logistics, especially over very significant distances, maritime transport is not considered in-depth within this report.

Cloncurry's logistics chains are tightly coupled with the Port of Townsville, and to a lesser extent with ports in Brisbane and Darwin. Although the couplings are close, the focus on "last mile" of the supply chain to increase the efficacy and applicability of this project's recommendations, means that the focus of this report is not on maritime transport or sea-borne trade.

Impacts to ports, particularly Townsville Port, could have supply chain consequences within and around Cloncurry Shire.

Mining organisations within the region are actively managing their supply chains with Townsville Port.

4.5.6 Air

Air transport to, from and within Cloncurry Shire is generally restricted to passenger transport, with some minor freight.

Cloncurry Airport (CNJ) has regular passenger services from multiple airlines.

During the 2019 floods, perishable foods were flown in to Cloncurry Airport and then out to stations by small aircraft and helicopter. The army also used the airport as a staging area for their helicopters for fodder drops, with the fodder stored at Ernest Henry Mining.

The Cloncurry airport did not completely close during the 2019 floods; however, flooding does cause issues at the airport, including runway restrictions, or closures until floodwaters recede.

Councils owns two airstrips at Dajarra and Kajabbi, and there are many private airstrips within the shire. The project mapped these airstrips, and they are recorded within the Guardian IMS and as a project output at the Appendix: Maps

4.5.7 Intermodal

Intermodal transport refers to commodities, goods or services that are transported via multiple freight modes. It can also refer to the facilities that transfer goods from one transport mode to another.

Several intermodal freight facilities exist within Cloncurry Shire, including at mine sites for loading and unloading trains, for general freight in Cloncurry, and a large mining intermodal facility just outside Cloncurry Shire as an interface between road and rail transport.

A recommendation within the report at Appendix: Companion Report: Recommendations for Improving Community Continuity from the Building Resilient Logistics Chains Project, is the investigation and potential support of an intermodal freight facility within Cloncurry Shire. This would certainly help community continuity should Cloncurry be affected by transport network outages around the Shire in the future.

4.6 Good and Services (Commodities)

All communities need goods and services to support lives and livelihoods. The key link between goods and services and wellbeing is described in Community Wellbeing, the Economy, and Supply Chains.

Sometimes the word commodities is used as a replacement for goods and services, but commodities tends to refer to unfinished goods that feed into a supply chain, such as mineral ore.

The following descriptions identify critical goods or services that support Cloncurry's lives and livelihoods. Wherever possible, the following items are identified for each good or service:

- Primary method of supply
- Alternative methods of supply (including existing contingencies, activated for disruption)
- Existing or potential methods for improving supply chain resilience
- Links to recommendations in the Companion Report on Project Recommendations

A detailed criticality assessment comparing each good or service hasn't been completed. However, the goods or services are listed broadly in order of criticality for supporting life, then livelihoods, then property, then the environment.

4.6.1 Medical Care

This good or service is prioritised by emergency or urgent medical care followed by normal medical care. Emergency medical care is defined as medical care that is required to avert serious illness or death.

4.6.1.1 Primary Method of Supply

Primary supply of medical care varies on location within Cloncurry Shire:

- Close to Cloncurry Town
  - Queensland Ambulance Service
  - Cloncurry Hospital

- Further from Cloncurry Town
  - Royal Flying Doctor Service (RFDS) Kit
  - Telehealth (e.g. RFDS phone call)
  - Royal Flying Doctor Service air transport

For non-emergency care a General Practice (GP) clinic is located within town. Many of the doctors who work at the GP clinic also work at Cloncurry Hospital.

4.6.1.2 Contingency Methods of Supply

Contingency supply progresses through the lists outlined above. Further transport within the Queensland Health system (e.g., from Cloncurry to Mt Isa or to Townsville) may need to occur. As with most transport, the speed required and cost are the determining factors in selecting the logistics mode. Contingencies effectively mean progressing through these modes.

As in many areas of rural Australia the Royal Flying Doctor Service (RFDS) provides emergency medical services. Most stations have an RFDS kit.

4.6.1.3 Methods for Improving Supply Chain Resilience

Queensland Health, Queensland Ambulance Service and RFDS have contingency methods for providing these services.

All health services supporting Cloncurry are complex businesses in their own right and should have their own business continuity plans.

4.6.1.4 Recommendations for Supply Chain Resilience (See Companion Report)

- OR-QH1: Review and update Cloncurry Hospital Business Continuity Plan (in progress)
- OR-QH 2: Review and update Cloncurry Hospital COVID-19 Plan (in progress)

4.6.2 Potable Water

Potable water is required to support life. Potable water provides significant support for livelihoods domestically and commercially.

4.6.2.1 Primary Method of Supply

Primary supply of potable water varies on location within Cloncurry Shire:

- Cloncurry Town
  - Raw water from three sources:
    - Cloncurry pipeline (sourced from Julius Dam)
    - Cloncurry River (harvesting, harvesting into dam, and river wells)
    - Chinaman Creek Dam
  - Treated water from one source:
    - Phillip St Water Treatment Plant (WTP)
  - Storage
    - Approximately 5 days storage capacity for 1500 connections regular usage
  - Reticulation
    - 50km of water mains
    - 1500 connections (residential and commercial)

- Further from Cloncurry Town
  - On property dams, tanks and bores
  - It is noted that non-potable bores are in place at Dajarra and Kajabbi but these have not been considered within this project

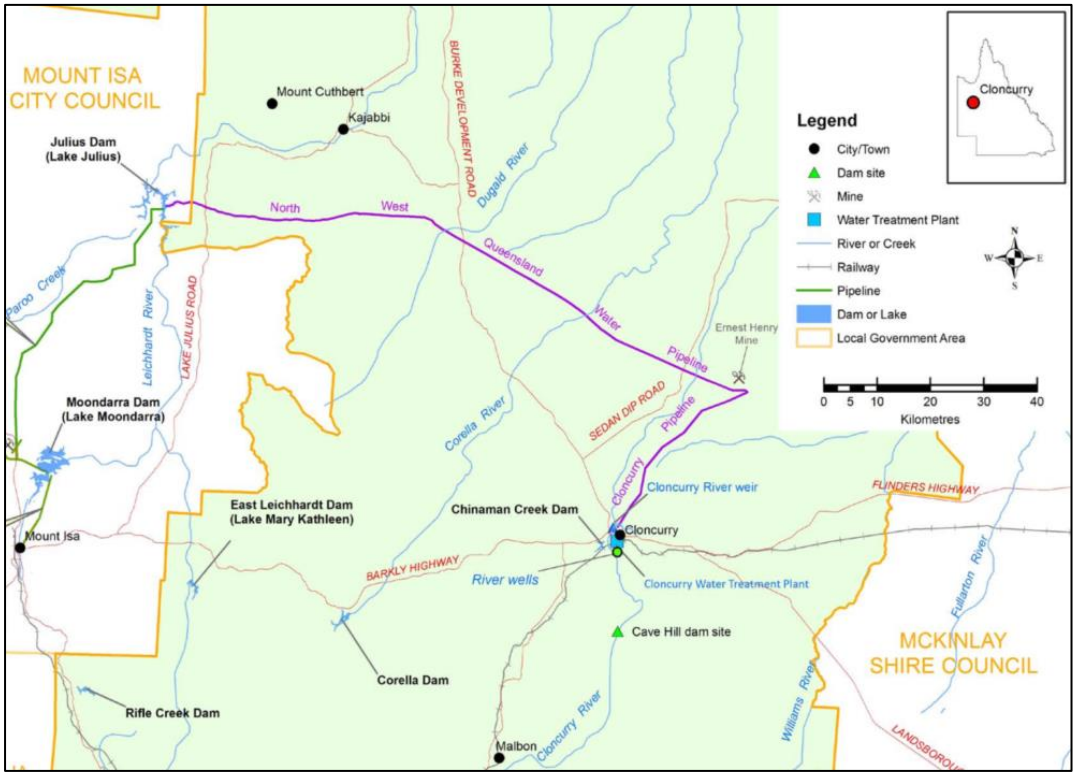


Figure 25: Location of Cloncurry Town's bulk water sources[27]

4.6.2.2 Contingency Methods of Supply

Contingency supply for raw water progresses through the list outlined above. Improved access to Chinaman Creek in wet weather would ensure water harvesting opportunities are maximised.

There is no contingency for the water treatment plant. Risk management and hazard reduction have been recommended. Treated water storage amounts to approximately 5 days town usage, which would allow most interruptions to be resolved, apart from extensive damage to WTP (e.g., plant damage from fire). The discussed option of treated wastewater for watering the racetrack would also help to protect the town treated water storages.

Within the water reticulation network, improved valve maintenance and operation would reduce outage size and possibly durations.

4.6.2.3 Methods for Improving Supply Chain Resilience

Treatment plant and treatment plant supplies (e.g. chemicals) are key to maintaining Cloncurry's drinking water reliability.

Improving supply chain resilience relies on focusing on single point of failure with hazard reduction for WTP, and stockpiling essential inputs to the treatment process. Supplier diversification and alternate routes for supply of essential inputs would also assist.

Improving interconnections to other critical infrastructure service (e.g., electricity for pumps, communications for remote operation of plant in emergency) would also assist in improving the supply chain for potable water.

4.6.2.4 Recommendations for Supply Chain Resilience (See Companion Report)

- IR-GP1: Hazard Reduction around Critical Infrastructure
- IR-GP2: Priority Infrastructure Plan
- IR-W1: Test Valves in Water Network
- IR-W2: Improved access to WTP during floods
- IR-W3: Improved access to Chinaman Creek water infrastructure

4.6.3 Wastewater

Wastewater services are very important for public health. Damage to a wastewater network and services can stop removal of sewage from household and public areas via the sewerage system.

4.6.3.1 Primary Method of Supply

Primary supply of wastewater services varies on location within Cloncurry Shire:

- Cloncurry Town or Dajarra
  - Sewerage system:
    - 1500 connections Cloncurry / 72 connection Dajarra
    - 30km of sewer mains Cloncurry / 3km of sewer mains Dajarra
    - Single Sewage Treatment Plant (STP) (both Cloncurry and Dajarra)
  - Treated water:
    - Cloncurry: currently discharged after treatment but investigations underway to re-use to turf racetrack.

- Further from Cloncurry Town
  - On property septic tanks and other types of standalone privately-owned systems

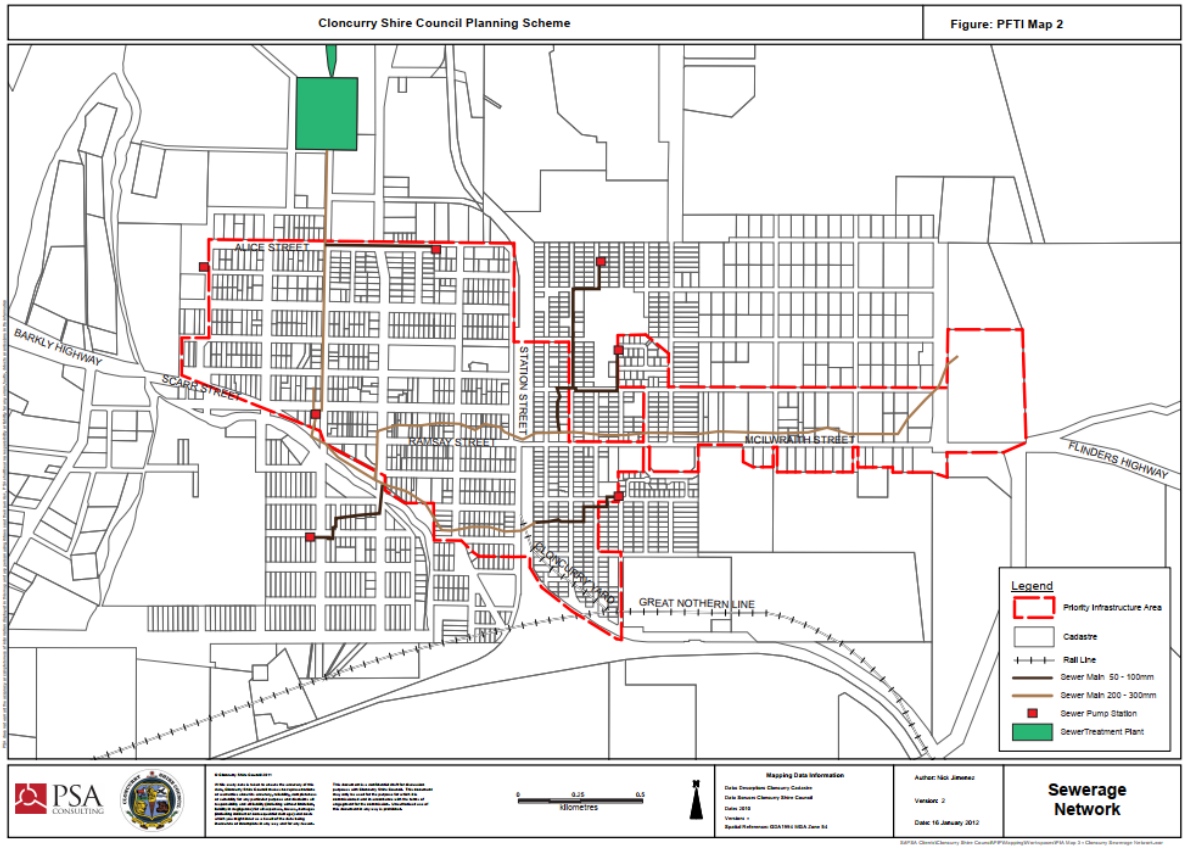


Figure 26: Cloncurry Sewerage Network [28]

4.6.3.2 Contingency Methods of Supply

Contingency methods of supply are based on likely duration of sewerage system outages.

- Cloncurry Town or Dajarra
  - Temporary Toilets – either internal chemical toilet or port-a-loo (very short-term)
  - Pit latrines (short-term generally on private property be able-bodied homeowners)[29]
  - Containerised sewerage treatment system (medium term / dependent on system damage)
  - Replacement sewerage network (long term)

- Further from Cloncurry Town
  - Repair to on property septic tanks and other types of standalone privately-owned systems
  - Pit latrines
  - Temporary Toilets – either internal chemical toilet or port-a-loo

Contingency supply for wastewater treatment progresses through the list outlined above.

4.6.3.3 Methods for Improving Supply Chain Resilience

Treatment plant and treatment plant supplies (e.g. chemicals) are key to maintaining Cloncurry's sewage treatment reliability.

Improving supply chain resilience relies on focusing on potential points of failure with hazard reduction for STP, ensuring access and reliability of STP (e.g. improving wet weather access to ponds and dredging to ensure pond capacity).

A sewer pump audit and performance assessment would be useful to identify key pumps that may need protection from outages (e.g. generator cutover switches or similar).

Reducing the amount of stormwater into sewerage system is a challenge for every system, with most incorrect connections on private property.

Stockpiling essential inputs to the treatment process will provide protection against supply chain disruption. Supplier diversification and alternate routes for supply of essential inputs would also assist.

Improving interconnections to other critical infrastructure service (e.g., electricity for pumps, communications for remote operation of plant in emergency) would also assist in improving the supply chain for wastewater.

4.6.3.4 Recommendations for Supply Chain Resilience (See Companion Report)

- IR-GP1: Hazard Reduction around Critical Infrastructure
- IR-GP2: Priority Infrastructure Plan
- IR-WW1: STP Maintenance and Upgrade
- IR-WW2: Sewer pump station performance / capability assessment
- IR-WW3: Audit of stormwater plumbed into sewer

4.6.4 Stormwater

Stormwater services are important for reducing the impact of natural hazards on the operation of the community. A less-than-effective stormwater network can lead to community disruption, property damage, and loss of life in the most extreme circumstances. Stormwater networks are often linked to receiving waters, natural waterways that assist the flow of storm and surface water away from inhabited areas.

4.6.4.1 Primary Method of Supply

Cloncurry Town has a stormwater network for the dispersal of storm water to receiving waters. The stormwater network is managed by Cloncurry Shire Council:

- Cloncurry Town
  - Stormwater network in specific areas of Cloncurry Town. Recent upgrades to include eastern side of town around Cloncurry Hospital.

- Further from Cloncurry Town
  - Private landowners may install spoon drains or swales on their own land for directing stormwater to receiving waters.

4.6.4.2 Contingency Methods of Supply

Contingency methods of supply are based on likelihood of stormwater inundation and damage to property or infrastructure.

- Cloncurry Town
  - Temporary sandbag walls can assist with diversion of water from critical infrastructure and private property
  - Temporary water diversions/drainage can be created by earthmoving equipment

- Further from Cloncurry Town
  - Private landowners may use sandbags and temporary water diversions

4.6.4.3 Methods for Improving Supply Chain Resilience

Infrastructure maintenance, infrastructure investment, and community education are the best levers for improving stormwater network reliability.

4.6.4.4 Recommendations for Supply Chain Resilience (See Companion Report)

- IR-SW1: Stormwater installations and upgrades

- IR-SW2: Stormwater network pre-wet-season maintenance

4.6.5 Food and Beverages

Food and beverages are required to support life. Both provide significant support for livelihoods within Cloncurry Shire.

For the purpose of this report beverages include anything other than potable water delivered through the water infrastructure network. It includes bottled water and alcoholic beverages such as beer.

4.6.5.1 Primary Method of Supply

Primary supply of supply is through private logistics chains, with mostly retail shops (e.g. grocery, restaurant) as consumer end point of supply, although mining camps and large stations are a key destination within Cloncurry for a considerable quantity of food and beverages.

Each end point has their own chosen upstream supply based on their own requirements. The key enabler is the road network and logistics companies to provide transport via road.

There are two supermarkets in Cloncurry Town and a number of restaurants and hotels at various locations around the Shire.

- Primary Supply
  - Road (detailed roads map is available at Road Network: Cloncurry and Surrounds):
    - Flinders Highway from Townsville
    - Landsborough Highway from Brisbane
    - State and Council roads provide supply to locations outside Cloncurry Town (e.g., Dajarra, Four Ways, mine sites, stations)
  - Storage
    - Varies by supplier, but supermarkets generally have 2 – several weeks of storage of non-perishable foodstuff and beverages
    - Prior to wet season, many stations and mine sites stock as much non-perishable foodstuffs and beverages as possible (sometimes up to 3 months' worth)

4.6.5.2 Contingency Methods of Supply

Contingency supply progresses from road transport through the logistics modes outlined above. During the 2019 floods, fresh food and beverages (including vegetables, meat and milk) were flown in by meeting trucks at the closest possible airstrip (See Food Works case study in Appendix: Case Studies).

4.6.5.3 Methods for Improving Supply Chain Resilience

Improving supply chain resilience relies on the standard logistics mitigations of stockpiling essential items. Supplier diversification and alternate routes for supply of essential items are definitely required, and it is suggested the private retail end points test their alternate suppliers and supply routes at least once a year.

Increasing awareness of State Government reimbursement for resupply transport may help engage food and beverage suppliers in to further preparedness activity.

Improving interconnections to other critical infrastructure service (e.g., electricity for refrigeration, links to other logistics modes) would also assist in improving the supply chain.

4.6.5.4 Recommendations for Supply Chain Resilience (See Companion Report)

- CR-DP2: Expand existing pre-season communication networks (communication between LDMG and private suppliers of food and beverages)
- CR-CC1: Suppliers of food and beverage become familiar with community dashboard to assist decision making
- OR-LD16: Resupply / Logistics workshop for local suppliers

- OR-LB1: Business reporting on wet season preparedness
- OR-LB2: Business continuity training for local businesses
- OR-LB3: Modern merchant payment training
- OR-SC1: Supply chain resilience training / meetings for local organisations
- OR-SC2: Cold storage at intermodal transport hubs

4.6.6 Electricity

Cloncurry is connected to the North West Power System for electricity supply.

Since the year 2000, the primary fuel for this power system is gas. Electricity fuel supply chain is covered separately under the report section on gas.

To adequately describe the electricity supply chain, this section has been separated into generation, transmission and distribution sections, which reflect the three main components of the supply chain. Generation describes the plant where the electricity is generated, transmission is the movement of electricity long distances at high voltages (above 66,000 volts or 66kV), and distribution is the movement of electricity for generally shorted distances at 11,000 volts or the 240 volts used domestically. Cloncurry Shire has an extensive Single-Wire Earth Return (SWER) network for distribution to properties and more isolated locations. This is a less-expensive distribution option. However, can also be less reliable.

The majority of supply chain disruption (usually over 90%) in most electricity systems occurs in the distribution section of the chain, which follows the "last mile" approach to supply chain assessment and improvement recommendations in this report.

Electricity is important for the service it provides (light, temperature control, refrigeration etc.), but also as key enabler for many other services including water, food and beverage, medical care, transport etc. Loss of electricity is a significant disruption to most operations within Cloncurry Shire and most towns.

4.6.6.1 Generation

The five electricity generation plants in the North West Power System are listed in the table below. The primary generation sources for electricity for Cloncurry are the power stations owned by Diamantina Power Station, which include Diamantina and Leichhardt, both located in Mt Isa. Xstrata (also known as X41) is primarily to service the Mt Isa Mines site, but is also connected to the grid for export into the power system. Cannington and Phosphate Hill are not grid connected and provide electricity to their respective mine sites, and also Osborne mine site.

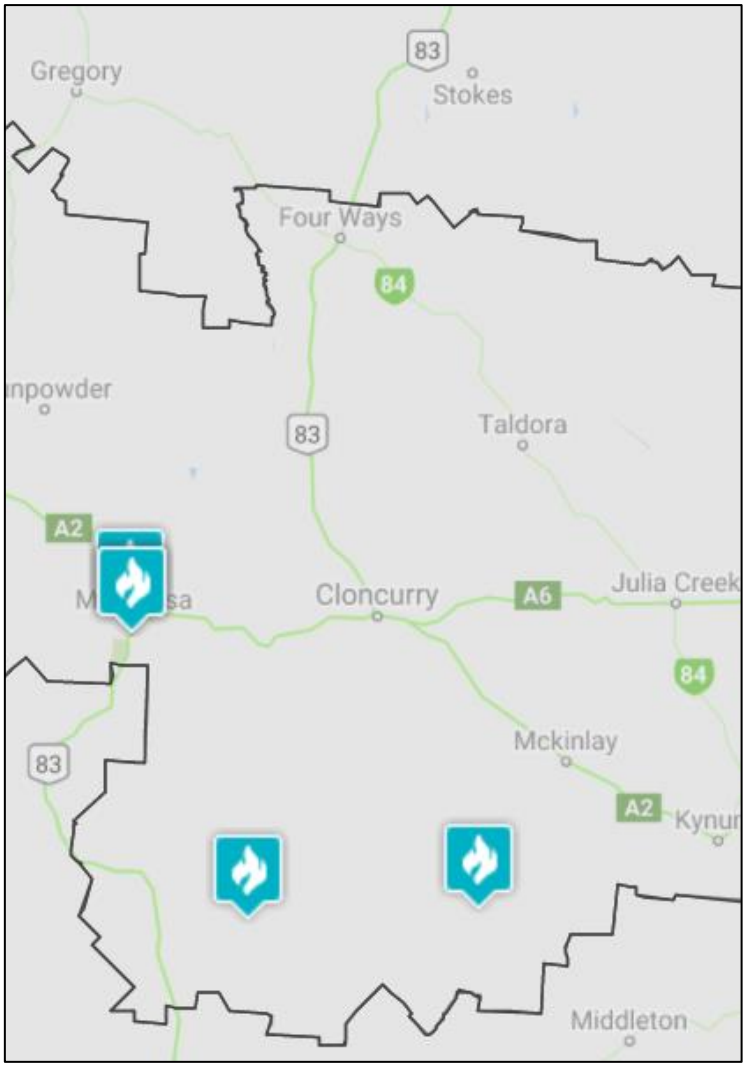


Figure 27: Extract from Power Plants Map of Queensland[30]

Table 5: Power Plants in and around Cloncurry Shire[31]

Name	Fuel Type	Owner	Capacity (MW)	LGA
Diamantina	Gas	Diamantina Power Station Pty Ltd	240	Mount Isa City
Leichhardt	Gas	Diamantina Power Station Pty Ltd	65	Mount Isa City
Xstrata	Gas	Mount Isa Mines	65	Mount Isa City
Phosphate Hill	Gas	Southern Cross Fertilisers	41.35	Cloncurry Shire
Cannington	Gas	Energy Developments Limited	35	McKinlay Shire

Generators outside Cloncurry Shire listed due to supporting infrastructure existing within Cloncurry Shire (e.g., Transmission and distribution networks from the first three generators, gas pipelines from the final two generators).

4.6.6.2 Transmission

Cloncurry is serviced by two main transmission routes.

Chumvale substation, located approximately 8km east of Cloncurry Town, has two incoming feeds. One at 220kV (from Mica Creek Substation in Mt Isa) and an alternate feed at 66kV (From Duchess Road Substation in Mt Isa). The transmission network to Cloncurry is 66kV to Cloncurry and Cloncurry North Substations.

Ergon Energy has identified a need for reliability and capacity improvements for the secondary 66kV feed through to Cloncurry, in the case of an outage to the 220kV transformer at Chumvale substation. A project has been identified to improve the reliability and capacity of the 66kV feed so that it can be used in the event of an outage to the network normal 220kV supply route. [32] It is recommended that Cloncurry Shire Council support this project.

Ernest Henry Mining (220kV) and Dugald River Mine (132kV) are also supplied via Chumvale substation.

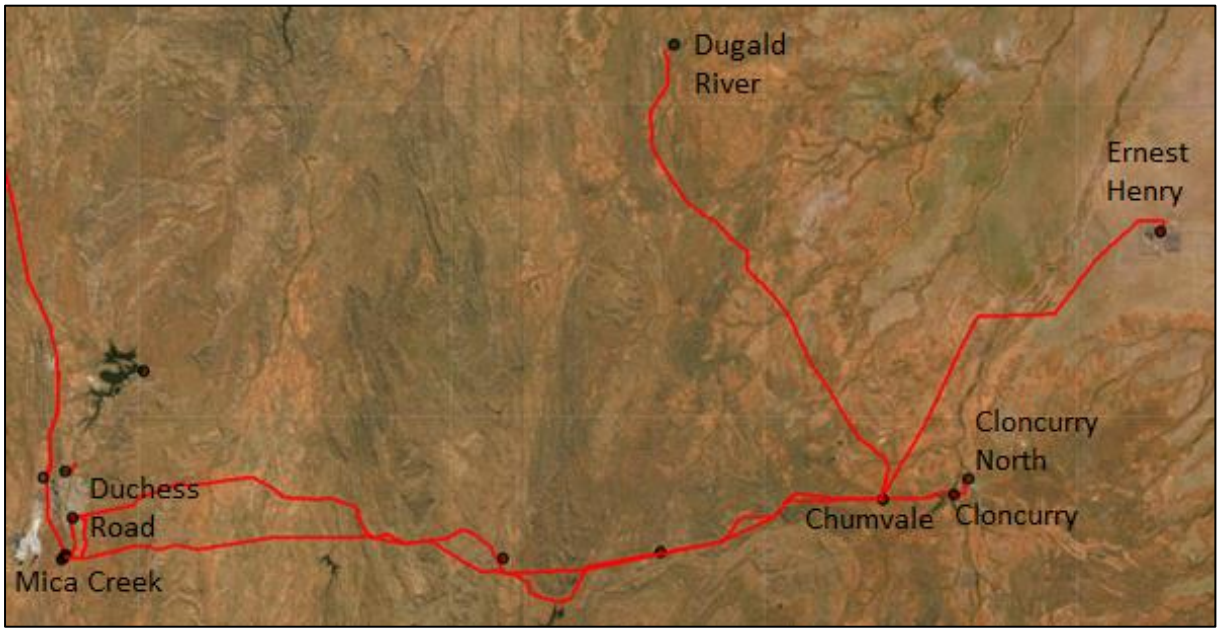


Figure 28: Transmission Network Servicing Cloncurry

4.6.6.3 Distribution

Electricity distribution within Cloncurry Town is at 11,000 volts (11kV). The distribution network extends to a few kilometres around town, just north of airport, just east of the hospital, south along Roxmere Road, and just west of the Cloncurry River.

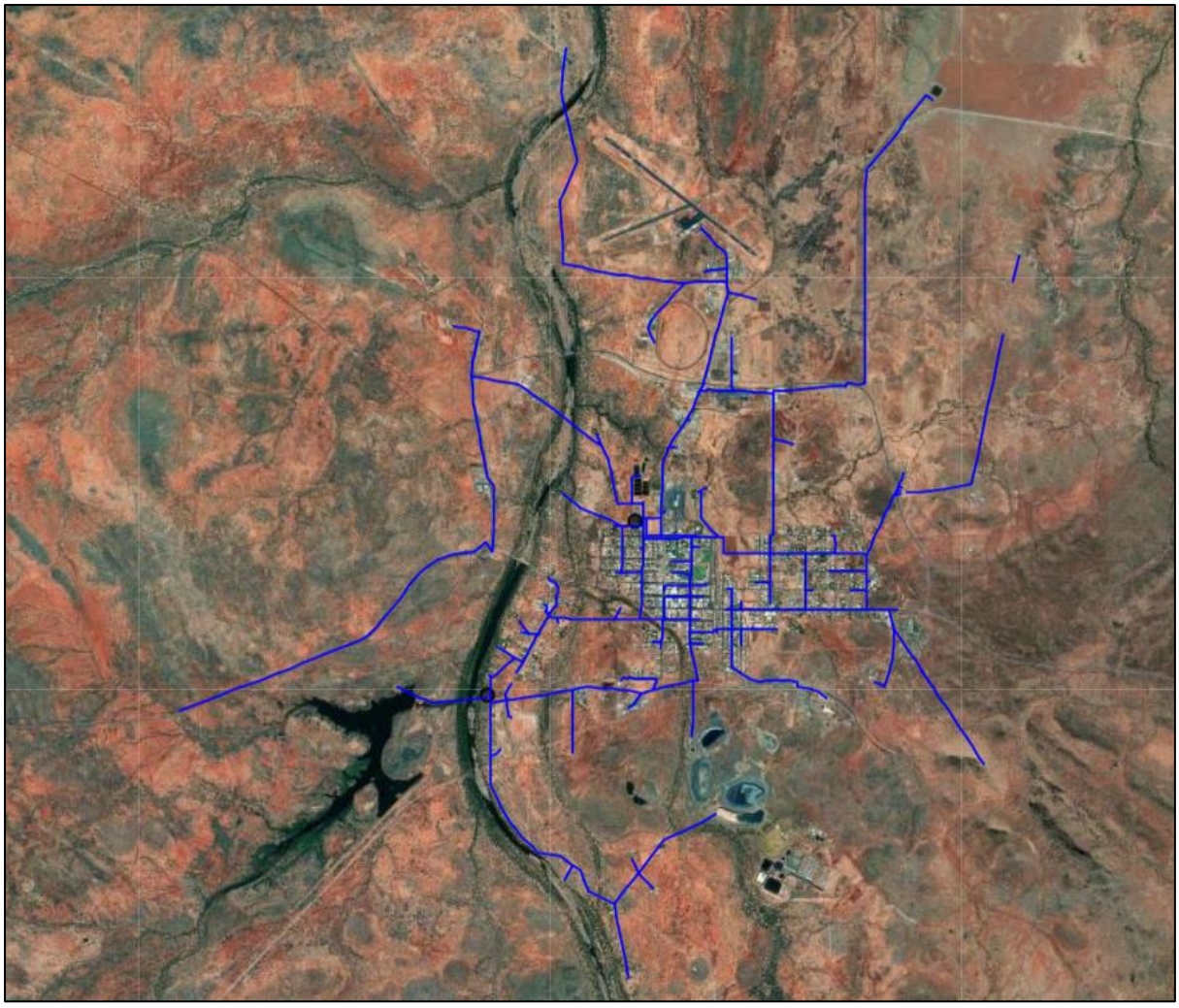


Figure 29: 11kV distribution network around Cloncurry Town

Supply is transformed from 11kV to 240v at many places throughout the network via pole mount and ground mount transformers into the Low Voltage (LV) network.

4.6.6.3.1 Low Voltage (LV) Network

There is a large LV (240V) network in Cloncurry Town, and much smaller LV networks in Dajarra and Kajabbi.

LV networks are generally lower to the ground and more susceptible to damage and outages (e.g., wind storms, severe thunderstorms).

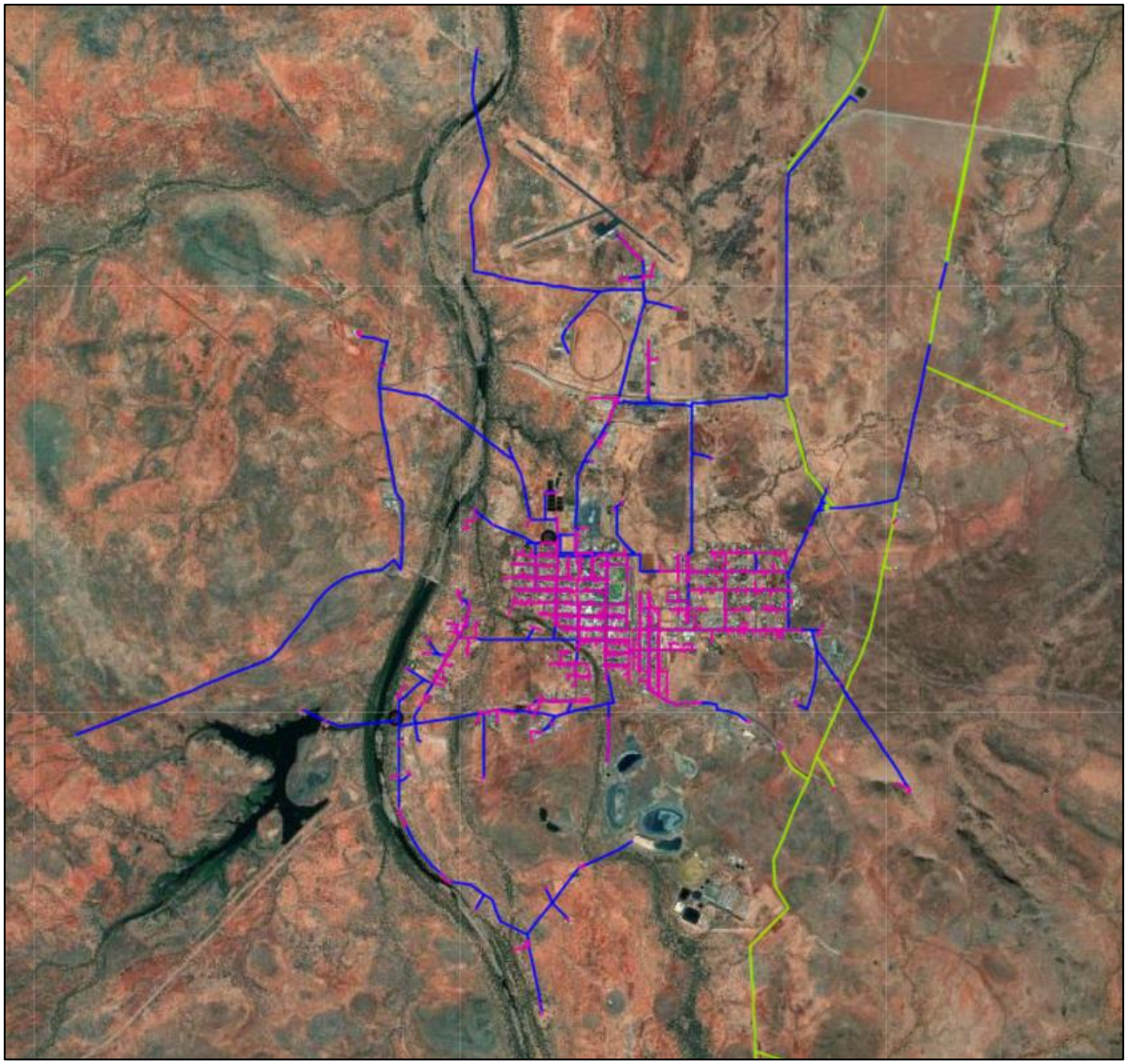


Figure 30: LV Distribution Network (pink lines) around Cloncurry Town

Figure 31: LV Distribution network (pink lines) around Dajarra (left) and Kajabbi (right)

4.6.6.4 SWER

Cloncurry Shire has an extensive Single-Wire Earth Return (SWER) network for distribution to properties and more isolated locations. This is a less-expensive distribution option but can also be less reliable.

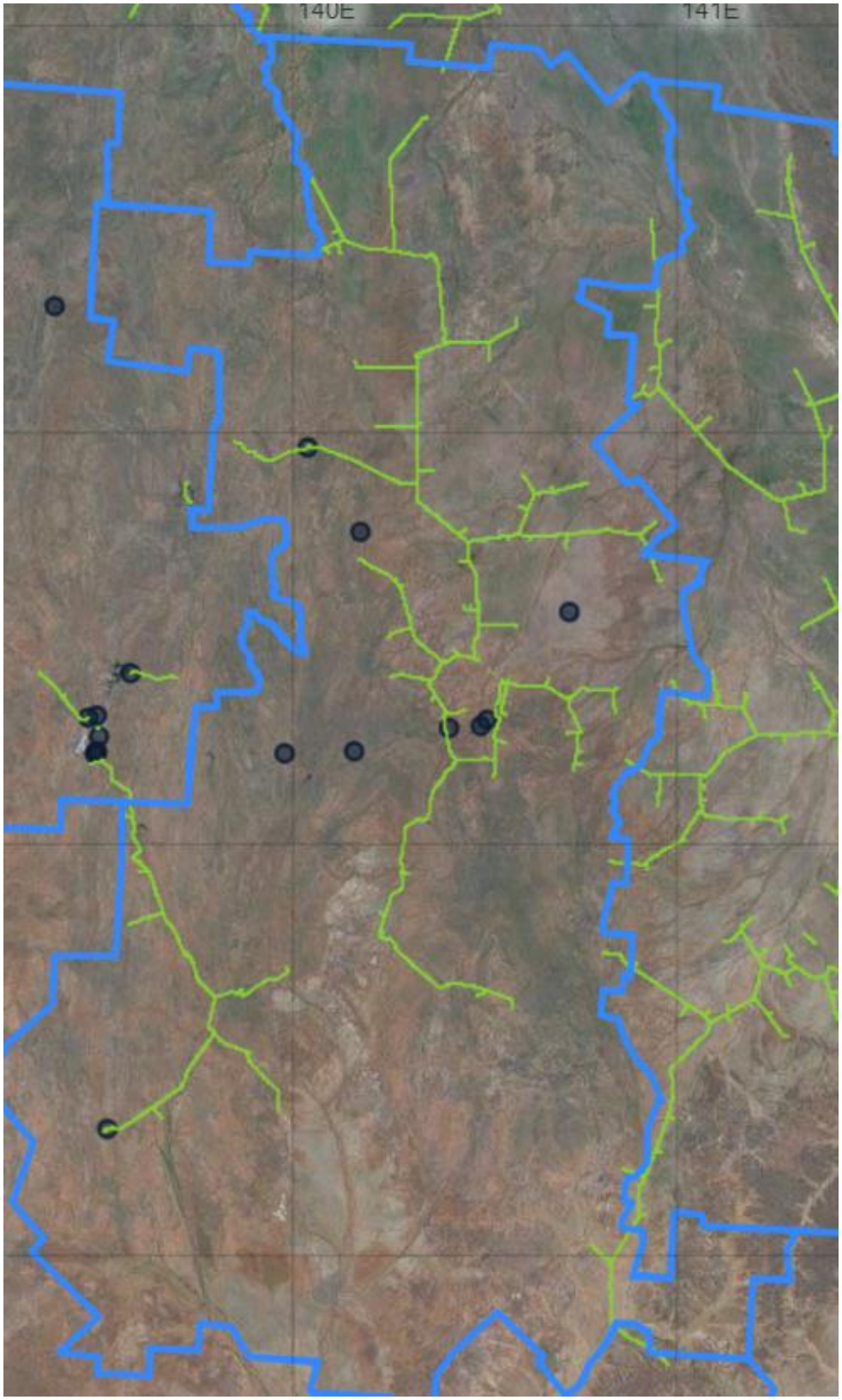


Figure 32: Cloncurry Shire's extensive SWER electricity distribution network

4.6.6.5 Contingency Methods of Supply

The extensive physical footprint of the Cloncurry Shre SWER network means it is very vulnerable to physical hazards, such as extreme wind, servere thunderstorms, or flooding. and most electricity users serviced by SWER lines are likely to have private diesel or petrol generation.

Dajarra has backup diesel generation owned and operated by Ergon Energy.

Key facilities within the 11kV distribution area of Cloncurry Town have generators, including Cloncurry Shire Council assets such as the main offices and the Water Treatment Plant. Some home users within Cloncurry are likely to have generator cutover switches in their switchboards, allowing them to supply their house via portable liquid fuel generator. With the right inverter and a battery, home users with solar panels may be able to continue electricity supply to their house during outages.

4.6.6.6 Methods for Improving Supply Chain Resilience

Although project participants reported many electricity outages within Cloncurry Shire (Generally increasing in frequency with distance from Cloncurry Town) generation is generally quite reliable in the North West Power System, as is transmission.

Like most power systems, the majority of lengthier outages occur in the distribution system, which is longer and more extensive and therefore has more assets exposed to natural hazards and disruption. In particular, SWER distribution is particularly vulnerable to outages, and most electricity users serviced by SWER lines are likely to have private diesel or petrol generation.

In general, electricity networks are seeing more generation at the edges of the network (e.g., solar panels on house roofs). These are referred to as Distributed Energy Resources (DERs). Provided Distributed Energy Resources are designed and installed properly, they can provide improvement in electricity security and reliability by locating the electricity production closer to the load (how the electricity is used), thereby eliminating some of the natural hazard risk by reducing the geographic footprint of the risk, and reducing vulnerability of long electricity lines, particularly SWER. Cloncurry's position further west provides some assistance for peak loads on the east coast, while Cloncurry's ample solar resources are still available for solar generation, that could also be used to support local loads. Cloncurry has ample solar resource, and good wind resource, and should Copperstring go ahead, could position itself as a renewable energy zone. Community solar/batteries, or similar technologies could also assist Cloncurry with electricity network outages.

In other regional and remote parts of Australia, Stand Along Power Systems (SAPS) (which can be a mix of solar and battery or solar and diesel generation) are becoming the preferred option over electricity network upgrade for supplying power to regional and remote locations.

Electricity usage is a modern need. With likely increases in heat and heatwaves, electricity for cooling could become more and more of a necessity to assist health outcomes. New loads such as electric-powered vehicles are also likely to grow electricity usage. Most other goods and services within Cloncurry rely on electricity to operate (e.g. health care, water, sewerage, liquid fuels, food and beverage etc.). Reliable and Secure electricity is a challenge to be prioritised for Cloncurry Shire.

4.6.6.7 Recommendations for Supply Chain Resilience (See Companion Report)

- IR-GP1: Hazard Reduction around Critical Infrastructure
- IR-GP2: Priority Infrastructure Plan (supply to Ergon to aid restoration priority planning)
- IR-R5: Electric vehicle charging infrastructure
- IR-EN1: Cloncurry as a Renewable Energy Zone
- IR-EN2L Distributed energy and microgrids for Cloncurry towns
- IR-EN3: Copperstring 2.0
- IR-EN4: Targeted standalone power systems (SAPS)

4.6.7 Gas

Gas is important to Cloncurry as the primary fuel to generate electricity and electricity supplies many services and support many goods and services required for Cloncurry Shire's community continuity.

4.6.7.1 Primary Method of Supply

Since the commissioning of the Northern Gas Pipeline in 2019, which connects gas plants in Darwin with Mt Isa, the North West Power System has had two supply chains for gas generation fuel. This is a boon to security and reliability for electricity generation in the system. In 2021, the majority of gas fuel for generation is supplied via the Northern Gas Pipeline, while flows through the Carpentaria Gas Pipeline (from Ballera in Central Queensland) mostly service the mining connections toward the Southern end of Cloncurry and McKinlay Shire. Gas can be sourced from either pipeline for any of the destination uses.

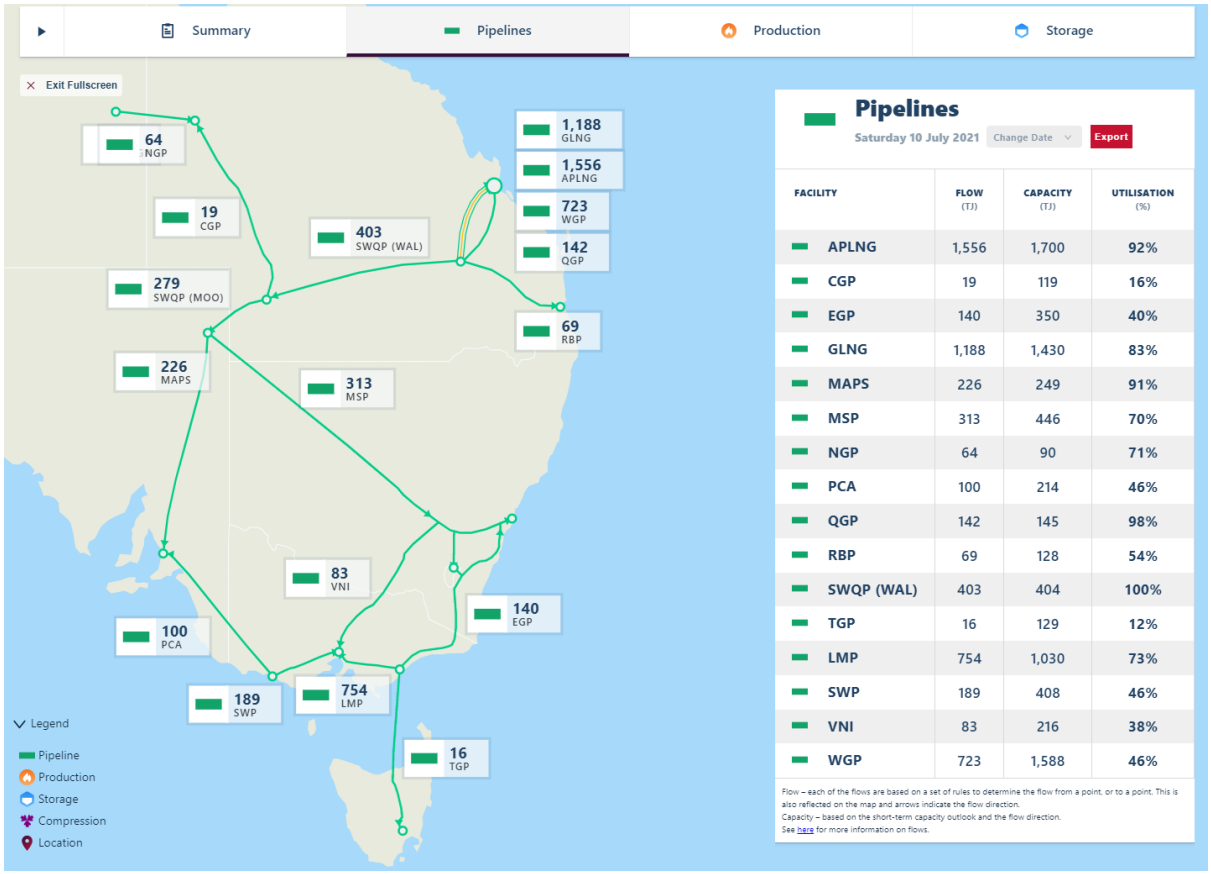


Figure 33: Australian Energy Market Operator (AEMO) Gas Bulletin Board[33]

Bottled gas is used in commercial and residential settings for cooking and heating. This is transported by freight.

4.6.7.2 Contingency Methods of Supply

Beyond transport by pipeline, gas is transported in its liquid state (usually by sea or road). Road-freighted gas supply may not be sufficient to provide supply at the necessary levels for generation within the North West Power System.

Redundant gas pipelines (Northern and Carpentaria) operate as contingencies for each other for gas servicing Cloncurry Shire.

4.6.7.3 Methods for Improving Supply Chain Resilience

Much like any transported commodity, the standard logistics options of stockpiling (larger gas holding facilities), Supplier diversification and alternate routes (as in the connection of the Northern Gas Pipeline) improve supply chain resilience for natural gas. These improvements are capital intensive and beyond the scope of this report.

4.6.7.4 Recommendations for Supply Chain Resilience (See Companion Report)

Improving supply chain resilience for gas supply to gas generators for Cloncurry's electricity supply is beyond the scope of this report.

Recommendations for improving electricity supply chain resilience, serve as recommendations to help the community continue operating, should gas supply be interrupted.

4.6.8 Communications (including Voice and Data Communications)

Communications is a key enabler to livelihoods, and sometimes life (e.g., 000 calls). Of all goods and services, both voice and data communications have seen a rapid rise in recent years in community expectations around reliability and availability.

The line between voice and data communications has been blurred, with voice being carried over traditional data channels, and mobile phones able to act as data communications hotspots. The reliance on data networks, and need for contingency methods of connection, is highlighted by several of Council's systems existing in the Cloud, including Guardian IMS and the Community Dashboard.

Additionally, communications networks rely on both physical and logical infrastructure to provide services. Routing of communication service may not directly reflect layout of physical infrastructure, as many types of communications will automatically try to use a contingency route to get messages or data to the destination.

4.6.8.1 Primary Method of Supply

Primary supply of communications varies on location within Cloncurry Shire, and type of communications or service required:

- National Broadband Network (Data Comms – see figure below)
  - Fixed Line (Fibre to the Node)
  - Satellite outside of Cloncurry Town

- Mobile Phone (Voice and Data Comms)
  - Several providers service the area. Telstra has the largest coverage within Cloncurry Shire, with a coverage map available in the Maps Appendix at Telstra 3G / 4G Coverage: Cloncurry and Surrounds.

- Radio Communications
  - There are many connected radio networks (UHF and others) within Cloncurry Shire. Some of these are owned by communications providers such as Telstra and Optus, some by Emergency Services (QAS, QFES), others by infrastructure providers such as Queensland Rail, Ergon Energy and Cloncurry Shire Council, and some are owned by mining and agricultural companies. The figure below highlights the extensive number of UHF installations registered with ACMA for Cloncurry Shire and Cloncurry Town.
  - One way voice communications (FM/AM radio) can be extremely useful during emergencies, notably ABC Emergency Radio.

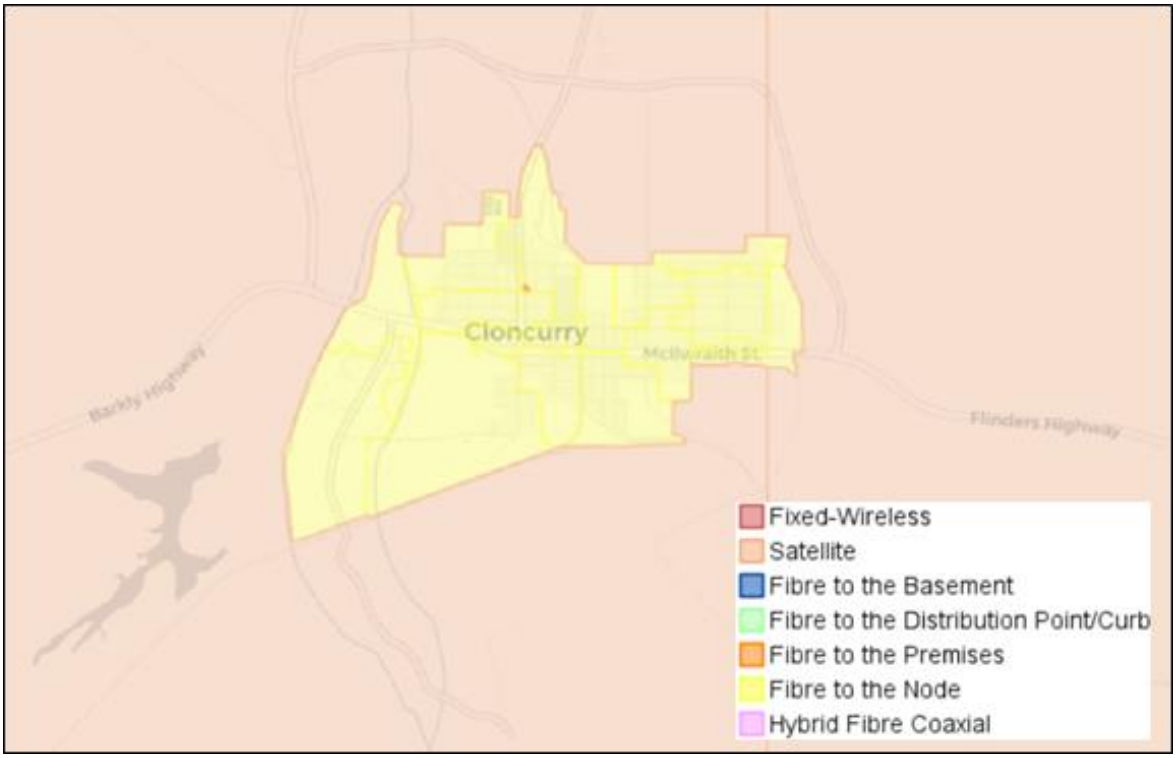


Figure 34: National Broadband Network (NBN) Connection by Technology Type[34]

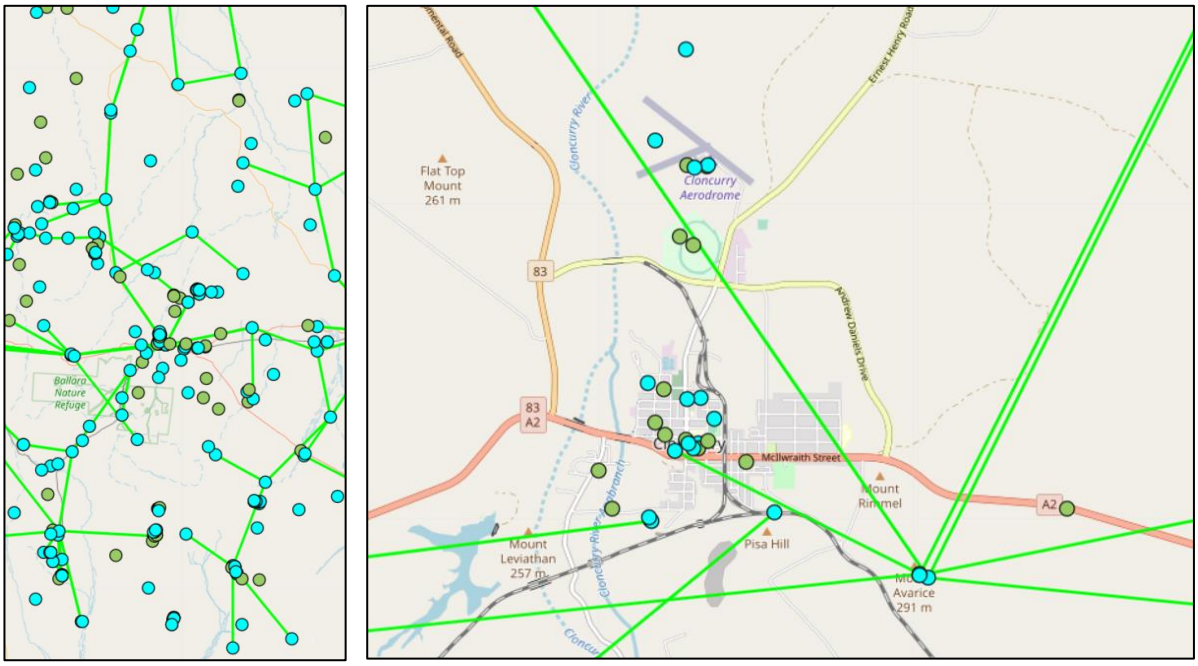


Figure 35: Cloncurry Shire's Extensive Radio Network (left) and Cloncurry Town (right) [35]

4.6.8.2 Contingency Methods of Supply

Contingency supply of communications

- Satellite Connection
  - Voice satellite connection
  - Data satellite connection

The primary barrier to using satellite for contingency communications is cost. As more satellite providers becomes available, the cost is reducing and becoming a viable alternative in contingencies e.g. Cloncurry Shire Council is currently investigating satellite backup for its two fixed line internet links.

4.6.8.3 Methods for Improving Supply Chain Resilience

Primary methods for improving resilience are physical (more coverage via more infrastructure) and within the communications networks themselves (e.g., redundancy in key equipment or in configuration).

One of the key recommendations relating to communications throughout Cloncurry would be to enable mobile phone and mobile data coverage on all state roads. This would improve public safety and also improve emergency co-ordination of both public and private resources. While this is recognised as needing cohesion from many actors, it is a goal that could be pursued over a longer period of time than other recommendations. While promoting this ultimate goal, a better understanding of the UHF and other radio networks within the Shire could enable a stronger and more resilient communications backup system in the event of mobile phone outages.

Improving interconnections to other critical infrastructure service (e.g., electricity for communications equipment at key sites) would also assist in improving the supply chain for communications and data.

4.6.8.4 Recommendations for Supply Chain Resilience (See Companion Report)

- IR-GP1: Hazard Reduction around Critical Infrastructure
- IR-GP2: Priority Infrastructure Plan
- IR-CD1: Mobile phone communications coverage for all national and state-controlled roads
- IR-CD2: Targeted mobile black spot reduction within CSC LGA
- IR-CD3: Promote use of radio communications
- IR-EN2: Distributed energy and microgrids for Cloncurry towns
- IR-EN4: Targeted standalone power systems (SAPS)

4.6.9 Freight

Freight connects people and businesses to goods that support their livelihoods.

Current business as usual projections indicate Queensland's freight task and volumes will grow more than 20% over the next decade[36], and Cloncurry Shire is likely to see similar, if not greater, increases in freight.

Cloncurry is important in North West Queensland as a source, destination and key route for freight.

CSIRO has produced an interesting animation of one year's worth of freight movement by goods, available at their Transport Logistics-TraNSIT website. This animation shows the importance of Cloncurry as a key route for key goods.

4.6.9.1 Bulk Freight

Bulk freight includes bulk solids like mineral ore, bulk liquids, and containerised general freight. Bulk freight may also contain hazardous materials, particularly inbound freight to mining sites.

Outbound bulk freight from Cloncurry includes mineral ore, fertiliser commodities and goods. In-transit freight also includes mineral ore, much of which is destined for Townsville Port for export.

Much of Cloncurry's bulk freight is transported by rail, with road another key freight mode.

4.6.9.2 Livestock Freight

Livestock freight to, from, and through Cloncurry is generally by road or rail. Cloncurry also serves as an intermodal hub for livestock freight, that includes spelling livestock during road freight, or transfer from road freight to rail freight, to Townsville Port for export.

Cloncurry's importance as a livestock freight hub is shown through the figure below, with key routes including Cloncurry to Roma and through to Brisbane, Cloncurry to Darwin, as well as Cloncurry to Townsville.

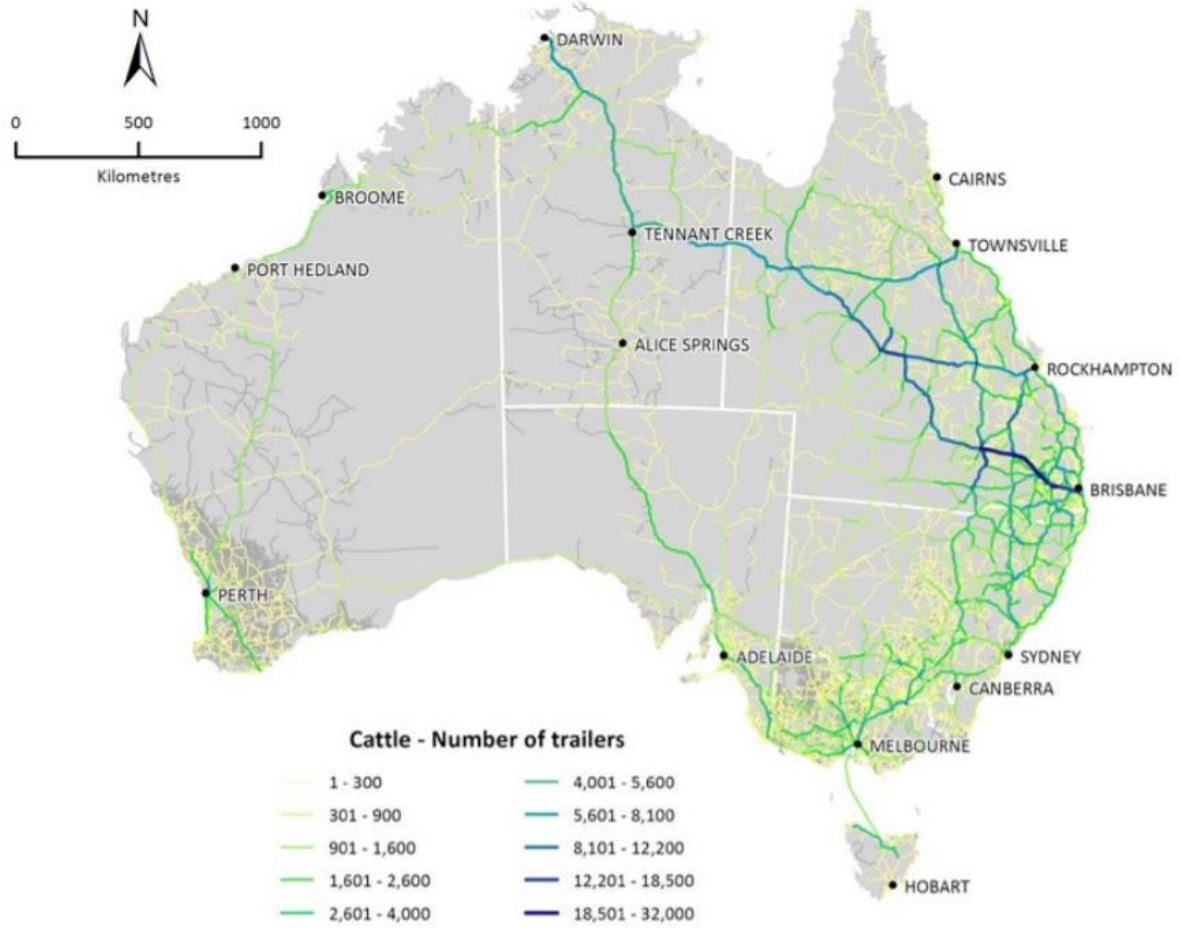


Figure 36: Baseline annual trailer (semi-trailer equivalent) freight flow for cattle[37]

4.6.9.3 General Freight

General freight is defined as consumer articles, such as groceries and general merchandise, as well as business inputs such as building materials.

General freight is usually transported by road can be full truckload freight shipping (FTL) or less than truckload shipping (LTL). General freight can also be transported via rail and for high-value or time-sensitive goods, by air. General freight is key to keeping Cloncurry running, with much of Cloncurry's Food and Beverages being transported as general freight by road.

4.6.9.4 Freight Data

Australian governments are looking to obtain more accurate information around freight movements, and in the next few years the National Freight Data Hub should increase reporting and allow better analysis of freight from, to and through Cloncurry.

4.6.9.5 Freight modes

Within Queensland, road freight accounts for 65% of all freight, rail 32.5%, seaborne freight between Queensland ports 2.4% and air freight less than 1%.[38]

Although Cloncurry-specific statistics were not available to confirm, rail freight is likely to account for a higher percentage of goods within and around Cloncurry, due to the bulk freight from mining and agriculture.

The difference in transport mode selection based on bulk or non-bulk freight can be seen in a comparison of Australia-wide statistics, with rail dominant for bulk freight and road dominant for general (non-bulk) freight.

As described in the section on Logistics Modes, selection of a freight method is highly dependent on volume, speed, distance and cost, with existing infrastructure (e.g., networks, rail) playing a role in mode selection.

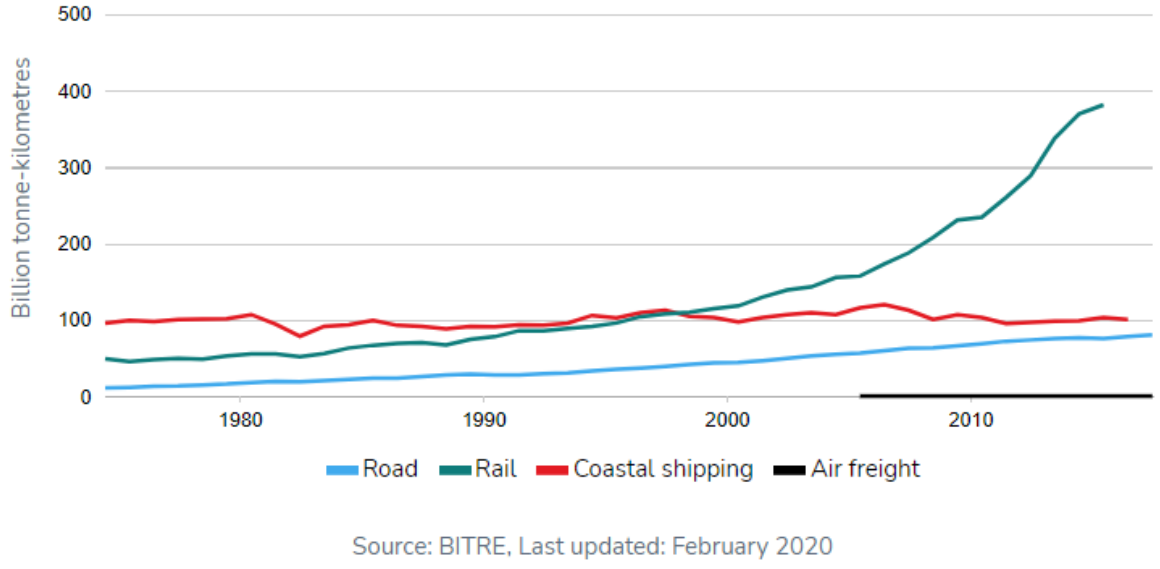


Figure 37: Bulk domestic freight by transport mode (Australia-wide)[39]

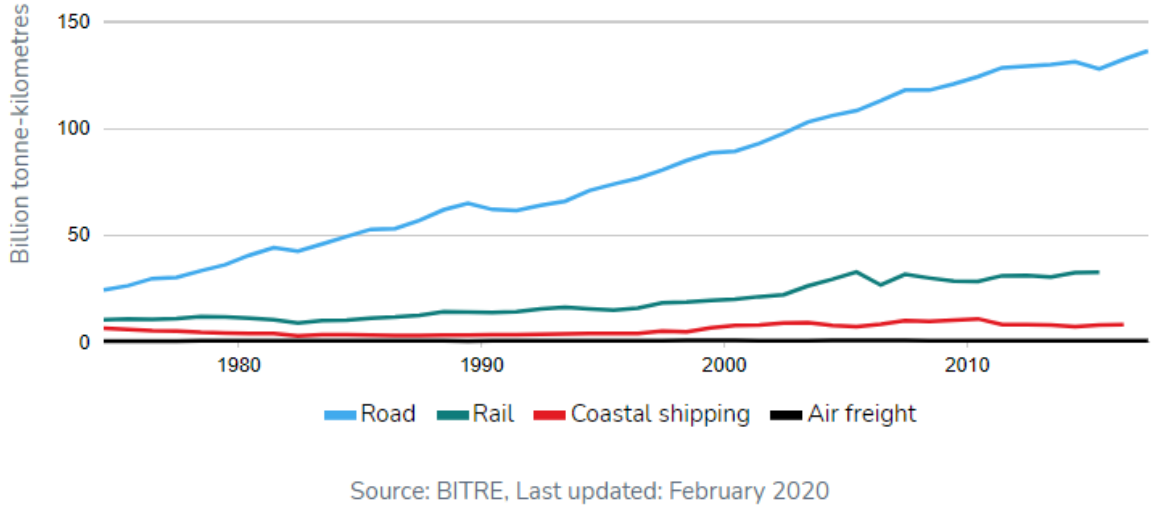


Figure 38: non-bulk domestic freight by transport mode (Australia-wide)[40]

4.6.9.6 Freight Infrastructure

Freight relies on both the underlying infrastructure and the commercial freight operators that use that infrastructure.

Listed below are the key infrastructure networks. Although freight is the service that is important to Cloncurry, it is enabled by these key infrastructure networks.

4.6.9.6.1 Roads

4.6.9.6.1.1 Primary Method of Supply

Freight to, from, and through Cloncurry accesses the following State and National roads, with council roads connecting other locations within the Cloncurry Shire:

Table 6: State and National Roads within Cloncurry Shire

Road	Direction	Connects To	Previous Disruption Risk
Landsborough Highway	South east	Winton, Longreach, Roma, Brisbane (A2) Rockhampton (A4).	Previous outages up to 7 days
Barkly Highway	West	Mt Isa (A2), Northern Territory (A2, A87, National 1), Southern Australia (A2, A87)	Q50 rainfall specification
Flinders Highway	East	Townsville, Townsville Port, East Coast of Australia (A6)	Previous outages up to 7 days
Burke Development Road	North	Fourways, Gulf, Kurumba Port (National Route 83)	Previous outages up to 7 days
Wills Development Road	East-West (North end of Shire)	Julia Creek - Burketown (78A)	
Cloncurry to Duchess Road	South West	Duchess, Dajarra (7708)	Previous outages up to 7 days

There are several key national routes that intersect Cloncurry, including the important Brisbane to Darwin route (Landsborough through Barkly Highway), and the Mt Isa to Townsville route (Barkly to Flinders Highway) that are used to ship to and through Cloncurry. The Burke Development Road is an important cattle transport route. It intersects with the Wills Development Road (also known as the Beef Road), and further north to Normanton and Karumba Port, a cattle export port and general cargo port (as well as a return to lead and zinc export). Given the major industries within Cloncurry that rely on transport, the road network is critical.

The road transport network comprises 100km of sealed roads and 75km of unsealed roads owned and maintained by the Department of Transport and Main Roads (DTMR). Additionally, Cloncurry Shire owns and maintains 1054.61km of sealed roads and 201.24km of unsealed roads.

4.6.9.6.1.2 Contingency Methods of Supply

Contingencies for freight rely on the methods outlined in the Risk Management Techniques for Managing Supply Chain Risk

In general freight operators will look for alternate routes, and then alternate modes. For some resources such as mineral ore, stockpiling represents a viable alternative for short-medium term disruption.

CSC website maintains updates on local road conditions and closures on the website at https://www.cloncurry.qld.gov.au/council/stay-connected/road-conditions and has introduced an interactive online map system for road closures in 2021 utilising the Guardian IMS Road Closure system at the Cloncurry Community Dashboard.

4.6.9.6.1.3 Methods for Improving Supply Chain Resilience

Methods include increasing the resilience of road infrastructure (increasing resistance to natural hazards), improving reliability (wider and better pavements) and improving the redundancy of the transport network. Improving the ability to restore road freight service after outage is also important.

There are many related projects that Cloncurry Shire Council is working on with the Queensland and Commonwealth governments to improve road networks in and around Cloncurry Shire, highlighted in the section on Related Infrastructure Projects.

4.6.9.6.1.4 Recommendations for Supply Chain Resilience (See Companion Report)

- IR-GP1: Hazard Reduction around Critical Infrastructure
- IR-GP2: Priority Infrastructure Plan
- IR-GP4: Involve community in infrastructure resilience
- IR-R1: Road Wardens
- IR-R2: Enhanced Technology for road monitoring and closures
- IR-R3: Identification of potential future road upgrade areas
- IR-R4: Partnering for better roads
- IR-FR1: Freight loadout and stockpile
- IR-EW1: Extend flood and weather warning systems

4.6.9.6.2 Rail

4.6.9.6.2.1 Primary Method of Supply

Rail freight to, from, and through Cloncurry uses Queensland Rail's Mt Isa Line.

In 2020, the Mount Isa line carried more than five million tonnes of product for freight operators, including mineral concentrates, mining inputs, acid, fertiliser, fuel and livestock

Key rail infrastructure within Cloncurry Shire is tabled below[41].

Table 7: Rail Infrastructure within Cloncurry Shire

Rail Infrastructure	Location	Usage	Disruption Risk
Mt Isa Line (narrow gauge rail)	Townsville to Mt Isa (1038km)	Mining commodities and goods for export at Townsville port Mining inputs Passenger Transport	Flooding Heat Transport Accident
Yurbi Rail Siding	15 km East of Cloncurry	Loading mining commodities and goods for export to Townsville Port (primarily Cannington road to rail but also other mines)	Flooding Heat Transport Accident
Cloncurry Rail Yards	Cloncurry Town	Loading cattle for export at Townsville Port	Flooding Heat Transport Accident
Phosphate Hill Branch Line and Rail Loop	Mt Isa Line - Phosphate Hill Branch	Loading mining commodities and goods for export at Townsville Port	Flooding Heat Transport Accident

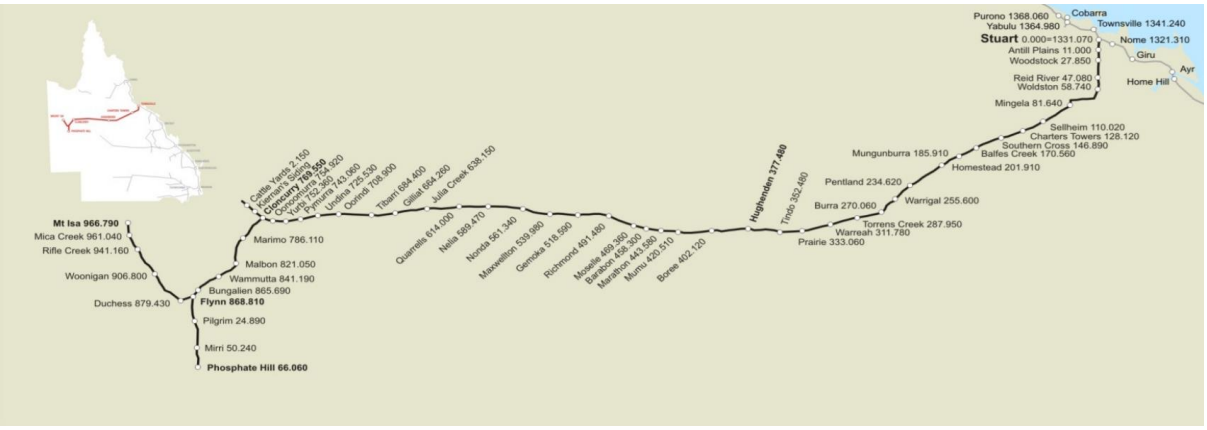


Figure 39: Mount Isa Rail System[42]

In recent years Queensland Rail has reduced intermodal access to the Mt Isa line to create freight competition with road networks and is investing $360m in capital upgrades over five years from 2021.

To help protect the Mt Isa line from disruption, weather monitoring stations, overload and imbalance detectors, wheel impact load detectors, hot box detectors and dragging equipment detectors are used.[43]

4.6.9.6.2.2 Contingency Methods of Supply

Contingencies for freight rely on the methods outlined in the Risk Management Techniques for Managing Supply Chain Risk

In general freight operators will look for alternate routes, and then alternate modes.

For some resources such as mineral ore, stockpiling represents a viable alternative for short-medium term disruption, and for time-sensitive bulk freight, operators look to road freight as an alternative, as they did during the 2019 flooding disruptions to the rail network.

4.6.9.6.2.3 Methods for Improving Supply Chain Resilience

Methods include increasing the resilience of rail infrastructure (increasing resistance to natural hazards), improving reliability (e.g. ability to operate in extreme temperatures) and improving the redundancy of the transport network through intermodal transport links. Improving the ability to restore the rail network after outage is also important.

As an input to the project, Queensland Rail advised of $50 million committed by the Queensland Government for three projects, including flood resilience works, replacement of ageing rail equipment like sleepers and ballast, and the exploration of double stacked containers.

4.6.9.6.2.4 Recommendations for Supply Chain Resilience (See Companion Report)

- OR-SC2: Cold Storage at Intermodal Transport Hubs
- IR-FR1: Freight loadout and stockpile
- IR-EW1: Extend flood and weather warning systems

4.6.9.6.3 Air

Air freight (other than very small amounts of goods) is not frequently used within Cloncurry Shire. Aircraft are used for essential goods resupply during hazards that disrupt the road network.

Air passenger transport is covered under transport below.

4.6.10 Passenger Transport

There is limited public transport within and around Cloncurry, with most residents relying on private transport to travel. There is a community bus available for hire from Council for schools, not-for profit

community groups and local businesses to support programs and activities which benefit the community.

Public transport for Cloncurry is mostly between Cloncurry and other regional destinations such as Mt Isa, Townsville and Brisbane. Key passenger transport modes are air, road (bus and car), and rail.

4.6.10.1 Passenger Transport Modes

4.6.10.1.1 Air

Cloncurry Shire Council operates three airports / airstrips within Cloncurry Shire.

Table 8: CSC operated airfields within Cloncurry Shire

Airport	Location	Type	Runways
Cloncurry Airport Code: CNJ YCCY	Sir Hudson Fysh Drive Latitude: -20.668600 | 20 40.116005 S | S20 40 06 Longitude: 140.503998 | 140 30.239868 E | E140 30 14 Field Elevation: 616 ft/188 m MSL	Regional airport	Runway 12/30 2,000 x 30 m Paved, lit Runway 06/24 1,157 x 18 m Paved, unlit
Dajarra Airport Code: DJR YDAJ	Latitude: -21.708300 | 21 42.497978 S | S21 42 29 Longitude: 139.533005 | 139 31.980286 E | E139 31 58 Field Elevation: 335 ft/102 m MSL	Local airport - light traffic	Runway (gated road surface) 1,138 m
Kajabbi Airstrip Code: YKAJ	Latitude: -20.033300 | 20 1.998024 S | S20 01 59 Longitude: 140.033005 | 140 1.980286 E | E140 01 58	Local airport - light traffic	Runway (gated road surface) 700 m

Additionally, there are a considerable number of private airstrips at stations and mine sites with varying landing capabilities and capacities. These are shown on the map at Airstrips: Cloncurry Shire and Surrounds.

Aircraft flying to and from Cloncurry airport are usually commercially owned and operated, generally by large operators such as Qantas, Virgin and Alliance. Aircraft into private airstrips are privately-owned or commercially through smaller operators.

4.6.10.1.2 Road

Road transport is generally along the same routes as described for freight in the section on Roads. Smaller passenger only vehicles (generally privately owned) are able to access deeper into the road network, including the unsealed road network.

Intercity public bus routes service Cloncurry, primarily from Townsville and Mt Isa, with connections to other cities through these routes.

A map of Cloncurry's road network, including know troubles spots is included at Road Network: Cloncurry and Surrounds.

4.6.10.1.3 Rail

Rail transport is along Queensland Rail's Mount Isa Line, in much the same way that rail freight travels. The Inlander train operates twice a week between Townsville and Mt Isa for passenger transport.

4.6.10.2 Methods of Supply

In general passengers choose their transport in the same way that freight is selected, by balancing demands around time, cost and convenience, with air transport the overwhelming mode for small

numbers of people on business, and road transport more likely for either larger numbers of people or tourism.

Contingencies for passenger transport rely on the methods outlined in the Risk Management Techniques for Managing Supply Chain Risk

When other transport methods are unavailable, air transport may be the only alternative, and as stated in the section on the Medical Care service, air transport may well be the only viable option.

4.6.10.3 Methods for Improving Supply Chain Resilience

With air transport the priority, it is worth noting that during the 2019 floods, the Cloncurry Airport had to restrict the size and weight of aircraft landing due to the airstrip edges sagging and slumping with water-saturated ground. This is key given that air traffic increased with army helicopters and supplies being flown in as a result of extensive road closures. It is clear the Cloncurry airport should be viewed as critical infrastructure for the Town and Shire of Cloncurry and prioritised for this purpose.

The airport prepares in advance of the wet season with stocks of Avgas and JET A-1 and has a good bushfire buffer zone. The most likely risk is inundation during a flood. As the airport can become a life-saving resource within Cloncurry, a periodic review of airport pavement maintenance and flood mitigation may assist, along with adding Cloncurry Shire Council's Airport Manager to the Local Disaster Management Group with Advisor Status, in line with other critical infrastructure operators.

4.6.10.3.1.1 Recommendations for Supply Chain Resilience (See Companion Report)

- IR-GP1: Hazard Reduction around Critical Infrastructure
- IR-GP4: Involve community in infrastructure resilience
- IR-R1: Road Wardens
- IR-R2: Enhanced Technology for road monitoring and closures
- IR-R3: Identification of potential future road upgrade areas
- IR-R4: Partnering for better roads
- OR-SC2: Cold Storage at Intermodal Transport Hubs
- IR-AI1: Airport Drainage Improvement
- IR-AI2: Airport Manager as part of LDMG
- IR-EW1: Extend flood and weather warning systems

4.6.11 Liquid Fuels

Within liquid fuels, this report considers common use fuels within Cloncurry Shire such as diesel, petrol and Avgas.

Specialised fuel such as JET-A1 is not considered, which is a consideration only for Cloncurry Airport.

Private fuel supplies such as mine sites aren't considered, although the actions taken by agricultural businesses to stockpile fuel prior to the wet season equally apply to other private industry.

The general recommendations made around supply chains and road freight also apply to liquid fuels, and liquid fuel supply will benefit from infrastructure recommendations included within this report.

4.6.11.1 Primary Method of Supply

Primary supply of liquid fuels is by road freight. Commercially-available liquid fuel is stored within Cloncurry Shire at fuel outlets around Cloncurry Town, and at the Four Ways.

Figure 40: Liquid fuel supplies and storage around Cloncurry Town, shows locations of fuel outlets within Cloncurry Town.

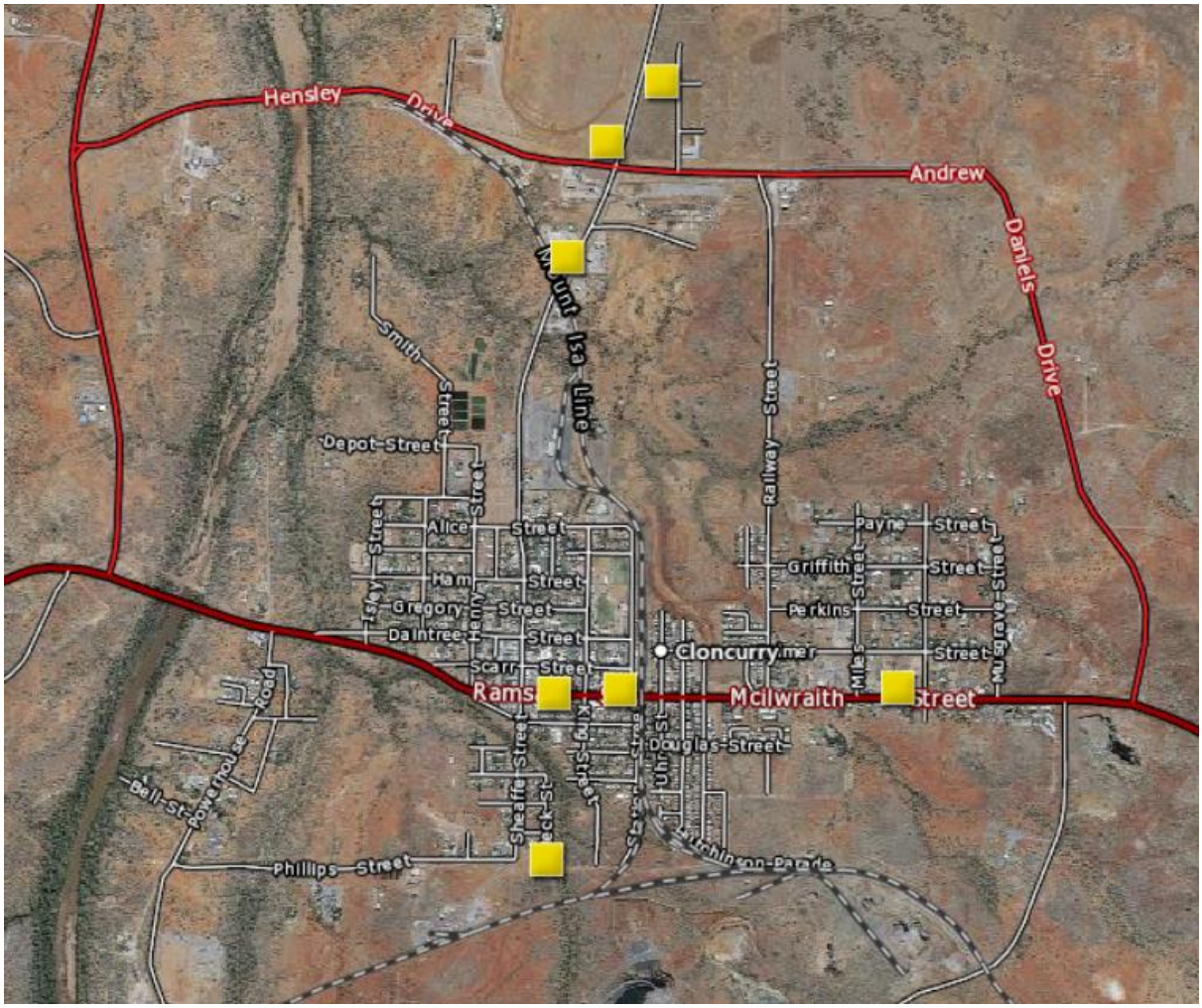


Figure 40: Liquid fuel supplies and storage around Cloncurry Town[44]

Cloncurry is well served for liquid fuel storage.

Further from Cloncurry Town, liquid fuel is stored privately on properties.

As in most large rural areas, Avgas is an important liquid fuel and is key to aerial mustering and resupply (particularly for emergency mustering as in 2019 floods, and aerial resupply of food for people and fodder for livestock).

4.6.11.2 Contingency Methods of Supply

Stockpiling works well for diesel and reasonably well for Avgas. Agricultural property owners reported filling private tanks after mustering, just prior to the wet season.

During the 2019 floods there was no reported shortage of diesel; the main liquid fuel shortage during the 2019 floods was Avgas. Avgas is normally transported from Brisbane to Cloncurry Town and distributed out from there. Emergency services have some capacity to distribute Avgas in an emergency (slung under a helicopter) but relies upon the local supply to arrive.

As well as stockpiling, alternative supply routes are available for Avgas, and during the 2019 floods Avgas was sourced from as far away as Katherine by upstream suppliers.

4.6.11.3 Methods for Improving Supply Chain Resilience

Better contact (via LDMG) with upstream suppliers may help to ease fuel supply issues in future events. As fuel supply is generally privately owned, communication is a key strategy.

If private fuel suppliers are unwilling to stockpile at levels needed for the community, an alternative strategy may be for CSC to choose to take on a strategic fuel supply role for the region, by creating a fuel stockpile locally.

4.6.11.4 Recommendations for Supply Chain Resilience (See Companion Report)

- OR-LD2: Expand advisor membership of the LDMG
- OR-LD12: Hazardous materials (HAZMAT) transport exercise
- OR-LD16: Resupply / Logistics workshop for local suppliers
- OR-LB1: Business reporting on wet season preparedness
- OR-SC1: Supply chain resilience training / meetings for local organisations
- IR-GP1: Hazard Reduction around Critical Infrastructure
- IR-R1: Road Wardens
- IR-R2: Enhanced Technology for road monitoring and closures
- IR-R3: Identification of potential future road upgrade areas
- IR-R4: Partnering for better roads
- IR-FR1: Freight loadout and stockpile
- IR-EW1: Extend flood and weather warning systems

4.6.12 Pharmaceuticals

Pharmaceuticals behave much like other general freight, however they are often time critical, and are often quite small loads, so can be air-freighted more readily than other types of goods.

4.6.12.1 Primary Method of Supply

While Queensland Health has procedures for ensuring its facilities are stocked with appropriate levels of pharmaceuticals, a key consideration is confirming with the privately-owned pharmacy they have sufficient stockpile prior to the wet season.

The Cloncurry Pharmacy is just on the edge of the flood plain, near Coppermine Creek. Although not a high probability, it would be wise to organise an alternative pharmaceuticals storage site, which may require refrigeration, in case they need to evacuate their existing premises due to imminent flood risk, or another type of rapid-onset emergency.

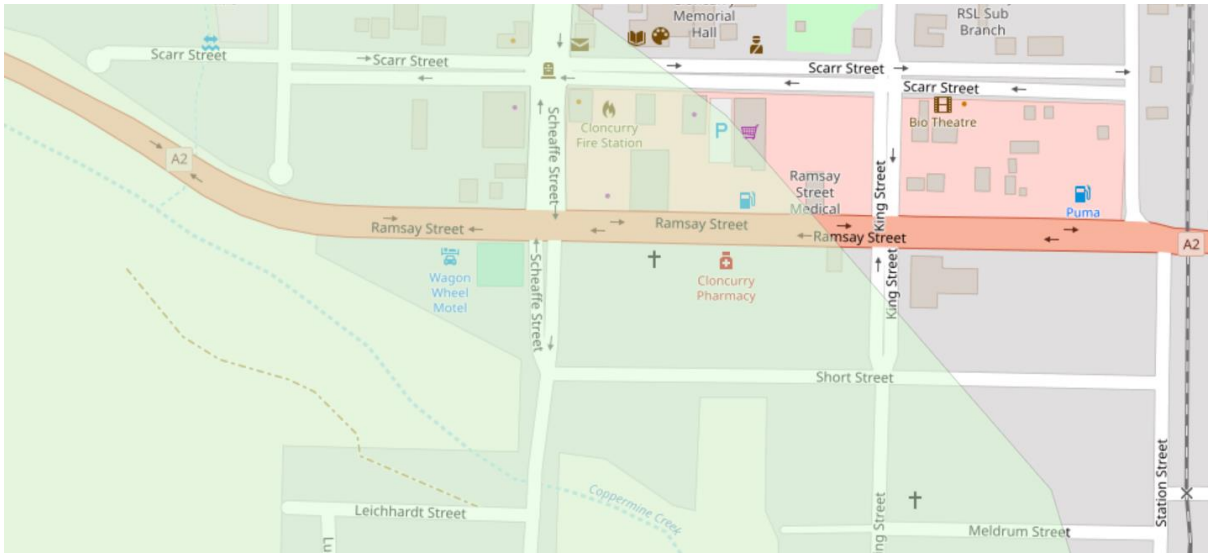


Figure 41: Cloncurry Pharmacy location in relation to flood plain (shaded green)[45]

Just like other freight, the key objective is to include pharmaceuticals in LDMG planning and pre-wet season checks.

4.6.12.2 Contingency Methods of Supply

Depending on the event, pharmaceuticals may be able to be sourced from the East (all the way from Townsville) or West (Mt. Isa) or Southeast (Brisbane or major centres in between), via normal supply routes. Air freight is a likely option for time-sensitive items.

4.6.12.3 Recommendations for Supply Chain Resilience (See Companion Report)

- CR-DP2: Expand existing pre-season communication networks
- OR-LD16: Resupply / Logistics workshop for local suppliers
- OR-LB1: Business reporting on wet season preparedness
- OR-LB2: Business continuity training for local businesses
- OR-SC1: Supply chain resilience training / meetings for local organisations
- OR-SC2: Cold storage at intermodal transport hubs
- IR-EW1: Extend flood and weather warning systems

4.6.13 Agriculture & Livestock Services

Livestock are key to the prosperity of Cloncurry Shire. Cattle farming is one of the two biggest industries in Cloncurry Shire, and key to the livelihoods of many residents of Cloncurry and surrounding shires. The 2019 floods had a significant impact on the cattle industry with large number of livestock lost. Livestock services are key to community continuity within Cloncurry Shire.

4.6.13.1 Primary Method of Supply

4.6.13.1.1 Veterinary Services

Large animal vets are located in Mt Isa and Julia Creek, with one general vet in Cloncurry. Many stations do their own veterinary work (e.g. hospital paddocks close to the house). Supply of veterinary services for livestock can be challenging during normal times, and more so during an emergency.

4.6.13.1.2 Cattle Movement

Moving large numbers of cattle is a major undertaking. After the 2019 floods, over 70,000 head of cattle were trucked from the Northern Territory to a Cloncurry Shire cattle station, which equates to a lot of road transport.

Primary method of supply is road or stock routes for walking cattle. Rail is generally reserved for cattle being transported to the coast for slaughter of live export. There are few alternate methods of transport.

4.6.13.1.3 Saleyards

With approximately 300,000 head of cattle passing through the area annually, the Cloncurry Saleyards is the second-largest cattle handling facility in Queensland. Incorporating livestock inspection and dipping, this facility is pivotal in maintaining Queensland's tick-free and control zones.

The saleyards are well positioned away from the flood plain and away from bushfire prone areas. The saleyards form a key part of livestock transport through Cloncurry.

4.6.13.1.4 Fodder / Provender

Normally fodder or provender is grown locally or transported by road to cattle farms.

The key method for ensuring hay supply is stockpiling, which all stations do before the wet season with the limitation generally being shed capacity. During local droughts, hay has been sourced from as far away as Western Australia.

During emergency events, animals are often unable to forage and can be fed from the air by fodder drops, so this is a service that relies on hay supplies and aerial freight transport. Fodder drop helicopters

are also sometimes used to rescue animals caught in floodwaters by cutting fences so animals can move to higher ground.

During the 2019 floods, the government assisted through provision of fodder drops by military helicopter.

Avgas supply for aerial feeding of livestock is discussed the section on Liquid Fuels.

4.6.13.1.5 On-station emergency management

Some larger stations have comprehensive emergency management plans (See Case Study on AACo in Appendices).

Personal worker safety should be paramount. Personal Locator Beacons (PLB's) are recommended for farm workers who work alone or in remote environments (refer to Case Study Appendix).

4.6.13.2 Contingency Methods of Supply

Many of the inputs for agriculture rely on road freight, and mitigations follow those for Supply Chain Risk Management Techniques. Most agricultural enterprises are privately owned, and general business continuity and emergency management planning and preparedness apply, as per other businesses within this report. Some agriculture specific recommendations are made within case studies.

4.6.13.3 Recommendations for Supply Chain Resilience (See Companion Report)

- CR-W1: Promote the value of Personal Locator Beacons (PLBs)
- OR-LD16: Resupply / Logistics workshop for local suppliers
- OR-LB2: Business continuity training for local businesses
- OR-SC1: Supply chain resilience training / meetings for local organisations
- OR-AG1: Emergency planning for agriculture
- IR-EW1: Extend flood and weather warning systems

4.6.14 Sanitation / Waste

Household waste is collected from kerbside once a week.

CSC operates two landfills, both within 5km of Cloncurry as depicted below. The General Waste Facility accepts putrescible waste and a number of other materials such as green waste, metal and white goods, waste oils and construction and demolition waste. The Regulated Waste Facility accepts dead animals, asbestos and contaminated soils.

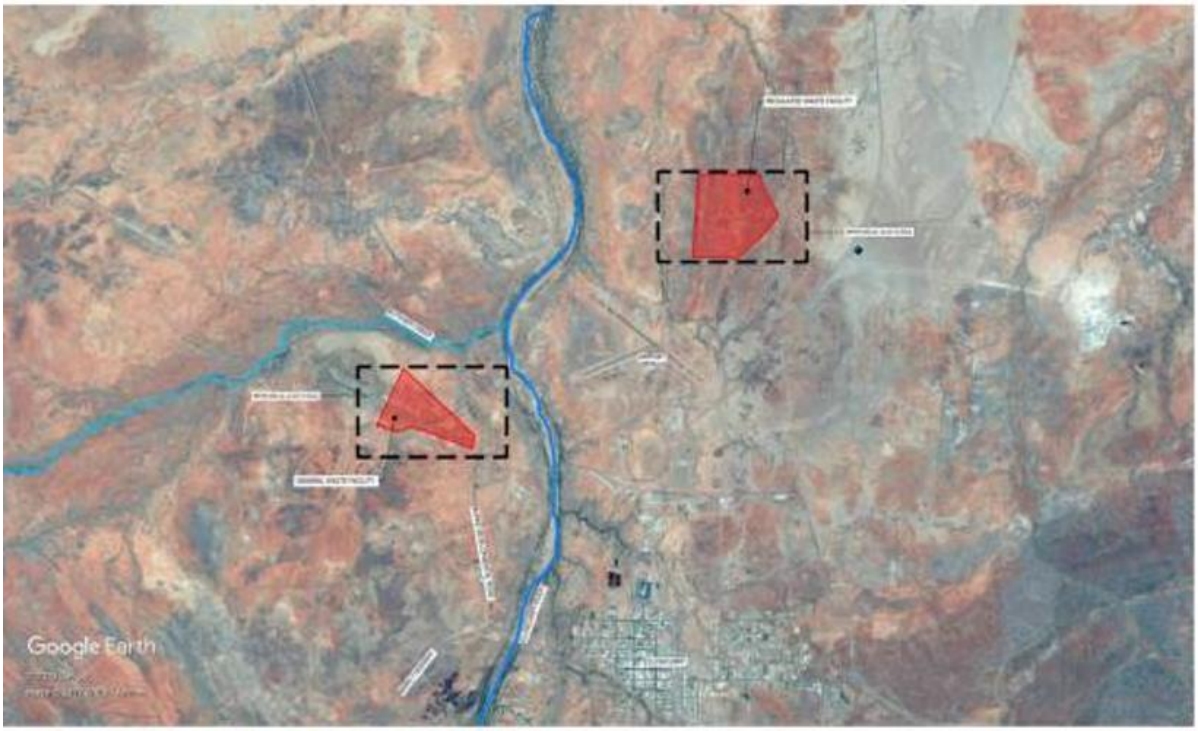


Figure 42: Landfill locations in Cloncurry Shire

Sanitation disruption due to emergency events can contribute to poor public health outcomes, especially should an event such as a flood overwhelm the sewerage system or similar, or where a hazard or disaster impacts structures that contain asbestos or similar hazardous materials.

Sanitation requires roads covered in detail under Freight Infrastructure, while Cloncurry Shire Council uses a mixture of ownership and contracts for the equipment required for sanitation and waste.

4.6.14.1 Recommendations for Supply Chain Resilience (See Companion Report)

- CR-W1: Promote the value of Personal Locator Beacons (PLBs)
- OR-LD16: Resupply / Logistics workshop for local suppliers
- OR-LB2: Business continuity training for local businesses
- OR-SC1: Supply chain resilience training / meetings for local organisations
- OR-AG1: Emergency planning for agriculture
- IR-EW1: Extend flood and weather warning systems

4.6.15 Emergency Services

This service is focussed around response to emergencies, including health emergency, natural hazards emergencies, and human-made emergencies such as traffic accidents.

4.6.15.1 Primary Method of Supply

Primary supply of emergency services within Cloncurry Shire:

- Within Cloncurry Shire
  - Queensland Ambulance Service provide first response and emergency patient transport
  - Queensland Rural Flying Doctor Service for areas further from Cloncurry Town
  - Queensland Police have a station in Cloncurry
  - Queensland Fire and Rescue have auxiliary staff located within Cloncurry
  - Queensland Rural Fire Service have volunteer staff located within Cloncurry and throughout Cloncurry Shire

- Queensland State Emergency Service has a depot in Cloncurry and facilities at other towns within Cloncurry Shire

4.6.15.2 Contingency Methods of Supply

Contingency supply of emergency services:

- Neighbouring Shires through to State
  - Mt Isa and McKinlay Shire provide closer support and assistance
  - Escalation through Queensland Police district to access state police resources
  - Escalation via Queensland Ambulance Service for further assistance
  - Escalation through Local Disaster Management Group to District Disaster Management Group, and then State Disaster Management Group for large emergency events / disaster declarations.
  - Escalation through Queensland Fire and Rescue Service for agencies within their department
  - Queensland Rural Flying Doctor Service for areas further from Cloncurry Town

Cloncurry's Local Disaster Management Group (LDMG) can escalate requests for assistance to District and through to State at any time. A 24hr watchdesk is available through the State Disaster Co-ordination Centre (SDCC).

As in many areas of rural Australia, the Royal Flying Doctor Service (RFDS) provides emergency medical services. Most stations have an RFDS kit.

4.6.15.3 Methods for Improving Supply Chain Resilience

All nominated emergency services have methods for providing backup from outside area / district with state-based emergency services usually able to mobilise larger workforces during emergency or disaster events.

Actively involving the community in emergency services, helps bolster volunteer ranks with events such as an Emergency Services Day, while helping the community to get prepared for natural hazards.

Further relationship building (building social capital) often assists in smoothing the escalation process.

4.6.15.4 Recommendations for Supply Chain Resilience (See Companion Report)

- CR-DP1: Emergency Services Day
- CR-DP2: Expand existing pre-season communication network
- CR-W1: Promote the value of Personal Locator Beacons (PLBs)
- CR-SC2: Prevention, Preparedness, Response, and Recovery Network
- CR-SC3: Historical hazard data as stories
- CR-LD1: Raise LDMG profile within Cloncurry Shire
- OR-LD15: Fire Management Committee planning
- IR-GP1: Hazard reduction around critical infrastructure

4.6.16 Education / Schools / Pre-Schools

This service is focussed around education of young people within the Cloncurry community.

In many disaster events, getting young people returned to school or care is key to speeding disaster response and recovery.

4.6.16.1 Primary Method of Supply

Primary supply of emergency services within Cloncurry Shire:

- Education Queensland school within Cloncurry
- Private school within Cloncurry

- Distance Education supplied via Education Queensland
- Cloncurry Kids local child care

4.6.16.2 Contingency Methods of Supply

Contingency supply of education is often facilitated through online learning, effectively making all learners taught by Distance Education, as has been seen during the COVID-19 pandemic.

The importance of children not missing out on their education, but also returning them to school so that adults can continue with disaster response and recovery has been shown to be vital in many past emergency events.

Restoration of school infrastructure is important and should be prioritised to speed recovery.

4.6.16.3 Recommendations for Supply Chain Resilience (See Companion Report)

A mutual aid agreement between the state and private schools within Cloncurry may assist in getting all students back to school as soon as possible.

State-based schools may be able to bring in temporary supply if local teaching staff are impacted by a disaster event.

Other possible initiatives are:

- CR-DP1: Emergency Services Day
- CR-DP2: Expand existing pre-season communication network
- CR-VP1: Vulnerable Facilities Register
- CR-F1: Improved access and resilience of childcare and Out of School Hours Care (OSHC)
- CR-LD1: Raise LDMG profile within Cloncurry Shire
- OR-LD2: Expand advisor membership of the LDMG

4.6.17 Aged Care and Vulnerable Residents

There is a 10-bed aged care facility co-located with Cloncurry Hospital. Private providers provide in-home assistance for Cloncurry Shire residents who require this service.

4.6.17.1 Primary Method of Supply

In-home care or aged care at hospital.

4.6.17.2 Contingency Methods of Supply

Contingences for aged care, including evacuating residents, should be approached cautiously, due to the potential for harm to vulnerable residents during an evacuation or relocation.

Cloncurry Hospital may have capacity to supply short term refuge for aged care residents in an emergency.

4.6.17.3 Methods for Improving Supply Chain Resilience

All health services supporting Cloncurry are complex businesses in their own right and should have their own business continuity plans.

4.6.17.4 Recommendations for Supply Chain Resilience (See Companion Report)

- CR-VP1: Vulnerable facilities register
- OR:LB2: Business continuity training for local businesses

4.6.18 Community Social Connections

While not a good or service in its own right, there is strong evidence of the value of social connections for success in disaster recovery.

Cloncurry Shire enjoys strong social capital connections between similar groups within Cloncurry Town.

While this report is focussed on community continuity in the face of hazards, the scope hasn't included community infrastructure. Long-term disruption to community infrastructure (or social infrastructure) can be very debilitating, especially during disaster recovery, and separate work may be required to consider this for Cloncurry Shire.

Quotes from project engagement around community resilience included:

- "Everyone looks after each other. Everybody's got each other's back."
- People pick up stuff from town for each other once they can get through e.g., medication
- Drought Angels very good
- Blaze Aid good. Lots of volunteers to help with fences

This can be built upon and grown with other groups and those further from town and extended via bridging capital by extending relationships in emergency management with adjoining councils and the State.

5 Appendix: Case Studies

Case Studies

North Queensland Monsoon Trough Event 2019

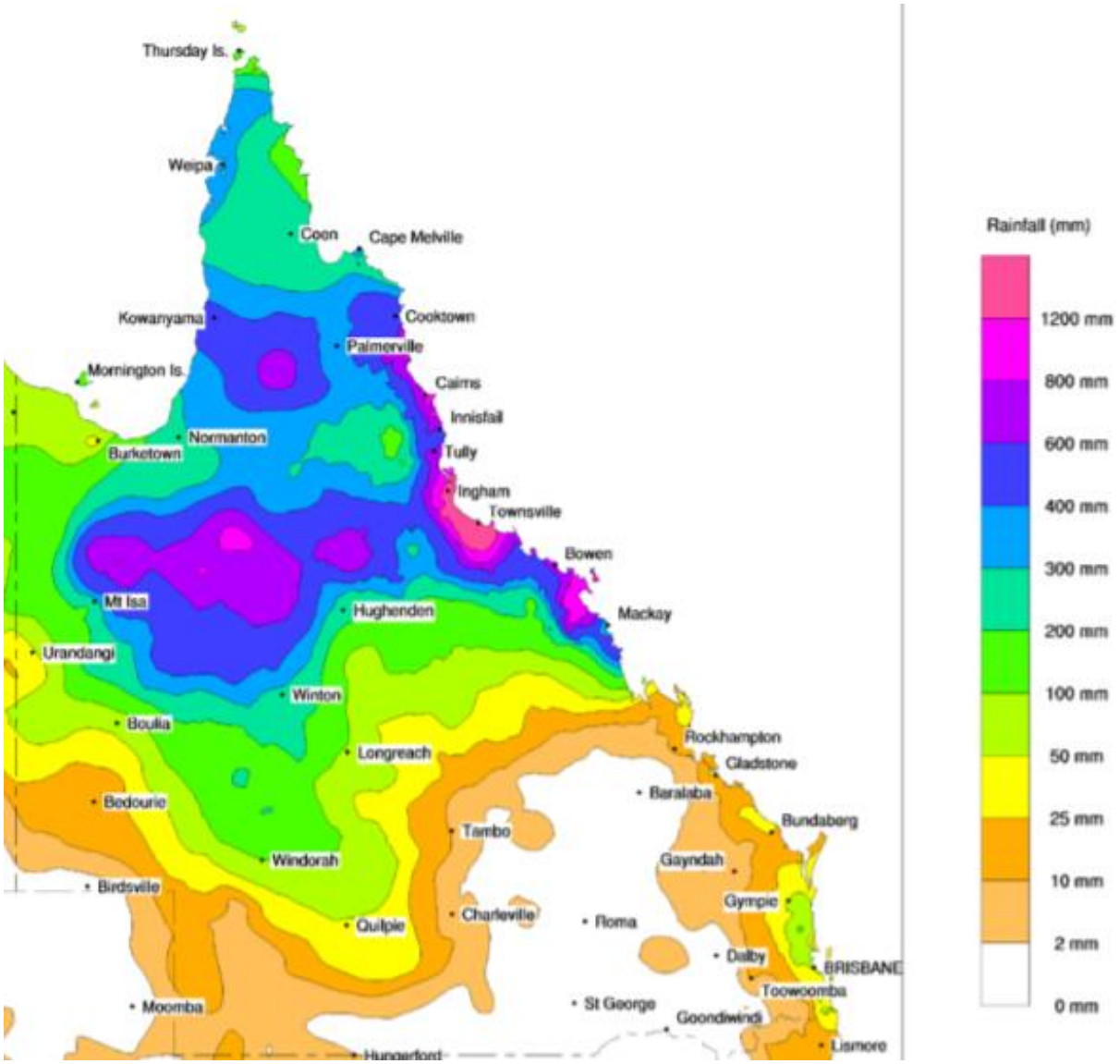
Road leading to Cloncurry Weir (Supplied Hamish Griffin to ABC News, 2019)

CLONCURRY SHIRE COUNCIL

E TERRA SICCA PROSPERA

2019 North West Queensland Flood Overview

In early 2019, the Cloncurry region, like more than 50% of Queensland, was affected by severe weather conditions. From 25 January to 14 February 2019, an active monsoon trough and slow-moving low-pressure system over the northern tropics produced extremely heavy rainfall in northeast Queensland and record-breaking rainfall in the gulf and northwest Queensland. Many river systems across the State recorded major flood impacts. Existing flood records were exceeded across the State including in the Flinders and Cloncurry Rivers where flood extents were visible from space.



Event rainfall totals from 26 January to 9 February 2019 (BOM, 2019)

This unprecedented rainfall led to widespread major flooding, infrastructure damage, erosion, environmental impacts, economic disruption and isolation. Within the Cloncurry region, the flooding, along with wet conditions, low day-time temperatures, and strong winds, caused the death of an estimated 85,899 head of cattle. For some farmers, losses represented 100% of their stock.

The severe weather also damaged pastures, fences, private roads, and water infrastructure, causing financial hardship and uncertainty for primary producers. Farmers, and the community, were physically and mentally affected by the immediate impacts and prospect of a longer-term recovery.

2 GB, 7am, 2019

As a result, the Cloncurry Shire was activated for Disaster Recovery Funding Arrangement (DRFA) assistance measures on 6 February 2019. The damage and impacts are summarised in the below extract from the Cloncurry Shire Council Monsoon Trough Local Recovery Plan:

Damage and impacts

Damage and impacts

Human and Social

- Extreme financial hardship for primary producers due to extensive loss of livestock after the flooding, following years of drought and the prolonged financial burden.
- Uncertainty on the economic future for primary producers and employees due to the timeframes to re-establish business which will provide an income.
- Mental health concerns for primary producers due to previous prolonged drought conditions.
- Mental health concerns for young people, particularly children of primary producers due to separation during the event.
- Health concerns around clean up, carcass management, mould, and fatigue.
- Properties were inundated and properties are inhabitable.
- Primary producer fencing was destroyed.

Economic

- Mining resource industry impacts due to isolation of staff, damage to assets including railway and roads.
- Mining and resource industry impacts – Phosphate Hill ceased operations.
- Agriculture industry: extensive stock loss by graziers in the region, as well as damage to fencing, machinery and sheds.
- Extended disruptions to transport routes for product freight into and from Cloncurry, particularly the cattle producers facing long term delays in repairs to roads to allow heavy vehicle access.
- Loss of local services and supplies, particularly food and fuel.
- Loss of income/profits to small businesses – staff isolation and lack of stock due to road closures.

Environment

- Cloncurry Basin and river catchment erosion.
- Biosecurity concerns within agriculture industry.
- Public health concerns, including mosquitos, water quality.
- Loss and disposal of wildlife and livestock plans.
- Weed growth throughout the environment.

Building

- River height monitoring stations damaged.
- Council's Wide Area Network (WAN) directly impacted, impeding response and business continuity.
- Damaged shade sail at community playground and community pool.

Roads and Transport

All townships, outlying areas and key transport routes were isolated for varying lengths of time due to flooding, bridge floodway damage including, but not limited to:

- Six roads remain at limited access to local 4WD traffic only.
- Flinders Highway closed for 27 days.
- Landsborough Highway to Winton closed for 26 days.
- Clonagh Road remains closed to all traffic.
- Mount Isa to Townsville train line damaged at Nelia (McKinlay Shire). Impacts to local mining exports. Closed until end of April 2019.

ABC News, 2019

The Cloncurry Local Recovery Group was established on 11 February 2019 to ensure community safety during response, to work together to repair and re-establish community linkages, to bring the community forward to a new normal during rebuilding, and to embed resilience in all activities to mitigate, improve and build betterment for the community. The recovery objectives of the Group are included below:

Recovery objectives

1. Essential services – Power, water, waste, telecommunications – repaired and restored
2. Implementation of Carcass Disposal Plan for deceased livestock and wildlife
3. Supporting and assisting people to access emergency hardship grants and funding approvals
4. Support primary producers with the disposal of deceased wildlife and livestock
5. Fencing requirements identified, graziers supported to utilise available assistance to restore fencing
6. Consult and engage with the local leaders, community members and service providers on long term community-led recovery outcomes
7. Community support opportunities including outreach, adopting a community led approach when planning for long term support with a focus on mental health, community wellbeing, connectedness and leveraging off ongoing community events
8. Road transport network – Completed damage assessment, developed coordinated restoration and betterment planning for the extensive road transport network for state and local controlled roads
9. Impact assessments – to be completed and understood by Council
10. Road transport network – Completed damage assessment, developed coordinated restoration and betterment planning for the extensive road transport network for state and local controlled roads
11. Key transport routes – priority restoration and improved resilience to the key transport routes for Primary producers and resource sectors – completed surveys of primary producers and Cloncurry Shire mining
12. Flood resilience – develop and implement strategies for greater flood resilience – Cloncurry River and catchment areas
13. Work closely with local businesses to assist with rebuilding, including developing their resilience to future disasters
14. Restore confidence in the tourism market
15. Regional collaboration plan completed with neighbouring Councils which were also impacted by the event

Community groups and organisations stepped forward to help the region and its residents respond and recover, including Glencore's Ernest Henry Mining, Cloncurry Shire Council, Foodworks Cloncurry, and the Australian Agricultural Company. Many others were involved in the massive recovery and restoration efforts, and the Cloncurry Shire has worked hard to build back better, increasing community resilience, infrastructure resilience and organisational resilience.

The following stories provide a snapshot of just some of these efforts.

Case Study: Partners in Recovery: Ernest Henry Mining's assistance during the 2019 Floods

Employees from Glencore's Ernest Henry Mine, located 38km north-east of Cloncurry, worked closely with local stakeholders and neighbouring pastoralists to provide over $70,000 of in-kind assistance to where it was needed. The mine supplied heavy equipment and consumables including loaders, excavators and fuel, as well as employees to help with the clean-up and safe removal of dead cattle from neighbouring stations.

Ernest Henry Mine was also used as a dedicated dry storage and onsite landing area and base for the Australian Defence Force to supply aerial fodder drops to surrounding properties in both Cloncurry and McKinlay shires. Glencore also donated $1 million towards flood recovery efforts to reinforce its aim to '*build enduring relationships with the local community that result in positive and lasting social and economic benefits*'.



Since the 2019 floods, Glencore has put additional preparations in place to ensure the best possible response to future significant weather events, to support and protect their people, assets and the community from the impact of such events. At Ernest Henry Mine, a comprehensive inspection, maintenance and upgrade of stormwater infrastructure has provided greater capacity to retain water onsite and minimise potential water discharge from site.

Glencore's Community Investment Program provides annual support to organisations and groups for events, initiatives, and large locally-based infrastructure projects related to health, the environment, education, capacity building and other needs identified in community planning at a local or regional level.

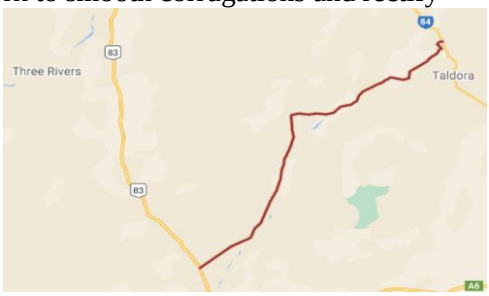
Organisations working together, whether public or private, ensures better preparedness to extreme weather events and better outcomes for the community during response and recovery.

While recovery from the 2019 floods is ongoing and predicted to take up to 5 years, Glencore has joined with the Mayor of Cloncurry in praising the community's incredible spirit and resilience.

Case Study – Sedan Dip Road Reconstruction

The Sedan Dip Road joins the Burke Developmental Road north of Cloncurry, to the Wills Developmental Road, north of Taldora. As a crucial access route for cattle-producers in the Cloncurry and McKinlay Shires, the arterial road sees heavy stock movement, as well as tourist traffic.

Previously, the unsealed black soil road required frequent work to smooth corrugations and rectify potholes, and often became impassable for at least 2 weeks at a time during wet periods. The 2019 flooding rain, caused loss of gravel, major washouts and covered multiple sections of the road in large amounts of silt and debris, cutting the road off for an extended period. Following this damage, Betterment Funding was received to upgrade the road, making it more resilient in wet conditions and shortening the duration of road closures following a weather event.



The 2019 Betterment program was a joint Australian Government and Queensland Government initiative providing funding to State Agencies and Local Governments to build back better, more resilient essential public infrastructure which was damaged by the 2019 Monsoon Trough. In December 2019, the Cloncurry Shire Council was successful in gaining $9.4 million of Betterment Funding to construct and seal Sedan Dip Road's remaining gravel sections as well as reinstate shoulders, table drains, grids, road markers and signage. This work would create a fully bitumen sealed road from the Burke Development Road through to the McKinlay Shire boundary. Deputy Premier and Minister for State Development, Infrastructure, Local Government and Planning, Steven Miles, said, '*Not only are we repairing infrastructure, we're building it to a higher standard than before it was damaged making the road more resilient. This means down the track council won't need to constantly repair the same road after every major weather event.*'

North Queensland Register 2020

The Sedan Dip Road has been rebuilt better than ever, simultaneously improving the road and subsequently surrounding communities', resilience, safety and efficiency.

The Queensland Reconstruction Authority stated that the '*investment has allowed the Cloncurry Shire Council to increase the longevity of the road, giving primary producers the ability to move to and from their properties as needed*.' In addition to assisting the major pastoral operations, the large-scale construction work also stimulated the local

economy and supported regional jobs. Cloncurry Mayor Gregory Campbell said, ‘the outcome achieved for the community and the broader beef industry was tremendous.’

Curry PM, 2021

Case Study – Building Back Better at Canobie & Wondoola Stations

The Australian Agricultural Company (AACo), Australia's largest integrated cattle and beef producer, owns and operates Canobie and Wondoola Stations, located 200km north of Cloncurry. Like many cattle stations in the Cloncurry region, Canobie and Wondoola Stations experienced significant infrastructure and livestock losses during the 2019 floods.

Figure 43: AAco Stations during 2019 flood peak: Canobie (left) and Wondoola (right)

AACo's rebuild and recovery efforts aligns with their claim that, 'we're trailblazers; doing things differently, and taking the reins.' Rather than replace existing damaged infrastructure like-for-like, AACo improved the safety of workers and livestock, protected infrastructure and their entire operation against future flood events. The rebuild and upgrade included fencing, water infrastructure, flood banks and accommodation buildings.

Following the floods, over 626km of fencing was reconstructed. To reduce damage next time, this included some realignment to ensure fence lines ran with the direction of water, and 'swinging' fences at flood ways to allow the fence to lift when debris washed through.

Figure 44: Swing Fence (creek crossing)

Significant water infrastructure repairs and upgrades were undertaken, including:

- Construction of 72 tanks to replace damaged tanks and turkey's nests
- Installation of 59 troughs, including calf troughs with concrete pads to assist with access and reducing calf loss
- Installation of 65km of poly pipe
- Replacement of 4 solar pumps
- Redrilling 2 bores

Figure 45: New calf trough in use

Old turkey nests were filled in and utilised as tank pads, with panels erected around tanks to stop cattle from potentially damaging the pads.

In areas prone to flooding, 37 circular flood banks were constructed, offering cattle and other animals places of high ground during floods and an opportunity for rest when paddocks are water logged.

Due to extensive damage, some of Wondoola's accommodation buildings were demolished after the flood. These buildings have been replaced with raised buildings to improve safety during future events.

In addition to the infrastructure recovery, AACo also considered staff welfare, implementing a Mental Health Program that ensured a counsellor visited Canobie fortnightly throughout 2019. The counsellor was available to staff throughout the region at other stations such as Dalgonally, Carrum and Headingly.

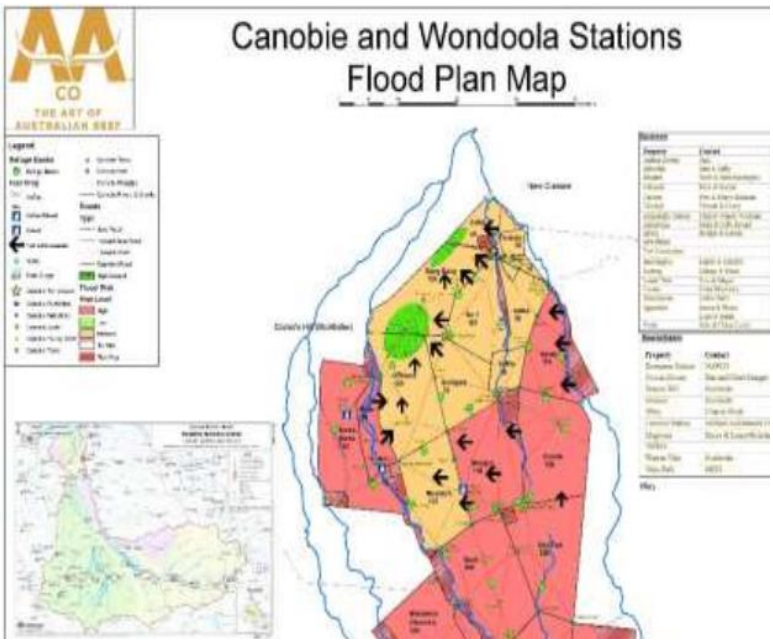


Figure 46: Paddock Shift Planning

As a result of the 2019 flood event, Flood Operational Plans have been developed to ensure management take measures and are aware of the risks of flood events in the Gulf including paddock shifts that are to occur prior to rain events; proactive protective measures for infrastructure like removing river pumps and moving vehicles; creating contact lists such as emergency contacts and neighbouring properties; detailing river height information and estimated flood peak travel times; and stocking supplies to have on hand prior to the wet season.

In AACo's 2020 Annual Report, Hugh Killen, the Managing Director and CEO praised the staff, '*We lost a significant number of cattle as a result of the flood event and it was a very emotional time for the team involved and I commend them for the resilience they've demonstrated*.'

Case Study – Support for Remote and Isolated Workers

Safe Work Australia state that working remotely or alone increases the risk of any job, with poor access to emergency assistance being one of the main hazards of this type of work. During the 2019 floods, Council staff became stranded for a number of days. To be able to communicate with their Works Manager, they had to leave their camp to obtain phone signal. Safe Work Australia highlight that, *'the consequences of an incident when a worker is injured can be more serious if there is nobody to provide first aid or call for assistance. Specific measures should be put in place to ensure, that should an incident occur, help is quickly received.'* Council recognised that worker isolation posed potential hazards and identified that a survival kit and satellite internet system would help mitigate some of these risks.

Council successfully applied for a grant of $17,220 from the Natural Disaster Resilience Program to purchase five Survival Kits. Each kit includes an Iridium Extreme 9575 Grab and Go satellite bundle, high risk survival first aid kit, 15PST 160 LPM air compressor, UHV CB Radio Twin Pack, mobile power bank and portable solar charger. Each kit is contained within a water and dust proof cargo box and deployed whenever staff are attending or working in remote areas. The enhanced ability to contact others and apply first aid are crucial control measures in minimising the risks associated with lone and remote working.

In addition to these Survival Kits, Council has recently acquired a VSAT communication trailer to transmit and receive data, voice and video signals over a satellite internet connection. The fully integrated and ruggedised trailer contains everything needed to obtain secure satellite internet, dual-band and long-range Wi-Fi, and VoIP telephony with full outback/remote coverage, advanced networking and 12V/240V operation. This system will not only benefit remote workers but could also be utilised by Council or community groups at events, or by the disaster coordination centre during response when other fixed internet and phone systems have failed due to outages.

Measures such as the survival kits and satellite internet trailer show significant consideration of mitigating WHS risks and significant vision in enhancing resilience against future events.

Case Study – Cloncurry Foodworks Aerial Resupply

Foodworks Cloncurry is a locally owned business, that 'understands the needs of the community' (the North West Star, 2019). When the floods left Cloncurry residents isolated, Foodworks used inventive initiatives to ensure they could continue providing goods to people in the area.

Foodworks Cloncurry maintains a level of disaster preparedness during the wet season, holding extra stocks especially of UHT milk and canned foods. However, the unanticipated extent of the floodwater's impact on Queensland supply routes meant they had to resort to chartering in food resupplies during the event, at their own cost.

Fresh fruit, vegetables, meat and other perishables were flown in a number of times, initially from a truck inbound from Brisbane but stranded in Winton, and then with the supply trucks from Townsville meeting the Foodworks planes at Richmond.

For larger loads Foodworks had to activate their alternate supply route from Darwin, highlighting the need for depth in supply chain planning. Once flood waters had receded, supplies were able to be sourced from usual suppliers in Townsville and Brisbane.

Case Study: Disaster Response & Community Disaster Relief Staging Shed

After the 2019 floods, Council received generous donations from the public and relevant agencies, including <items>. To streamline both the receipt of donated goods and the distribution to those in need, a suitable designated storage space was urgently required.

Council consulted the community and applied for a grant from the Queensland Reconstruction Authority. Council's application for $29,495 to establish a Staging Shed for Community Recovery Activities was successful and works commenced in <month, year>.

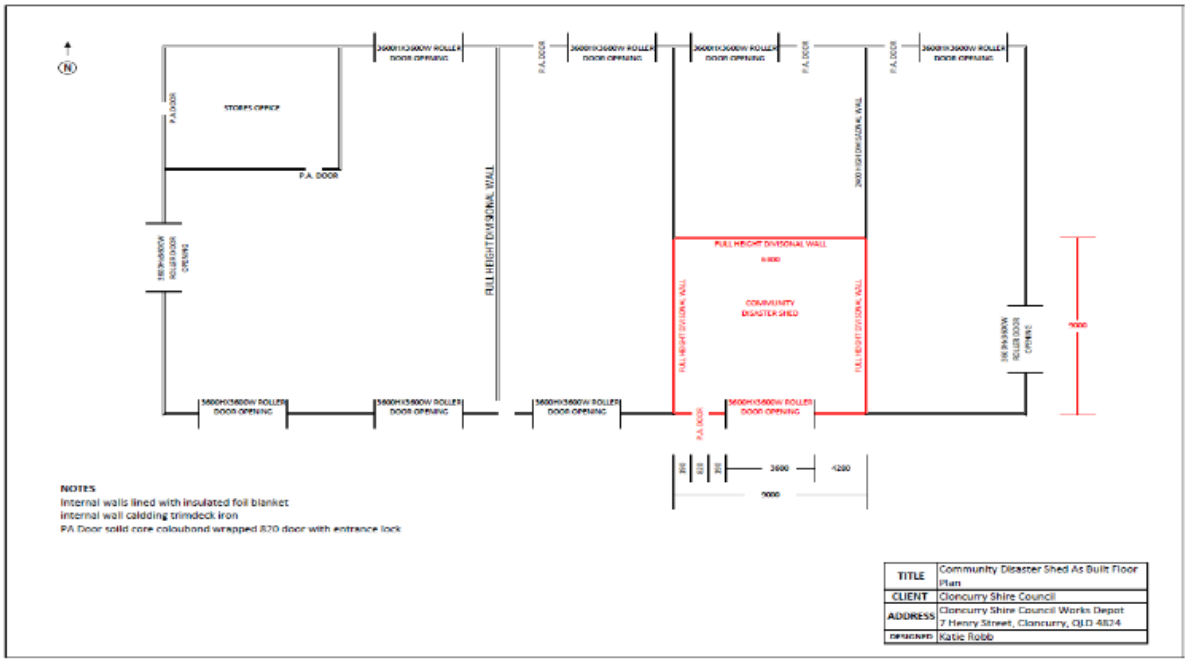
The funding was used to upgrade an existing structure at the Council Depot including:

- Installation of insulation
- LED lighting
- Signage
- Vermin proofing (flashing)
- Ventilation / roofing
- Storage options
- Restoration of motorised roller doors,
- Repairs to concrete flooring, and
- Electrical work.

There are plans to install additional shelving as required.

The designated staging shed gives Council somewhere to store their emergency response Variable Message signs (VMS) when there isn't an event, and a place to store and disseminate disaster relief supplies when there is.

Cloncurry Shire Council Project Manager, Scott Barker, stated, *'Council now has a storage space at the Depot specifically for disaster relief, making us more prepared for any future events.'*

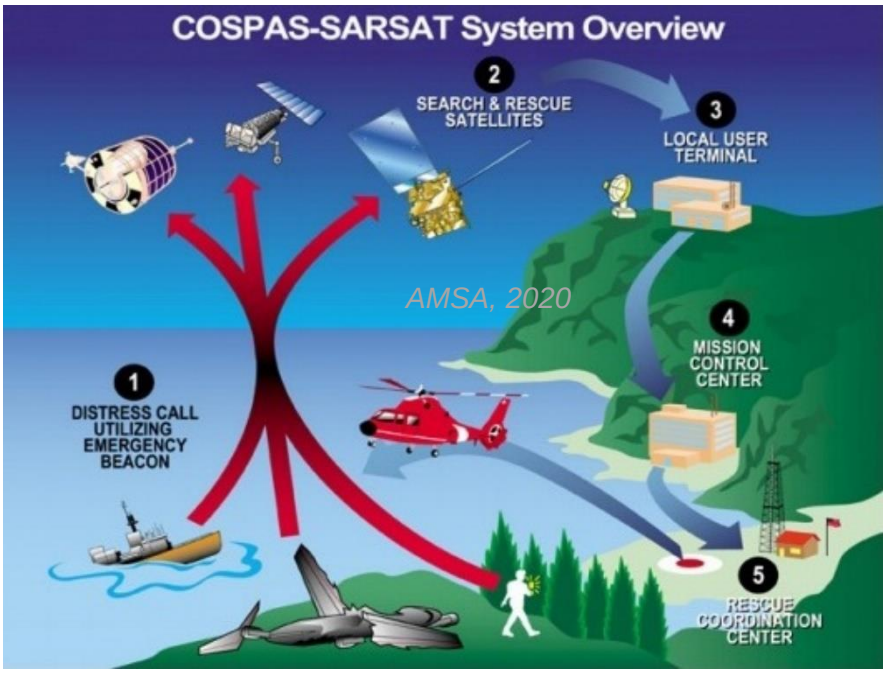


Case Study – Personal Safety: The Value of Emergency Locator Beacons

Australian Government
Australian Maritime Safety Authority

Farming is one of the most dangerous industries in which to work (Safe Work Australia, 2021). The unique risk in farming is the combination of hazards, ranging from vehicle and plant incidents, moving objects, electricity, chemicals and working with animals; to falls, hard physical labour, noise, dust, sun exposure, working at night, and the stresses of running a business. In addition, farming has the largest proportion of self-employed workers, meaning farmers frequently work alone at a distance from help or first aid and often in remote locations without mobile phone coverage. Given this solitary isolation combined with the above hazards, an Emergency Locator Beacon's ability to alert and get help could mean the difference between life and death.

Emergency Locator Beacons are essential safety items that, when activated, alert search and rescue authorities to your estimated position and trigger a response, such as contacting emergency contacts. There are two main categories of emergency locator beacons: Emergency Position-Indicating Radio Beacons (EPIRBs) and Personal Locator Beacons (PLBs). While both are portable battery-powered radio transmitters which utilise satellite communications to pinpoint the distress signal's location, EPIRBs are designed specifically for maritime applications, while PLBs are designed for individuals and are therefore smaller and lighter. Both operate on the COSPAS-SARSAT system by sending a radio signal on the 406 MHz distress frequency to the Joint Rescue Coordination Centre (JRCC) in Canberra (run by the Australian Maritime Safety Authority) who then contact the designated emergency contact as per the device's registration and initiate search and rescue operations as required.



There are numerous examples of the difference PLBs can make to the outcome of an incident on a remote property. Earlier this year, a New Zealand worker was kicked by a bull tumbling 7m downhill and suffering moderate back injuries. In 2019, a New Zealand farmer was working alone in a remote area when he dislocated his hip and was unable to move. In both cases, by activating their PLB, there were able to be found promptly by rescue helicopter and airlifted to hospital for further/emergency treatment.

The NZ Federated Farmers president, Jim Galloway, emphasised, *"If you're trapped under a bike and can't get to your phone or there's no reception, a PLB can save your life."* He highlighted that it is *'often many hours before people realise someone is missing and have to go and find* them'.

Closer to home, in 2016, a Pinnacle cattle farmer was gored by a bull and suffered multiple fractures and cuts to his legs, arms, and chest. He activated a PLB and was located and flown to Mackay Base Hospital where he received lifesaving treatment. CQ Rescue CEO quoted '*…a $150 device has saved his life.'*

Key farm safety bodies, including Workplace Health and Safety Queensland, the National Famer's Federation and Farmsafe Australia all advocate PLBs and EPIRBs as a crucial and critical method of communication. Cost effective, easy to use, lightweight and waterproof, they are one of the most reliable and straightforward ways of signalling distress and hastening response.

Emergency situations in remote location can escalate quickly and injuries and fatalities have immeasurable impacts on farmers, their families, their workers and the community. The value of potentially life-saving emergency location beacons cannot be underestimated.

For further information of beacons, visit: [Beacon types and models - Beacons (amsa.gov.au)]

Current PLB models

6 Appendix: Maps

Four A3 printable PDF maps were created specifically for this project.

Snapshots of these maps are included below, but higher resolution PDF versions have been supplied to Council.

6.1 Road Network: Cloncurry and Surrounds

This map focuses on the road network within and around Cloncurry Shire. It shows:

- Strategic freight importance of Cloncurry at the intersection of two National Routes
- Trouble spots on the road network. These are inputs into the Guardian Incident Management System that allow one step road closure in pre-defined locations, with almost immediate notification to Cloncurry's Community Dashboard/

6.2 Airstrips: Cloncurry Shire and Surrounds

This map focuses on the short-range aerial network within and around Cloncurry Shire. It shows:

- Cloncurry Shire Council's airport and airstrips
- With data sourced from the Royal Flying Doctor Service in 2021, up-to-date airstrip information for many of the privately-owned airstrips in and around Cloncurry Shire
- Date from state database (2015) on privately owned airstrips

This data has been replicated within Guardian IMS to assist with emergency management.

6.3 Telstra 3G / 4G Coverage: Cloncurry and Surrounds

This map focuses on mobile phone / mobile data coverage across the Telstra network within and around Cloncurry Shire.

This is particularly useful when considering safety and resilience improvements to the communications network within Cloncurry Shire, and relates directly to Infrastructure Resilience recommendations on communications within the Recommendations Report at Appendix: Companion Report: Recommendations for Improving Community Continuity from the Building Resilient Logistics Chains Project.

6.4 Aerial resupply for the 2019 Monsoon Event

This map focuses on recorded requests for aerial resupply during the 2019 Monsoon event.

- Useful for understanding potential resupply requirements in future events
- Useful for exercising for future resupply events
- Useful in preparing services providers (pharmacy / grocery / light aircraft) for upcoming wet seasons

Wherever possible, the geographical information data sets used for creating these maps were imported into the Guardian IMS All datasets supplied to QIT+ in WGS84 (EPSG: 4326). Data provided in SHP, Geotif and GeoPackage formats.

Road Network - Cloncurry Shire & Surrounds

Inset A - Kajabbi

Inset B - Cloncurry

Inset C - Cloncurry to Julia Creek

Inset D - Dajarra

See Inset A

See Inset B

See Inset C

See Inset D

ID	Troublespot
1	Hensley Drive culvert
2	Link Road
3	Kajabbi Normanton Road
4	Slaty Creek causeway
5	Cloncurry Duchess Road
6	Cloncurry Duchess Road
7	Pilgram Creek Causeway
8	Monastery Creek causeway
9	Petticoat Creek causeway
10	Prickly Creek causeway
11	Canal Creek Anabranch
12	Canal Creek Crossing 1
13	Gilliat Major Crossing
14	Cabbage Tree Creek causeway
15	Clonagh River causeway
16	Dugald River crossing culvert

HVP Heavy Vehicle Parking
T Public Toilets
A Ambulance Station
F Fire Station
P Police Station
SES SES Facility
C Council Chamber

Troublespots
Populated Place
Homesteads
National Route Road
State Route Road
State Controlled Road
Local Road
Railway
Watercourse

Floodway
Mines Tenure
State Land
Reserve or Park
Easement
Water
Flood Extent (2019)
Local Government Areas

0 10 20 30 km

GDA2020 / MGA zone 54

Although funding for this product has been provided by both the Australian and Queensland Governments, the material contained herein does not necessarily represent the views of either Government'. Prepared by Mangoesmapping 01/06/2021 Project: 2021-011.

Airstrips - Cloncurry Shire & Surrounds

Lorraine Homestead
Burketown Road (B4 - Beef Road)
The Three Ways Airstrip
Boomarra Airstrip
Kamilaroi
Gleeson Airstrip
Boomarra Airstrip
Alcala Airstrip
Melinda Downs
Coolullah Airstrip
Dugald River Airstrip
Kajabbi
Granada Airstrip
Cubbaroo Airstrip
Gereta
Clonagh Airstrip
Jessievale
Dugald Mine Road Site
Fort Constantine
Cloncurry Airport
Cloncurry
Mount Isa
Barkly Highway (A2)
Darwin & SA
Cloncurry Dugald River Road (Council Owned)
Brighlands Airstrip
Devoncourt Airstrip
Bushy Park
Dronfield Airstrip
Devoncourt Airstrip
Ashover Airstrip
Stanbroke Airstrip
Tick Hill
Selwyn Mine
Dajarra
Boulia Mount Isa Highway (B3)
The Monument
Chatsworth Airstrip
Trepell Airstrip
Cannington Airstrip
Elrose
Rutchilo
Landsborough Highway (A2)
Flinders Highway (A6)
Julia Creek
Townsville
Julia Creek Airmata Road (B4)
Landsborough Highway (A2)
Brisbane
Kennedy Dev Road (62)
Middleton
Burketown & SA
Burke Shire Council
Carpentaria Shire Council
Croydon Shire Council
Mount Isa City Council
Cloncurry Shire Council
Mckinlay Shire Council
Boulia Shire Council
Winton Shire Council
Alcyone Airstrip
Canobie Station
Violetvale
Glenidol Airstrip

Contains data from Mangoesmapping, RFDS and State of Queensland available at qldspatialinformation.qld.gov.au
In consideration of these parties permitting use of the data, you acknowledge and agree that they give no warranty in relation to the map (including accuracy, reliability, currency, completeness or suitability) and accept no liability (including without limitation liability in negligence) for any loss damage or costs (including consequential damage) relating to the use of this map.

Although funding for this product has been provided by both the Australian and Queensland Governments, the material contained herein does not necessarily represent the views of either Government'. Prepared by Mangoesmapping 01/06/2021 Project: 2021-011.

Airstrips

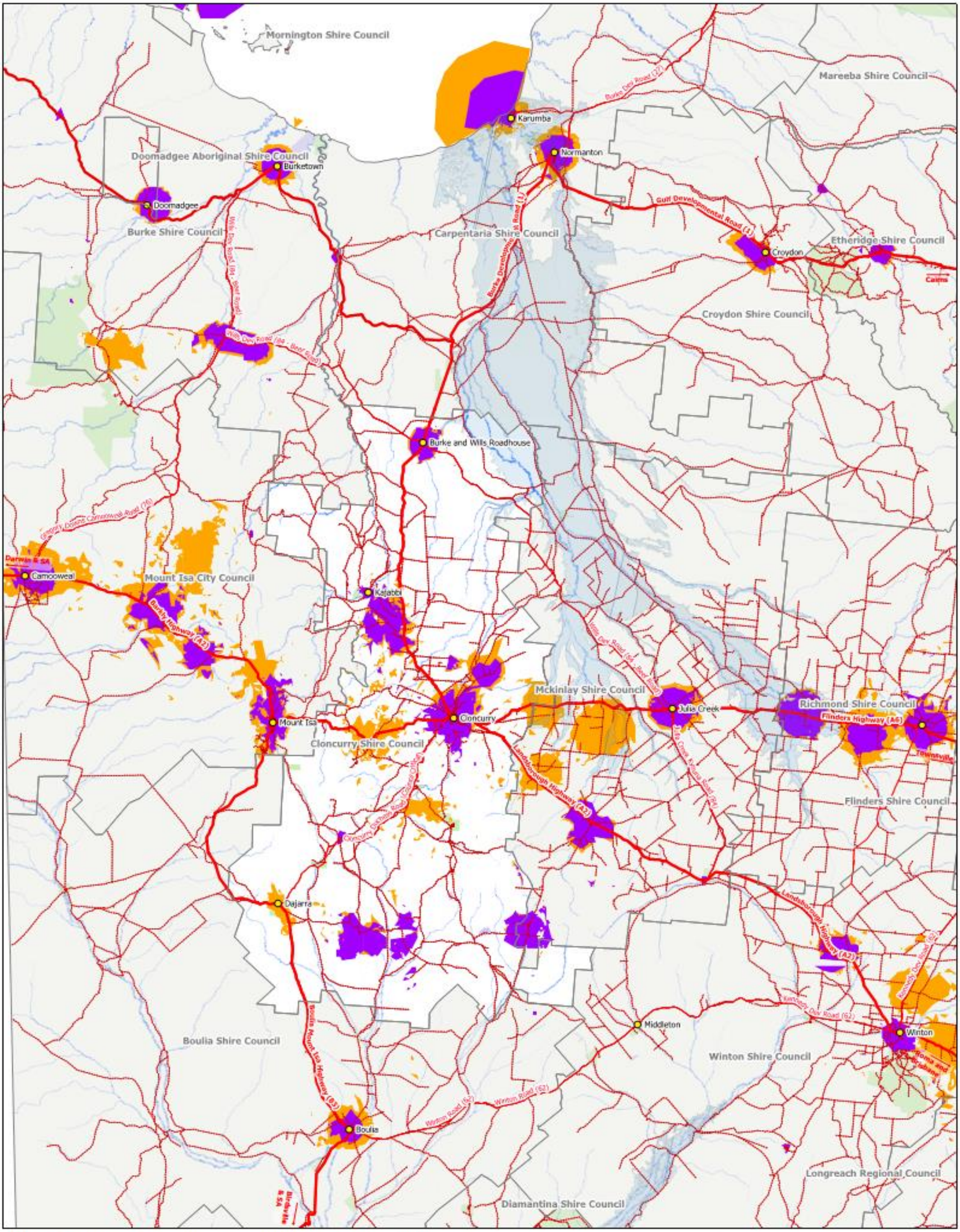
- Major: Council Owned
- Minor: RFDS Provided (2021)
- Other (2015 State Data)

- Populated Place
- Homesteads
- Railway
- National Route Road
- State Route Road
- State Controlled Road
- Local Road
- Watercourse
- State Land
- Reserve or Park
- Easement
- Water
- Flood Extent (2019)
- Local Government Areas

0 10 20 30 km

GDA2020 / MGA zone 54

Telstra 3G/4G Coverage - Cloncurry Shire & Surrounds



Telstra Modelled Coverage
- 4G Mobile
- 3G Mobile

- Populated Place
- Railway
- National Route Road
- State Route Road
- State Controlled Road
- Local Road
- Watercourse

- Mines Tenure
- State Land
- Reserve or Park
- Easement
- Water
- Flood Extent (2019)
- Local Government Areas

0 10 20 30 40 km

GDA2020 / MGA zone 54

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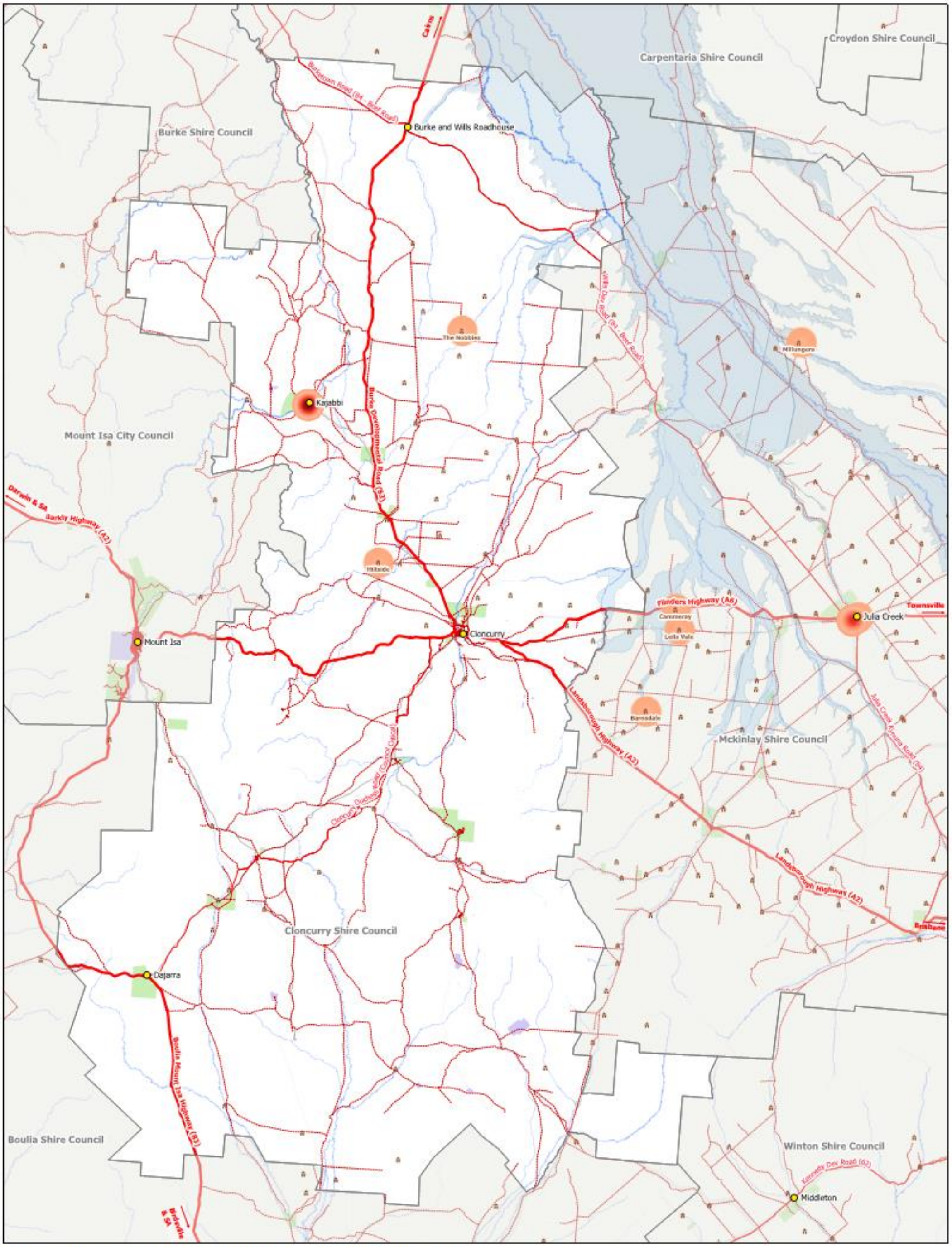

Aerial Resupply - 2019 Monsoon Event - Cloncurry Shire & Surrounds

Resupply* for 2019 Flood Event
- Single Resupply at Location
- Multiple Resupply at Location

*Only resupplies via Cloncurry Shire Council are included. 2019 hay drops were excluded in this mapping.

- Populated Place
- Homesteads
- Railway
- National Route Road
- State Route Road
- State Controlled Road
- Local Road
- Watercourse
- Mines Tenure
- State Land
- Reserve or Park
- Easement
- Water
- Flood Extent (2019)
- Local Government Areas

0 10 20 30 km

GDA2020 / MGA zone 54

Although funding for this product has been provided by both the Australian and Queensland Governments, the material contained herein does not necessarily represent the views of either Government'. Prepared by Mangoesmapping 01/06/2021 Project: 2021-011.

7 Appendix: Companion Report: Recommendations for Improving Community Continuity from the Building Resilient Logistics Chains Project

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CLONCURRY SHIRE BUILDING RESILIENT LOGISTICS CHAINS RECOMMENDATION REPORT

June 2021

Acknowledgements

This report was created by Resilient Projects for Cloncurry Shire Council as part of the Building Resilient Logistics Chains project (CSC 2020-02).

The project was jointly funded by the Commonwealth and Queensland Governments under the Disaster Recovery Funding Arrangements (DRFA).

Although funding for this product has been provided by both the Australian and Queensland Governments, the material contained herein does not necessarily represent the views of either Government.

#DRFA-Qld

Expenditure for this service is undertaken within Disaster Recovery Funding Arrangements 2018 and is managed by the Queensland Reconstruction Authority (QRA) according to the Queensland Disaster Relief and Recovery Arrangements Guidelines

(http://www.qldreconstruction.org.au/u/lib/cms2/NEW-Qld-Disaster-Relief and-Recovery-Arrangements-Guidelines-February-2016-added-2nd-march.pdf).

8 Project

8.1 Project Background

The Building Resilient Logistics Chains project (CSC 2020-02) was identified by Cloncurry Shire Council staff as a way to enhance the resilience of the Cloncurry community to future hazard events following significant flooding caused by the 2019 North and North West Queensland Monsoon.

The project was jointly funded by the Commonwealth and Queensland Governments under the Disaster Recovery Funding Arrangements (DRFA).

8.2 Project Objectives

Overall project objectives as stated by CSC and grant funding requirements included:

- The project contributes to disaster recovery and the future disaster preparedness of the community
- Vulnerability analysis of logistics chains and critical infrastructure of Cloncurry and identify pre- and post-disaster countermeasures

This included a requirement to supply an online tool that could be used to:

- Plan responses to disasters
- Mobilise community assets for recovery and response in disasters
- Used by the community to prepare for disasters

The project objectives have all been met, and this recommendations report is the tool to identify and advise on the countermeasures to further improve the disaster resilience of Cloncurry.

8.3 Project Approach

The project team chose a community continuity approach to delivering the objectives of the project.

Community continuity is an adaptation of business continuity, and revolves around keeping the community running, or returning critical community functions as soon as possible, whatever the disruption.

The process of community continuity follows a similar process to business continuity where:

- A community profile is developed, to better understand the needs of the community
- A vulnerability analysis is undertaken, with a specific focus on commodities and critical infrastructure

- Mitigations and contingencies (this report) are identified to improve community continuity and resilience.

Key to the concept of community continuity is the idea of resilience as a system, interlocking sets of different types of resilience. The three types of resilience in this system are:

- Community resilience
- Organisational resilience
- Infrastructure resilience

Where improvements are made to any type of resilience, the existing interconnections between all the systems that allow Cloncurry to operate, will necessarily improve the resilience of the system as a whole.

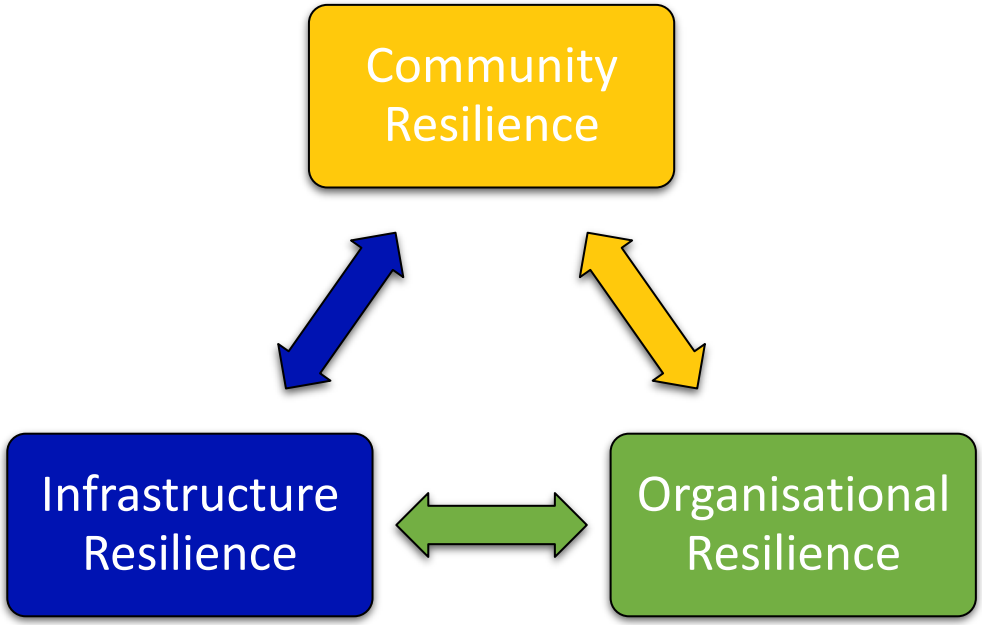

Figure 47: Community Continuity: A System to Build Resilience

8.4 Project Outcomes

The project outcomes included:

- Project Requirements Report
- Project Consultation Report (Workshops and Interviews)
- GIS Mapping
    - Road Network including known trouble spots
    - Airfields within CSC
    - Mobile communications coverage within region
    - Resupply map for 2019 flood event
- GIS inputs into online tool that also includes council assets such as water and sewer, and state-owned assets including roads and electricity supply
- Online tool for Emergency and Disaster Management
- Online tool for community – the Cloncurry Community Dashboard

Additionally, the project funds were stretched to provide additional value via:

- Update to Cloncurry Local Disaster Management Plan (LDMP)
- Additional Sub Plans to LDMP including Emergency Resupply and Logistics Sub Plan
- Role Cards for LDMP and CSC roles to better prepare staff for emergency and disaster events

Outcomes are either live (online systems for CSC and community), accepted, or with Council for final review.

Figure 49: Cloncurry's Community Dashboard

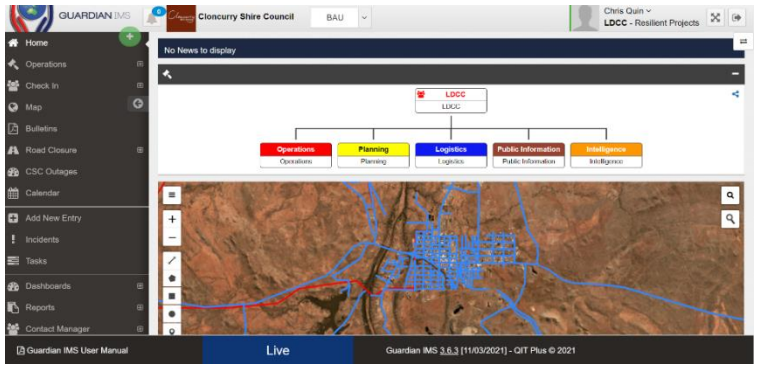

Figure 48: Cloncurry's Guardian Incident Management System

8.5 Recommendation Methodology

8.5.1 Recommendation Sources

Recommendations were collected during initial interviews and workshops with residents of Cloncurry Shire. Recommendations were assessed by the project team for viability and recorded within the tables below. The project team also added recommendations based on observations during interviews and community workshops.

8.5.2 Recommendation Resourcing

Individual recommendations are made in isolation and assume unlimited resources, which is never the reality with any Council, or indeed any organisation.

While a lead organisation and supporting organisations are identified, these are initial indicators only, and recommendations may be able to be adopted and implemented by many organisations, with many different supports.

8.5.3 Simplified Cost / Benefit Analysis

The methodology has been adjusted to help prioritise actions, with a very rudimentary version of cost/benefit analysis. Likely Costs and Benefits are high level scoping estimates only, in an effort to identify areas where action might yield the most benefit for cost inputs. Costs have been elevated slightly in the assessment to reflect that CSC does not have unlimited resources in either budget or time.

Where existing projects have already undertaken a Cost/Benefit Analysis or Detailed Business Case, this high-level assessment should not take the place of those assessments – assessments within this report are to allow a simple prioritisation on where CSC might best spend their effort, with a specific focus on Community Continuity.

Recommendations have been assessed against Cloncurry's 2019 Monsoon Recovery Plan, Queensland's State Recovery Plan Lines of Recovery for the 2019 Monsoon, the Queensland Strategy for Disaster Resilience objectives, and the Commonwealth's 2019 Recovery Pillars.

8.5.3.1 Cost Range Definitions

Rating	Cost Range	Value
1	Low	Time effort only required from existing staff resources
2	Low – Medium	Staff effort plus additional funds, likely to be covered within operational budgets
3	Medium	Some project funding required (indicatively below $200,000)
4	Medium – High	Project funding required (between $200,000 to $1,000,000)
5	High	Substantial project funding required ($1,000,000 +)

8.5.3.2 Benefit Range Definitions

Benefits were only assessed on their contribution to community continuity, in the form of saving lives or livelihoods, or protecting community services or property.

No consideration was given for usual benefits identification processes, such as increased profit or avoided costs. These should be considered in more detailed assessments or business case before undertaking the recommended activities.

Rating	Cost Range	Value
1	Low	Very minor assistance to save lives, livelihoods, protect community services, or protect property in excess of initial investment
2	Low – Medium	Minor assistance to save lives, livelihoods, protect community services, or protect property in excess of initial investment
3	Medium	Likely to save lives, livelihoods, protect community services, or protect property in excess of initial investment.
4	Medium – High	Very likely to save lives, livelihoods, protect community services, or protect property in excess of initial investment
5	High	Almost certain to save lives, livelihoods, protect community services, or protect property in excess of initial investment

8.5.4 Links to Local, State and Commonwealth Government Policy

Wherever possible, each recommendation has been linked to relevant local, state, and Commonwealth government policies, relevant to both general resilience and recovery, but also to the specific event that led to the funding for this project, the 2019 North and North West Queensland Monsoon Flooding.

8.5.4.1 Cloncurry Shire Council Local Monsoon Trough Recovery Plan

Cloncurry Shire Council, along with the Queensland Reconstruction Authority, produced the Cloncurry Shire Council Local Monsoon Trough Recovery Plan in 2019. Now in 2021, the recovery is well advanced, with a predicted transition to business-as-usual date of 1 March 2022.

The graphic below shows the intended progress toward recovery with the transition outcomes to the right. In identifying and assessing the recommendations, these transition outcomes have been front of mind for the project team, representing the local objectives for a more resilient community, and enhanced community continuity.

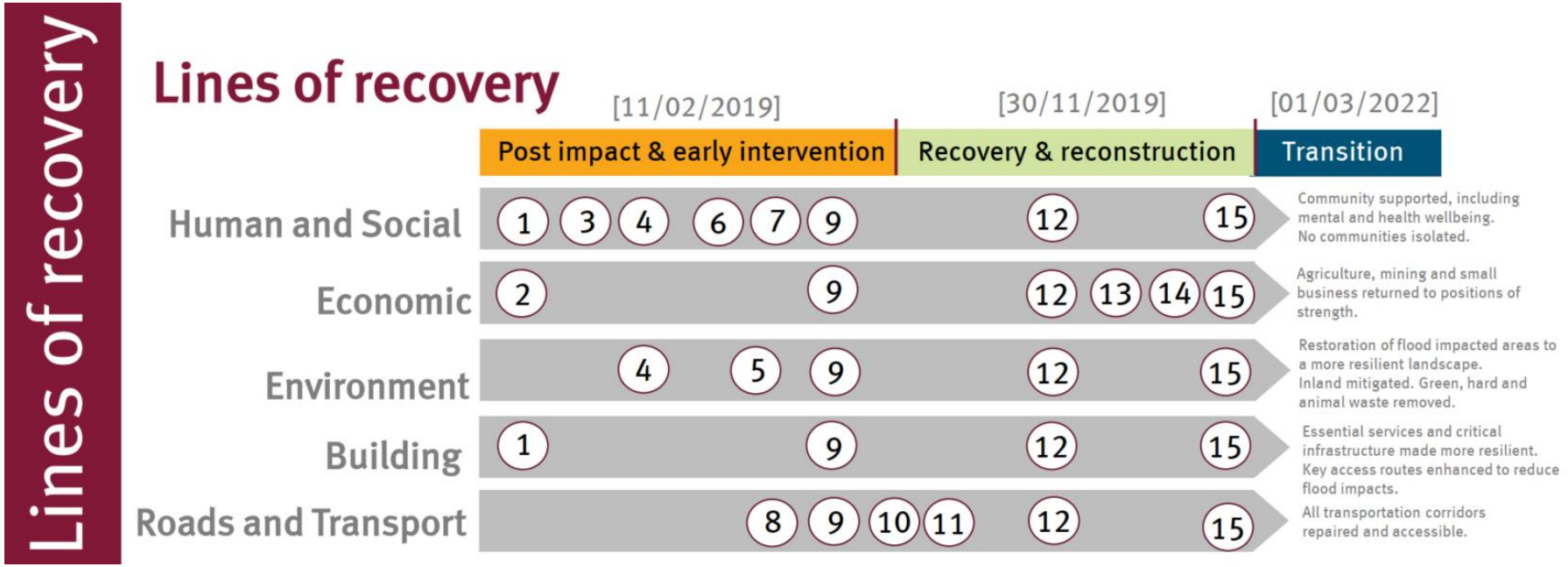

Figure 50: Cloncurry Shire Council's Lines of Recovery

8.5.4.2 North and Far North Queensland Monsoon Trough State Recovery Plan 2019-2021

The state recovery objectives are reflected strongly in the *North and Far North Queensland Monsoon Trough State Recovery Plan 2019-2021*. [47].

As the end of the recovery plan period approaches, the focus becomes the outer edge of the recovery diagram represented in the plan where progress along the recovery lines is represented by:

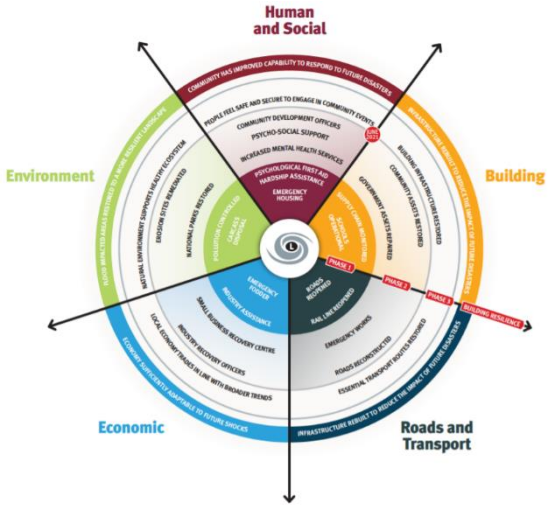

Figure 51: Queensland Lines of Recovery

Recovery Line	Resilience Building Objective
Human and Social	Community has improved capability to respond to future disasters
Building	Infrastructure rebuilt to reduce the impact of future disasters
Roads and Transport	Infrastructure rebuilt to reduce the impact of future disasters
Economic	Economy sufficiently adaptable to future shocks
Environment	Flood impacted areas restored to a more resilient landscape

8.5.4.3 Queensland Strategy for Disaster Resilience

The *Queensland Strategy for Disaster Resilience* [48] provides an overarching framework to empower Queenslanders to factor in resilience measures and activities as they anticipate, respond and adapt to changing circumstances.

The *Queensland Strategy for Disaster Resilience* is underpinned by the four key objectives in the table below.

Each of these objectives has been considered and identified in the recommendations, in this report.

Figure 52: Qld Strategy for Disaster Resilience Objectives

8.5.4.4 2019 Queensland Monsoon Trough. After the Flood: A Strategy for Long-term Recovery

The Australian Government's National Recovery and Resilience Agency (previously the National Drought and North Queensland Flood Response and Recovery Agency), published their strategy for long-term recovery in 2020[49].

The strategy is built on the five pillars below:

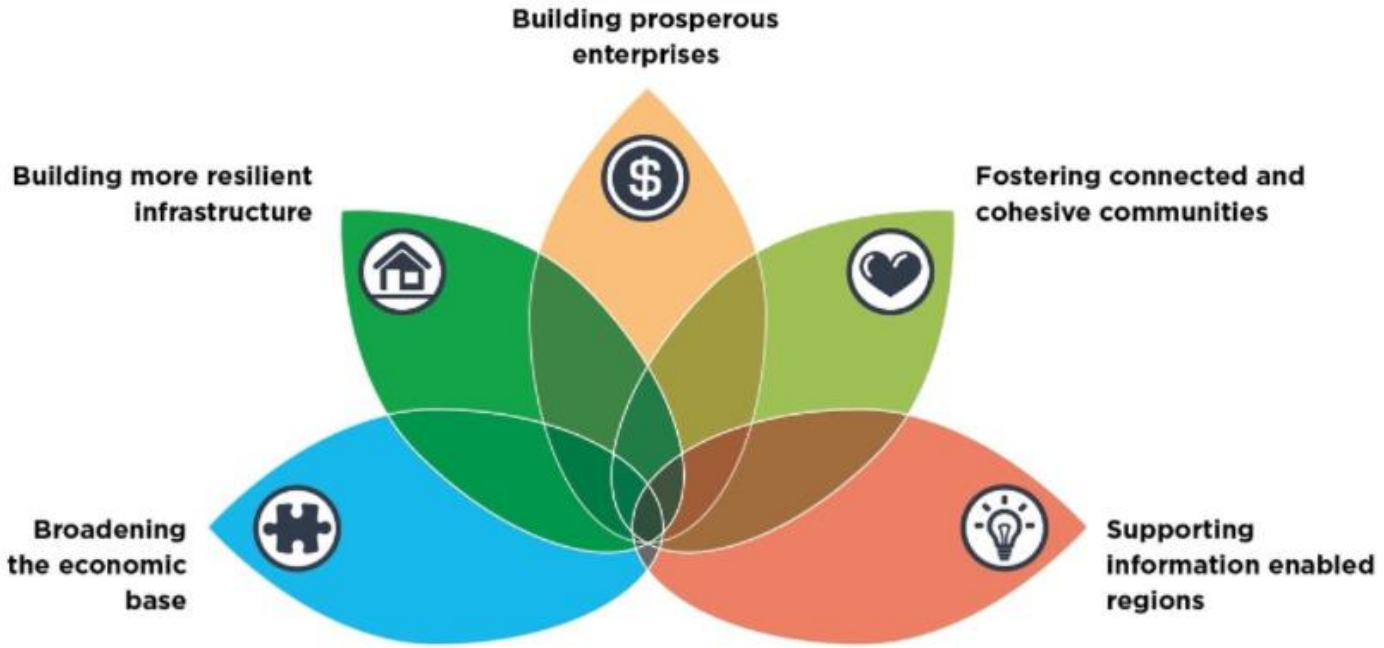

Figure 4: National Resilience and Recovery Agency five pillars of recovery

The recovery pillars have also been identified in the recommendations within this report.

8.6 Community Resilience Recommendations

Each recommended action within the table below is designed to improve community resilience within Cloncurry Shire. Improving community resilience also improves organisational and infrastructure resilience, as shown in Figure 1: Community Continuity: A System to Build Resilience.

These actions are the mitigations (before a hazard event) or contingencies (when an event occurs) that form the basis of improvements to Cloncurry's community continuity.

Before undertaking any of these actions, it is recommended that organisations undertake their own assessment of the costs and benefits, with relevance to the cost of each action.

ID	Category	Community Resilience Recommendation	Lead Org	Supporting Org	Likely Cost Range (1-5)	Likely Benefit Range (1-5)	Priority (simplified cost / benefit) (0-5)	Qld State Recovery Plan Lines of Recovery	QDSR Objectives	National Recovery Pillars
CR DP1	Community Resilience: Disaster Preparedness	**Emergency Services Day** Get Ready Community Day Support exists through Queensland Health, QFES and other agencies to assist with community day to provide disaster preparedness advice, disaster mental health first aid training and support etc.	Cloncurry Shire Council	State Agencies LDMG	1	3	3	Human & Social	1, 2	Cohesive Communities Information Enabled

ID	Category	Community Resilience Recommendation	Lead Org	Supporting Org	Likely Cost Range (1-5)	Likely Benefit Range (1-5)	Priority (simplified cost / benefit) (0-5)	Qld State Recovery Plan Lines of Recovery	QDSR Objectives	National Recovery Pillars
CR DP2	Community Resilience: Disaster Preparedness	**Expand existing pre-season communication networks** Currently includes grocery and bakery suggest expanding to include pharmacy, fuel suppliers and any other logistics chains to protect	Cloncurry Shire Council	Local Businesses	1	3	3	Human & Social Economic	2,3,4	Prosperous Enterprises Cohesive Communities
CR VP1	Community Resilience – Vulnerable Facilities	**Vulnerable facilities register** List should be stored in Guardian IMS List should include facilities where vulnerable people reside or spend time (although this is already held as local knowledge, locals are not always available).	Cloncurry Shire Council	Community Groups	1	3	3	Human & Social	1,2,4	Cohesive Communities Information Enabled
CR F1	Community Resilience – Families	**Improved access and resilience of childcare and Out of School Hours Care (OSHC)** Childcare and OSHC seen as key in retaining community members Schools and childcare should be priorities for service restoration after major disaster as when children are safe it frees up more resources to aid in community recovery	Cloncurry Shire Council	Community Groups	3	4	1.3	Human & Social	4	Cohesive Communities

ID	Category	Community Resilience Recommendation	Lead Org	Supporting Org	Likely Cost Range (1-5)	Likely Benefit Range (1-5)	Priority (simplified cost / benefit) (0-5)	Qld State Recovery Plan Lines of Recovery	QDSR Objectives	National Recovery Pillars
CR W1	Community Resilience – Remote Workers and Travellers	**Promote the value of Personal Locator Beacons (PLBs)** Personal Locator Beacons (PLBs) or their marine equivalents (EPIRBs) provide last resort emergency comms for personal safety. They have saved the lives of many farmers and remote workers.	Cloncurry Shire Council	State Agencies, LDMG	1	5	5	Human & Social Economic	2, 3	Prosperous Enterprises Connected Communities
CR CC1	Community Resilience – Communicating with the Community	**New community dashboard linked from other providers** Other agencies to promote the use of the new Cloncurry Community Dashboard via their own websites and social media. Queensland Health has already committed to provide a link to their staff, to better prepare them for travel to and from work.	Cloncurry Shire Council	State Agencies, LDMG	1	5	5	Human & Social Economic	1,2,3,4	Prosperous Enterprises Information Enabled

ID	Category	Community Resilience Recommendation	Lead Org	Supporting Org	Likely Cost Range (1-5)	Likely Benefit Range (1-5)	Priority (simplified cost / benefit) (0-5)	Qld State Recovery Plan Lines of Recovery	QDSR Objectives	National Recovery Pillars
CR CC2	Community Resilience – Communicating with the Community	**Multiple communications methods for emergency messaging** Promote multiple methods of communication with Cloncurry residents and visitors, especially in emergency situations: dashboard, internet, voice network, AM/FM radio, UHF, Satellite Phones/Data, HF Radio	Cloncurry Shire Council	State Agencies, LDMG	2	5	2.5	Human & Social Economic	2, 4	Connected Communities Information Enabled
CR H1	Community Resilience – Housing	**Promote heat mitigation through white roofs and thermal paint** Climate projects show more extreme heat for Cloncurry Shire. Passive heat mitigation through white roofs, thermal paint, and even shading from trees can promote a cooler environment with less risk of heat-related illness or death.	Private homeowners	DCHDE	2	3	1.5	Human & Social Building	3	Resilient Infrastructure
CR ED1	Community Resilience – Economic Diversification	**Economic diversification** Economic Diversification including tourism (historical tourism), dryland cropping etc.	Cloncurry Shire Council	DTIS, DAF, Sunwater	5	5	1	Economic	3	Economic Base

ID	Category	Community Resilience Recommendation	Lead Org	Supporting Org	Likely Cost Range (1-5)	Likely Benefit Range (1-5)	Priority (simplified cost / benefit) (0-5)	Qld State Recovery Plan Lines of Recovery	QDSR Objectives	National Recovery Pillars
CR SC1	Community Resilience – Increase Social Capital	**Build on existing strengths to increase social capital** Build on existing strengths to increase social capital – existing strengths include strong bonding social capital, mayoral leadership (linking social capital), strong resources and agricultural sectors. Options for building on good social capital include community events (see CR DP1) and support of community-centric organisations, including bringing these organisation together on a regular basis. Community training in first aid etc. can also help.	Cloncurry Shire Council	Community Groups, Businesses	1	5	5	Human & Social Economic Environment Building Roads & Transport	4	Resilient Infrastructure Cohesive Communities

ID	Category	Community Resilience Recommendation	Lead Org	Supporting Org	Likely Cost Range (1-5)	Likely Benefit Range (1-5)	Priority (simplified cost / benefit) (0-5)	Qld State Recovery Plan Lines of Recovery	QDSR Objectives	National Recovery Pillars
CR SC2	Community Resilience – Increase Social Capital	**Prevention, Preparedness, Response, and Recovery Network** Build a Comprehensive Disaster Management network of contacts: Cross council relationships (NWQROC) Inter Council relationships during events (e.g., Cloncurry looking after McKinlay and southern end of Carpentaria) Relationships and support from mining (e.g., 2019 floods support, sponsorship) Invite guest observers to LDMG	Cloncurry Shire Council	LDMG	1	4	4	Human & Social Economic Environment Building Roads & Transport	1,2,3,4	Resilient Infrastructure Connected Communities Information Enabled
CR SC3	Community Resilience – Increase Social Capital	**Historical hazard data as stories** Create sets of case studies or stories on previous events (e.g., 2009, 1997 floods, 2012 fire that threatened the hospital etc.)	Cloncurry Shire Council	LDMG	1	2	2	Human & Social	1	Information Enabled

8.6.1 Social Capital

Some recommendations in this report refer to increasing social capital. Social capital as a concept has existed for some time, but it has only been in the last decade or so that we understand the important links between social capital and a community's ability to recover from disasters.

The graphic below explains the commonly acknowledged types of social capital: bonding, bridging and linking social capital.

Prior to the 2019 floods it's very obvious that Cloncurry possessed significant amounts of bonding social capital – the connections to people that are very much like each other. From our community workshops, we heard many stories of how well people worked together to help each other – graziers helping other graziers is a good example of bonding social capital.

Different organisations helping each other (e.g., mining companies and the military helping graziers) exemplify bridging social capital, where different groups (usually community groups, in this case organisations) work together to help each other or others out.

Linking social capital came into play during 2019, where local political leaders such as Mayor Campbell, linked the community to both federal and state government to gain disaster recovery assistance for the community.

From these very specific examples within Cloncurry, it's clear how well social capital allows communities to adapt and recover to extreme situations. More examples can be found in Professor Daniel Aldrich's book *Social Capital in Post-Disaster Recovery*.

Building social capital, or enhancing existing social capital, is a key defence against future disruption from hazard events.

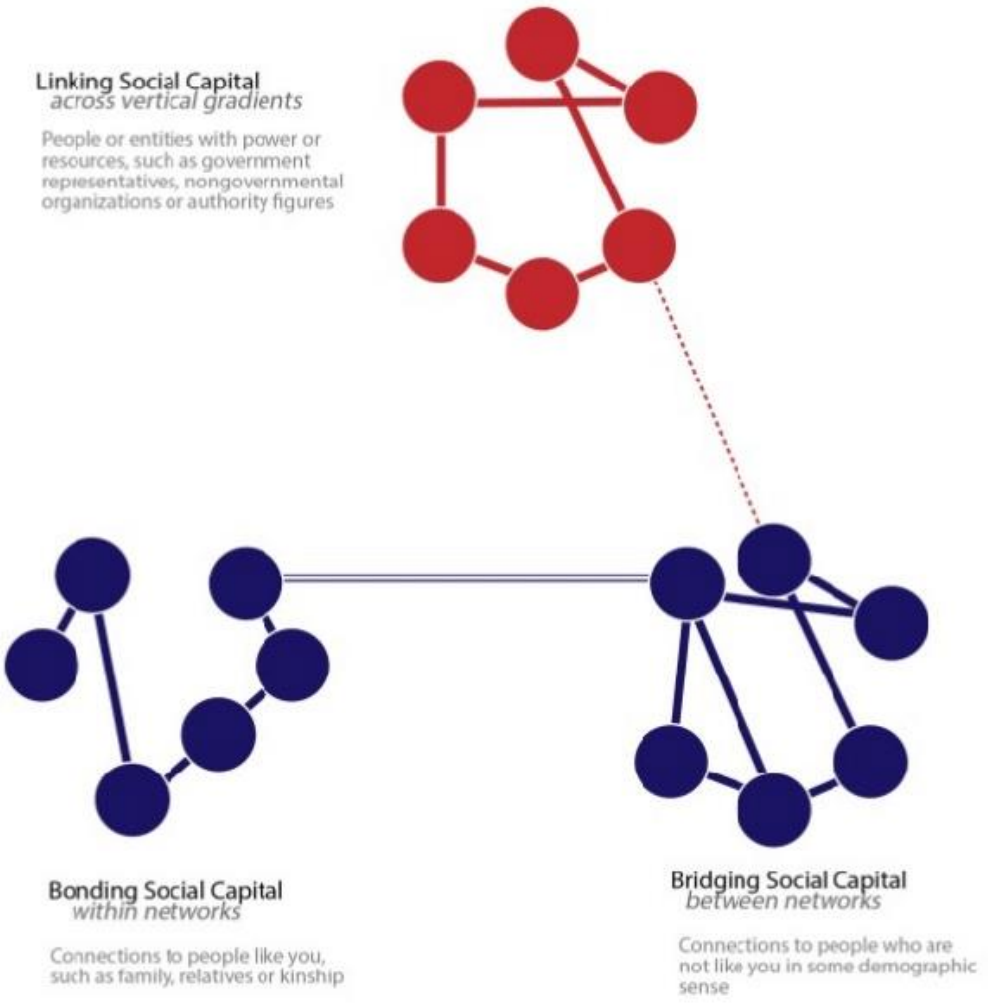

Figure 53: Bonding, bridging and linking social capital (Aldrich 2012)

8.7 Organisational Resilience Recommendations

Each recommended action within the table below is designed to improve organisational resilience within Cloncurry Shire. Improving organisational resilience also improves community and infrastructure resilience, as shown in Figure 1: Community Continuity: A System to Build Resilience.

These actions are the mitigations (before a hazard event) or contingencies (when an event occurs) that form the basis of improvements to Cloncurry's community continuity.

Before undertaking any of these actions, it is recommended that organisations undertake their own assessment of the costs and benefits, with relevance to the cost of each action.

ID	Category	Organisational Resilience Recommendation	Lead Org	Supporting Org	Likely Cost Range (1-5)	Likely Benefit Range (1-5)	Priority (simplified cost / benefit) (0-5)	Qld State Recovery Plan Lines of Recovery	QDSR Objectives	National Recovery Pillars
OR LD1	Organisational Resilience: Local Disaster Management Group (LDMG)	**Raise LDMG profile within Cloncurry Shire** Raise awareness of LDMG as trusted source of information during emergency and disaster events. Regular media briefings during emergency events Imparja / Southern Cross Community Notice Boards Radio interviews (in conjunction with Mt Isa)	LDMG	Cloncurry Shire Council	1	3	3	Human & Social Economic	2, 4	Cohesive Communities Information Enabled

ID	Category	Organisational Resilience Recommendation	Lead Org	Supporting Org	Likely Cost Range (1-5)	Likely Benefit Range (1-5)	Priority (simplified cost / benefit) (0-5)	Qld State Recovery Plan Lines of Recovery	QDSR Objectives	National Recovery Pillars
OR LD2	Organisational Resilience: Local Disaster Management Group (LDMG)	**Expand advisor membership of the LDMG** Revisit the membership of the LDMG. Consider likely recovery sub group membership after an event and consider inviting likely members to regular LDMG meetings before events to allow experience prior to recovery operations.	Cloncurry Shire Council	LDMG	1	2	2	Human & Social Economic Building Roads & Transport	2, 4	Resilient Infrastructure Connected Communities Information Enabled
OR LD3	Organisational Resilience: Local Disaster Management Group (LDMG)	**Hazard-specific plans** Where warranted, hazard specific sub plans to LDMP. Where a specific impact could hurt Cloncurry's Community these plans can improve community continuity and reduce recovery times: • Biosecurity (e.g., invasive pests / grasshoppers) • Disease outbreak (e.g., human and / or livestock)	Cloncurry Shire Council	LDMG	2	3	1.5	Human & Social Economic	1, 2, 3, 4	Prosperous Enterprises Cohesive Communities Information Enabled

ID	Category	Organisational Resilience Recommendation	Lead Org	Supporting Org	Likely Cost Range (1-5)	Likely Benefit Range (1-5)	Priority (simplified cost / benefit) (0-5)	Qld State Recovery Plan Lines of Recovery	QDSR Objectives	National Recovery Pillars
OR LD4	Organisational Resilience: Local Disaster Management Group (LDMG)	**Location-specific plans** Location-specific / hazard-specific plans Where a rapid impact could threaten lives, livelihoods or property: • Flood plan for housing on anabranch, including flood planning • Wind storm planning for north of Cloncurry shire	Cloncurry Shire Council	LDMG	2	4	2	Human & Social Economic	2, 4	Cohesive Communities Information Enabled
OR LD5	Organisational Resilience: Local Disaster Management Group (LDMG)	**Annual referable dam exercises** Test Chinaman Creek Dam Failure Response and Recovery Under Different Failure Modes	Cloncurry Shire Council	LDMG	1	5	5	Human & Social Economic Environment Building Roads & Transport	1, 2, 3, 4	Resilient Infrastructure Prosperous Enterprises Cohesive Communities Information Enabled
OR LD6	Organisational Resilience: Local Disaster Management Group (LDMG)	**Improve speed of LDMG messaging to community** Invest in a communications platform to provide email, SMS and voice warnings and messaging to residents of the Cloncurry shire, staff and LDMG members.	Cloncurry Shire Council	LDMG	3	4	1.3	Human & Social Economic	2, 4	Cohesive Communities Information Enabled

ID	Category	Organisational Resilience Recommendation	Lead Org	Supporting Org	Likely Cost Range (1-5)	Likely Benefit Range (1-5)	Priority (simplified cost / benefit) (0-5)	Qld State Recovery Plan Lines of Recovery	QDSR Objectives	National Recovery Pillars
OR LD7	Organisational Resilience: Local Disaster Management Group (LDMG)	**Pre-prepared emergency warnings and alert messaging** Create pre-prepared emergency warning templates and alert messaging for events that could occur often or have a rapid impact on human health Flooding of Cloncurry River via dam failure Hazardous materials (HAZMAT) heavy vehicle accident	Cloncurry Shire Council	LDMG	1	5	5	Human & Social Economic	2, 4	Cohesive Communities Information Enabled
OR LD8	Organisational Resilience: Local Disaster Management Group (LDMG)	**Configure an LDCC and test annually** Set up an LDCC, take photos of the arrangement and then test annually, including test of Guardian IMS, emergency electricity supply, and voice and data communications via backup links.	Cloncurry Shire Council	LDMG	2	3	1.5	Human & Social	2, 4	Cohesive Communities Information Enabled
OR LD9	Organisational Resilience: Local Disaster Management Group (LDMG)	**Portable LDCC (LDCC in a box)** Set up a portable LDCC in a box that can be moved to a secondary location if the primary location becomes unusable. Box should include role cards, plans and sub-plans, tabards, and any other items useful for managing an emergency.	Cloncurry Shire Council	LDMG	2	2	1	Human & Social	2, 4	Cohesive Communities

ID	Category	Organisational Resilience Recommendation	Lead Org	Supporting Org	Likely Cost Range (1-5)	Likely Benefit Range (1-5)	Priority (simplified cost / benefit) (0-5)	Qld State Recovery Plan Lines of Recovery	QDSR Objectives	National Recovery Pillars
OR LD10	Organisational Resilience: Local Disaster Management Group (LDMG)	**LDCC & LDMG training for LDMG staff** Training in the practical operations of the LDMG beyond normal QDMA training Guardian IMS LDCC Setup and Operation	Cloncurry Shire Council	LDMG	2	2	1	Human & Social	2, 4	Cohesive Communities Information Enabled
OR LD11	Organisational Resilience: Local Disaster Management Group (LDMG)	**LDMP and LDCC exercise for LDMG** Exercise to test LDCC activation and LDMG understanding of new LDMP	Cloncurry Shire Council	LDMG	2	2	1	Human & Social	2, 4	Cohesive Communities Information Enabled
OR LD12	Organisational Resilience: Local Disaster Management Group (LDMG)	**Hazardous materials (HAZMAT) transport exercise** Simulate an accident within Cloncurry Shire Example would be Phosphate Hill truck on Hensley Drive or diverted through town when Cloncurry in flood has a rollover in a business or residential area.	QFES	LDMG	2	5	2.5	Human & Social Economic Environment Building Roads & Transport	1, 2, 3, 4	Resilient Infrastructure Prosperous Enterprises Cohesive Communities Information Enabled

ID	Category	Organisational Resilience Recommendation	Lead Org	Supporting Org	Likely Cost Range (1-5)	Likely Benefit Range (1-5)	Priority (simplified cost / benefit) (0-5)	Qld State Recovery Plan Lines of Recovery	QDSR Objectives	National Recovery Pillars
OR LD13	Organisational Resilience: Local Disaster Management Group (LDMG)	**Primary LDCC backup generation refuelling** Confirm high priority generator refuelling contract for primary LDCC site (estimated at 8 hours runtime for main CSC Cloncurry offices load)	Cloncurry Shire Council	LDMG	2	2	1	Building	2, 4	Resilient Infrastructure
OR LD14	Organisational Resilience: Local Disaster Management Group (LDMG)	**Identify potential evacuation centres** Identify prioritised evacuation centres list in advance • Council-owned (PCYC) • Local accommodation providers • Mining camps	LDMG	Cloncurry Shire Council	1	2	2	Human & Social	4	Cohesive Communities
OR LD15	Organisational Resilience: Local Disaster Management Group (LDMG)	**Fire Management Committee planning** Increase activity of fire management committee including targeted hazard reduction burns	QFES	LDMG	1	3	3	Human & Social Environment	1, 2, 3, 4	Resilient Infrastructure Information Enabled

ID	Category	Organisational Resilience Recommendation	Lead Org	Supporting Org	Likely Cost Range (1-5)	Likely Benefit Range (1-5)	Priority (simplified cost / benefit) (0-5)	Qld State Recovery Plan Lines of Recovery	QDSR Objectives	National Recovery Pillars
OR LD16	Organisational Resilience: Local Disaster Management Group (LDMG)	**Resupply / Logistics workshop for local suppliers** Resupply workshop with local suppliers and logistics companies Explain QDMA rules and reimbursement Better support for logistics when emergencies occur	Cloncurry Shire Council	LDMG	2	3	1.5	Human & Social Economic	2, 4	Cohesive Communities Information Enabled
OR LD17	Organisational Resilience: Local Disaster Management Group (LDMG)	**Mines Inspectorate LDMG advisor status** Consider inviting Mines Inspectorate to Resources subgroup and LDMG	LDMG	RSHQ	1	2	2	Economic Environment	1, 2, 4	Infrastructure Resilience Prosperous Enterprises
OR CC1	Organisational Resilience: Cloncurry Shire Council (CSC)	**Business continuity planning for Cloncurry Shire Council** Business continuity planning for Cloncurry Shire Council: • Define CSC Critical Functions • Complete Business Impact Analysis • Provide Mitigations (before disruption) Provide Contingencies (actions on disruption)	Cloncurry Shire Council		3	5	1.6	Human & Social Economic	1, 2, 3, 4	Economic Base Resilient Infrastructure Prosperous Enterprises Cohesive Communities

ID	Category	Organisational Resilience Recommendation	Lead Org	Supporting Org	Likely Cost Range (1-5)	Likely Benefit Range (1-5)	Priority (simplified cost / benefit) (0-5)	Qld State Recovery Plan Lines of Recovery	QDSR Objectives	National Recovery Pillars
OR CC2	Organisational Resilience: Cloncurry Shire Council (CSC)	**Community contact database** Expand capability of new community dashboard (Guardian IMS advanced communications pack) to gather a community contacts database via online forms, signing up for weather alerts etc.	Cloncurry Shire Council		2	3	1.5	Human & Social Economic	2, 4	Prosperous Enterprises Cohesive Communities Information Enabled
OR CC3	Organisational Resilience: Cloncurry Shire Council (CSC)	**Waste management, reduction and recycling** Pursue planned initiatives around • Waste Management • Waste Reduction • Recycling	LDMG	RSHQ	3	4	1.3	Human Social Economic Environment	3, 4	Prosperous Enterprises Cohesive Communities
OR CC4	Organisational Resilience: Cloncurry Shire Council (CSC)	**Renewable energy for power sources** A shift in Council's energy sources to renewable energy Choice for CSC about where to source energy. Potentially unlocks some minor projects such as installing renewable energy at council sites to provide electricity. Potential to pair with technologies such as batteries to improve electricity supply during grid outages.	Cloncurry Shire Council		2	3	1.5	Human & Social Economic Environment Building	3, 4	Resilient Infrastructure Prosperous Enterprises

ID	Category	Organisational Resilience Recommendation	Lead Org	Supporting Org	Likely Cost Range (1-5)	Likely Benefit Range (1-5)	Priority (simplified cost / benefit) (0-5)	Qld State Recovery Plan Lines of Recovery	QDSR Objectives	National Recovery Pillars
OR CC5	Organisational Resilience: Cloncurry Shire Council (CSC)	**Skilled staff retention** A focus on existing efforts to attract and retain skilled staff to CSC and Cloncurry region. • Improves functions and efficiency of CSC • Improves operation of LDMG Improves community continuity to avoid disruption	Cloncurry Shire Council		2	5	2.5	Human & Social Economic	2, 4	Economic Base Resilient Infrastructure Prosperous Enterprises Cohesive Communities
OR CC6	Organisational Resilience: Cloncurry Shire Council (CSC)	**Non-terrestrial backup link to internet** Satellite Link (or similar new tech such as Starlink) for CSC internet access. • Assists when disruption is terrestrial (e.g., town fibre cut 9 times during 2019 floods) • Guardian IMS and other CSC systems increasingly moving to cloud – higher reliability and availability, but risk when access down	Cloncurry Shire Council		2	5	2.5	Economic	3, 4	Resilient Infrastructure Prosperous Enterprises Cohesive Communities Information Enabled

ID	Category	Organisational Resilience Recommendation	Lead Org	Supporting Org	Likely Cost Range (1-5)	Likely Benefit Range (1-5)	Priority (simplified cost / benefit) (0-5)	Qld State Recovery Plan Lines of Recovery	QDSR Objectives	National Recovery Pillars
OR CC7	Organisational Resilience: Cloncurry Shire Council (CSC)	**Priority generator refuelling arrangements for CSC offices** • CSC offices primary LDCC site • Generator is estimated at 8 hours runtime for CSC office load • Confirm high priority arrangements with local fuel supply to ensure LDCC remains operational for longer grid outage periods	Cloncurry Shire Council		2	3	1.5	Human & Social Economic	2, 4	Resilient Infrastructure Prosperous Enterprises Cohesive Communities
OR CC8	Organisational Resilience: Cloncurry Shire Council (CSC)	**Council Operations rapid recovery vehicle** Council operations vehicle prepared prior to every storm season • Loaded with tarps, chainsaws, road closure equipment etc. • Can get advice from SES on what to load into vehicle and potentially do joint training	Cloncurry Shire Council		2	4	2	Building Roads & Transport	2, 4	Resilient Infrastructure Prosperous Enterprises Cohesive Communities

ID	Category	Organisational Resilience Recommendation	Lead Org	Supporting Org	Likely Cost Range (1-5)	Likely Benefit Range (1-5)	Priority (simplified cost / benefit) (0-5)	Qld State Recovery Plan Lines of Recovery	QDSR Objectives	National Recovery Pillars
OR QH1	Organisational Resilience: Queensland Health	**Cloncurry Hospital business continuity plan** Cloncurry Hospital Continuity Plan Queensland Health's efforts to improve business continuity at the Cloncurry Hospital are likely to save lives, especially during a major incident or emergency.	Qld Health	Cloncurry Shire Council	1	5	5	Human & Social	1, 2, 3, 4	Resilient Infrastructure Cohesive Communities
OR QH2	Organisational Resilience: Queensland Health	**Updated Cloncurry Hospital COVID-19 management plan** Queensland Health are updating their Cloncurry Hospital COVID-19 Management Plan to better suit the ability of the facility to manage COVID-19 risk. Should COVID-19 spread to CSC area, Queensland Health's efforts to are likely to save lives.	Qld Health	Cloncurry Shire Council	1	3	3	Human & Social	1, 2, 3, 4	Resilient Infrastructure Cohesive Communities

ID	Category	Organisational Resilience Recommendation	Lead Org	Supporting Org	Likely Cost Range (1-5)	Likely Benefit Range (1-5)	Priority (simplified cost / benefit) (0-5)	Qld State Recovery Plan Lines of Recovery	QDSR Objectives	National Recovery Pillars
OR LB1	Organisational Resilience: Local Businesses	**Business reporting on wet season preparedness** Local Businesses use a template to report back to LDMG / CSC on their preparedness before each wet season. This differs from LDMG recommendation in that the businesses take charge of the reporting by a specific date, which improves community cohesiveness. E.g., Grocery, Bakery, Pharmacy, Fuel, Logistics. Similar templates could be used for Council Business Units (e.g., water, roads etc. and reported up to Council)	Local Business Network	Cloncurry Shire Council Local Business	2	4	2	Human & Social Economic	1, 2, 3, 4	Resilient Infrastructure Prosperous Enterprises Cohesive Communities Information Enabled
OR LB2	Organisational Resilience: Local Businesses	**Business continuity training for local businesses** Business continuity training via CSC/LDMG for Cloncurry businesses in business continuity: • Complete Business Impact Analysis • Provide Mitigations (before disruption) • Provide Contingencies (actions on disruption) (Critical Functions usually already known by small business)	Local Business Network	Cloncurry Shire Council Local Business	2	4	2	Human & Social Economic	1, 2, 3, 4	Economic Base Resilient Infrastructure Prosperous Enterprises Cohesive Communities Information Enabled

ID	Category	Organisational Resilience Recommendation	Lead Org	Supporting Org	Likely Cost Range (1-5)	Likely Benefit Range (1-5)	Priority (simplified cost / benefit) (0-5)	Qld State Recovery Plan Lines of Recovery	QDSR Objectives	National Recovery Pillars
OR LB3	Organisational Resilience: Local Businesses	**Modern merchant payment training** Provide financial systems that have failsafe if no internet access or EFTPOS During 2019 floods some local businesses could not accept payment over the phone.	Local Business Network	Cloncurry Shire Council	2	2	1	Economic	4	Economic Base Prosperous Enterprises
OR SC1	Organisational Resilience: Supply Chain Resilience	**Supply chain resilience training / meetings for local organisations** Supply chain resilience training / meetings for local businesses • Supply chain planning • Improving depth to supply chain • Identifying single points of failure • Having multiple geographic sources for key commodities • Asking suppliers to prove their own supply chain depth	Cloncurry Shire Council / Local Business Network	Local Business	2	3	1.5	Human & Social Economic	1, 2, 3, 4	Economic Base Resilient Infrastructure Prosperous Enterprises Cohesive Communities Information Enabled

ID	Category	Organisational Resilience Recommendation	Lead Org	Supporting Org	Likely Cost Range (1-5)	Likely Benefit Range (1-5)	Priority (simplified cost / benefit) (0-5)	Qld State Recovery Plan Lines of Recovery	QDSR Objectives	National Recovery Pillars
OR SC2	Organisational Resilience: Supply Chain Resilience	**Cold storage at intermodal transport hubs** • Install temporary or permanent cold storage at likely intermodal transport hubs • Airfields, rail – road transfer points • Enhances ability to co-ordinate fresh groceries between trucks and air, train and road etc.	Cloncurry Shire Council Other Councils	Local Business	3	3	1	Human & Social Economic	4	Resilient Infrastructure Prosperous Enterprises Cohesive Communities

ID	Category	Organisational Resilience Recommendation	Lead Org	Supporting Org	Likely Cost Range (1-5)	Likely Benefit Range (1-5)	Priority (simplified cost / benefit) (0-5)	Qld State Recovery Plan Lines of Recovery	QDSR Objectives	National Recovery Pillars
OR AG1	Organisational Resilience: Agricultural Businesses	**Emergency planning for agriculture** Specialist training and meetings for agriculture businesses to learn from each other around emergency planning. • See case study on AACo Flood Planning and Response • Learning from each other • Hints from experienced operators include mustering to / near high ground during wet season, stocking up on avgas, hay and groceries, property improvements, enhanced shelter and services for livestock • Combine with Agriculture LDMG Sub Group for increased impact	Local Business	LDMG / Cloncurry Shire Council	2	3	1.5	Human & Social Economic	1, 2, 3, 4	Economic Base Resilient Infrastructure Prosperous Enterprises Cohesive Communities Information Enabled

8.8 Infrastructure Resilience Recommendations

Each recommended action within the table below is designed to improve infrastructure resilience within Cloncurry Shire. Improving infrastructure resilience also improves community and organisational resilience, as shown in Figure 1: Community Continuity: A System to Build Resilience.

These actions are the mitigations (before a hazard event) or contingencies (when an event occurs) that form the basis of improvements to Cloncurry's community continuity.

Before undertaking any of these actions, it is recommended that organisations undertake their own assessment of the costs and benefits, with relevance to the cost of each action.

ID	Category	Infrastructure Resilience Recommendation	Lead Org	Supporting Org	Likely Cost Range (1-5)	Likely Benefit Range (1-5)	Priority (simplified cost / benefit) (0-5)	Qld State Recovery Plan Lines of Recovery	QDSR Objectives	National Recovery Pillars
IR GP1	Infrastructure Resilience: General and Planning	**Hazard reduction around critical infrastructure** Infrastructure providers access NDRR framework/processes for hazard and disaster reduction around assets/ systems critical to Cloncurry • Water Treatment Plant • Cloncurry Airport • Cloncurry Pump Station and Balancing Storage on NWQ pipeline	Cloncurry Shire Council	Infrastructure Operators	2	5	2.5	Economic Building Roads & Transport	2, 3	Resilient Infrastructure Prosperous Enterprises Cohesive Communities
IR GP2	Infrastructure Resilience: General and Planning	**CSC Priority Infrastructure Plan** CSC develops a catalogue of all critical infrastructure within Cloncurry Shire and prioritise for community continuity. This would then feed into other initiatives such as multi-year hazard reduction programs	Cloncurry Shire Council	Infrastructure Operators	1	2	2	Building Roads & Transport	4	Resilient Infrastructure Cohesive Communities

ID	Category	Infrastructure Resilience Recommendation	Lead Org	Supporting Org	Likely Cost Range (1-5)	Likely Benefit Range (1-5)	Priority (simplified cost / benefit) (0-5)	Qld State Recovery Plan Lines of Recovery	QDSR Objectives	National Recovery Pillars
IR GP3	Infrastructure Resilience: General and Planning	**Resilience as input into next CSC planning scheme** Integrate resilience, sustainability, and increased hazard reduction into next iteration of CSC planning scheme	Cloncurry Shire Council	DSDILGP	1	5	5	Human & Social Economic Environment Building Roads & Transport	3, 4	Economic Base Resilient Infrastructure Prosperous Enterprises Cohesive Communities
IR GP4	Infrastructure Resilience: General and Planning	**Involve community in infrastructure resilience** The community can be a real asset in effective asset management and infrastructure maintenance. Promote CSC's report an issue webpage (link on dashboard)	Cloncurry Shire Council	Community	1	3	3	Human & Social Economic Environment Building Roads & Transport	3, 4	Economic Base Resilient Infrastructure Prosperous Enterprises Cohesive Communities Information Enabled

ID	Category	Infrastructure Resilience Recommendation	Lead Org	Supporting Org	Likely Cost Range (1-5)	Likely Benefit Range (1-5)	Priority (simplified cost / benefit) (0-5)	Qld State Recovery Plan Lines of Recovery	QDSR Objectives	National Recovery Pillars
IR CD1	Infrastructure Resilience: Communications and Data	**Mobile phone communications coverage for all national and state-controlled roads** Promote voice comms (4G etc.) over full length of all national highways and state-controlled roads. Many rescues occur on state-controlled and national roads within and around Cloncurry Shire. Additionally, first responders, including those on cattle properties in helicopters during the 2019 lamented the lack of mobile phone communication when saving livestock from the air.	Austroads	DTMR / NBNCo / Voice Carriers	5	5	1	Human & Social Economic Roads & Transport	3, 4	Economic Base Resilient Infrastructure Prosperous Enterprises Cohesive Communities
IR CD2	Infrastructure Resilience: Communications and Data	**Targeted mobile black spot reduction within CSC LGA** Improve mobile communications in the Cloncurry Shire LGA and reduce blackspots. This recommendation is aligned with targeted funding for comms on roads (e.g., Black Spot Program and Regional Connectivity Program through DITRDC), provided CSC and its partners can provide input into national programs.	Cloncurry Shire Council	DITRDC / Voice Carriers	5	5	1	Human & Social Economic Roads & Transport	3, 4	Economic Base Resilient Infrastructure Prosperous Enterprises Cohesive Communities

ID	Category	Infrastructure Resilience Recommendation	Lead Org	Supporting Org	Likely Cost Range (1-5)	Likely Benefit Range (1-5)	Priority (simplified cost / benefit) (0-5)	Qld State Recovery Plan Lines of Recovery	QDSR Objectives	National Recovery Pillars
IR CD3	Infrastructure Resilience: Communications and Data	**Promote use of radio communications** Where communications are currently unavailable promote use of UHF (or possibly HF) radio – engage in active radio network expansion and encourage usage and testing.	Cloncurry Shire Council	ACMA, Private Businesses	4	4	1	Human & Social Economic Roads & Transport	3, 4	Resilient Infrastructure Prosperous Enterprises Cohesive Communities
IR W1	Infrastructure Resilience: Potable Water	**Test / exercise valves in water network** Valve exercise to determine replacement plan Water outage areas larger than necessary because some valves inoperable	Cloncurry Shire Council		2	2	1	Human & Social Economic	4	Resilient Infrastructure Prosperous Enterprises Cohesive Communities
IR W2	Infrastructure Resilience: Potable Water	**Alternate access to Cloncurry WTP during flooding / hazards** Plan alternate access to Phillip St Water Treatment Plant during hazard events (e.g., flooding that isolates plant). Review remote access to control systems at WTP (adhering to appropriate cyber security protocols)	Cloncurry Shire Council		2	3	1.5	Human & Social Economic Roads & Transport	3, 4	Resilient Infrastructure Prosperous Enterprises Cohesive Communities
IR W3	Infrastructure Resilience: Potable Water	**Enhanced access to Chinaman Creek Dam water infrastructure** Access to dam and pumps difficult in poor weather. Improve access where possible to ensure proper dam and water network operation.	Cloncurry Shire Council	DSDILGP	3	3	1	Human & Social Building Roads & Transport	4	Resilient Infrastructure

ID	Category	Infrastructure Resilience Recommendation	Lead Org	Supporting Org	Likely Cost Range (1-5)	Likely Benefit Range (1-5)	Priority (simplified cost / benefit) (0-5)	Qld State Recovery Plan Lines of Recovery	QDSR Objectives	National Recovery Pillars
IR SW1	Infrastructure Resilience: Stormwater	**Stormwater installations and upgrades** Targeted Stormwater Drainage: Installation or upgrades in flood-prone areas Examples on natural watercourses - Payne Street where driveways damaged regularly Improved stormwater and channel and kerb	Cloncurry Shire Council		4	4	1	Human & Social Building Roads & Transport	3, 4	Resilient Infrastructure Prosperous Enterprises Cohesive Communities
IR SW2	Infrastructure Resilience: Stormwater	**Stormwater network pre-wet-season maintenance** Annual stormwater network pre-season maintenance program: • clear outlets • pits cleaned out • monthly grate cleans in high traffic areas	Cloncurry Shire Council		2	4	2	Human & Social Economic	3, 4	Resilient Infrastructure Prosperous Enterprises Cohesive Communities
IR WW 1	Infrastructure Resilience: Wastewater	**Sewage Treatment Plant (STP) maintenance and upgrade** Sewage Treatment Plant pond dredging schedule review to stop potential run-over / run-off Improve access to sewer ponds during wet weather Treated water plan for racetrack may alleviate potential for pond runover	Cloncurry Shire Council		2	4	2	Human & Social Building Economic	3	Resilient Infrastructure

ID	Category	Infrastructure Resilience Recommendation	Lead Org	Supporting Org	Likely Cost Range (1-5)	Likely Benefit Range (1-5)	Priority (simplified cost / benefit) (0-5)	Qld State Recovery Plan Lines of Recovery	QDSR Objectives	National Recovery Pillars
IR WW 2	Infrastructure Resilience: Wastewater	**Sewer pump station performance / capability assessment** Assessment of effectiveness of key pump stations: • Alice St • Scarr St • Brisbane St • Prioritise for emergency backup power cutover (temp generation)	Cloncurry Shire Council		2	3	1.5	Human & Social Building Economic	3, 4	Resilient Infrastructure Prosperous Enterprises Cohesive Communities
IR WW 3	Infrastructure Resilience: Wastewater	**Audit of stormwater plumbed into sewer** Audit of stormwater plumbed into sewer • Stresses wastewater system unnecessarily • Can be hard to review/fix as mostly occurs on private property	Cloncurry Shire Council		3	2	0.66	Human & Social Building Economic	3, 4	Resilient Infrastructure Prosperous Enterprises Cohesive Communities
IR R1	Infrastructure Resilience: Roads	**Road Wardens** Formalise current road condition assistance via Road Wardens At key locations to assist with road inspections Minor training + mobile phone logon to Guardian IMS for reporting Locations could include Dajarra, Four Ways	Cloncurry Shire Council	Road Wardens	1	4	4	Human & Social Building Economic	2, 3, 4	Resilient Infrastructure Prosperous Enterprises Cohesive Communities

ID	Category	Infrastructure Resilience Recommendation	Lead Org	Supporting Org	Likely Cost Range (1-5)	Likely Benefit Range (1-5)	Priority (simplified cost / benefit) (0-5)	Qld State Recovery Plan Lines of Recovery	QDSR Objectives	National Recovery Pillars
IR R2	Infrastructure Resilience: Roads	**Enhanced technology for road monitoring and closures** At key sites such as Hensley Drive crossing of Cloncurry River Possible technologies include • Electronic Signage • Swing Gates • More River Crossing Cameras, plugged into Community Dashboard	Cloncurry Shire Council / DTMR	DTMR / QRA	3	4	1.3	Human & Social Building Economic	3, 4	Resilient Infrastructure Cohesive Communities
IR R3	Infrastructure Resilience: Roads	**Identification of potential future road upgrade areas** Guardian IMS assists with collection on historical road closures. Data on trouble spots can assist future upgrade funding submissions.	Cloncurry Shire Council		1	3	3	Building Economic	3, 4	Resilient Infrastructure Cohesive Communities

ID	Category	Infrastructure Resilience Recommendation	Lead Org	Supporting Org	Likely Cost Range (1-5)	Likely Benefit Range (1-5)	Priority (simplified cost / benefit) (0-5)	Qld State Recovery Plan Lines of Recovery	QDSR Objectives	National Recovery Pillars
IR R4	Infrastructure Resilience: Roads	**Partnering for better roads** Continue delivery of existing co-funded projects • Progressive Sealing of Cloncurry Dajarra Road: 7708 • Planned Bridge Upgrades: Malbon, Tommy's Creek, Corrella Bridge • Rural Road Sealing Program Monitor funding programs for further collaborative opportunities • Roads of Strategic Importance • Beef Roads Program Northern Australia Roads Program	Cloncurry Shire Council	DTMR / QRA / AustRoads	5	5	1	Building Economic	3, 4	Resilient Infrastructure Prosperous Enterprises Cohesive Communities
IR R5	Infrastructure Resilience: Roads	**Electric vehicle charging infrastructure** Electric vehicle charging infrastructure along Flinders / Barkly Highway Growth in electric vehicles increasingly likely and assists with reliance on long and vulnerable liquid fuel logistics chains Assists with tourism and broadening economic base	Ergon Energy	Cloncurry Shire Council	3	1	0.3	Building Economic	3, 4	Economic Base Resilient Infrastructure Cohesive Communities

ID	Category	Infrastructure Resilience Recommendation	Lead Org	Supporting Org	Likely Cost Range (1-5)	Likely Benefit Range (1-5)	Priority (simplified cost / benefit) (0-5)	Qld State Recovery Plan Lines of Recovery	QDSR Objectives	National Recovery Pillars
IR FR1	Infrastructure Resilience: Freight	**Freight loadout and stockpile** A multimodal load-out and stockpile facility would be useful for many organisations, both private and public. If sited correctly could provide QR a contingency when flooding occurs east and/or west of Cloncurry.	Cloncurry Shire Council or Private Proponent	QR, Mines, Freight Operators	5	5	1	Economic Roads & Transport	2, 4	Economic Base Resilient Infrastructure Prosperous Enterprises
IR WM 1	Infrastructure Resilience: Waste Management	**Run-off control at landfill Sites** Improve controls for run-off from landfill sites Holding ponds may be appropriate at some landfill sites Protects local waterways from contaminated water and waste	Cloncurry Shire Council	DES	3	3	1	Human & Social Environment Building	3	Resilient Infrastructure Cohesive Communities
IR H1	Infrastructure Resilience: Health Service	**Cloncurry hospital upgrade** An upgrade to the infrastructure at Cloncurry Hospital would improve health outcomes in the event of a major hazard or disaster, and have significant benefits during business as usual.	Qld Health	Cloncurry Shire Council	5	5	1	Human & Social Building	2, 4	Resilient Infrastructure Cohesive Communities

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IR EN1	Infrastructure Resilience: Energy	**Cloncurry as a Renewable Energy Zone** Renewable energy generation (e.g., large scale solar farm) to create a renewable energy zone within Cloncurry Shire. • Prime sites with access to energy infrastructure (Chumvale) and large loads (mines) indicate good investment potential. • Further potential should Copperstring 2.0 proceed to construction (IR-EN3) to export to National Market via East Coast. • Good solar resource with potential for early evening power to the East Coast should Copperstring go ahead.	Cloncurry Shire Council / Energy partners	Ergon / Energy Queensland	5	5	1	Economic Building	2, 4	Economic Base Resilient Infrastructure Cohesive Communities
IR EN2	Infrastructure Resilience: Energy	**Distributed energy and microgrids for Cloncurry towns** A distributed energy resource (e.g., solar farm + batteries) configured as a microgrid could potentially power towns within Cloncurry Shire (e.g., Cloncurry or Dajarra).	Cloncurry Shire Council / Energy Partners	Ergon / Energy Queensland	5	5	1	Economic Building	3, 4	Economic Base Resilient Infrastructure Cohesive Communities
IR EN3	Infrastructure Resilience: Energy	**Copperstring 2.0** Copperstring 2.0, as a high voltage electricity link into the National Energy Market, could be an enabler for other projects, including IR-EN1 and IR-EN2 recommendations.	CuString 2.0	Cloncurry Shire Council	5	5	1	Human & Social Building	2, 4	Resilient Infrastructure Cohesive Communities

ID	Category	Infrastructure Resilience Recommendation	Lead Org	Supporting Org	Likely Cost Range (1-5)	Likely Benefit Range (1-5)	Priority (simplified cost / benefit) (0-5)	Qld State Recovery Plan Lines of Recovery	QDSR Objectives	National Recovery Pillars
IR EN4	Infrastructure Resilience: Energy	**Targeted standalone power systems (SAPS)** Small mixed-fuel microgrids (e.g., solar / diesel / battery) could be useful as Standalone Power Systems (SAPS) or as backup for when grid connections (especially SWER lines) fail.	Cloncurry Shire Council / Private Organisations	Ergon / Energy Queensland	5	5	1	Economic Building	4	Resilient Infrastructure Prosperous Enterprises
IR AI1	Infrastructure Resilience: Airport	**Airstrip drainage improvement** Investigate possible drainage improvements at Cloncurry airport • 2019: runway restricted due to strip edges sagging and slumping • Water cannot get away via drainage pond / under-runway drainage when river up • Key medical care link when major roads closed	Cloncurry Shire Council		4	4	1	Human & Social Building	4	Resilient Infrastructure
IR AI2	Infrastructure Resilience: Airport	**Airport Manager as part of LDMG** Add airport manager to LDMG or Infrastructure Sub Group. Airport is life-saving infrastructure when roads cut due to floods	Cloncurry Shire Council	n/a	1	3	3	Building	4	Resilient Infrastructure

ID	Category	Infrastructure Resilience Recommendation	Lead Org	Supporting Org	Likely Cost Range (1-5)	Likely Benefit Range (1-5)	Priority (simplified cost / benefit) (0-5)	Qld State Recovery Plan Lines of Recovery	QDSR Objectives	National Recovery Pillars
IR EW1	Infrastructure Resilience: Early Warning Systems	**Extend flood and weather warning systems** Early warning technologies save lives. • Better warning systems for rapid onset hazards such as flooding, and possibly investing in flood prediction systems that can be integrated into IMS. • Continue to monitor and support North West Queensland Flood Warning Information Network (FWIN) project.	Cloncurry Shire Council	QRA / BoM	4	4	1	Human & Social Economic	2, 4	Resilient Infrastructure Prosperous Enterprises Cohesive Communities

8.9 Conclusion

It is recognised that every organisation has limited resources, including Cloncurry Shire Council.

While not every action in these tables will necessarily be pursued, each of these actions in isolation would go some way to improving the community continuity of Cloncurry Shire Council. Where possible, actions that can be linked are identified, and can multiply the effectiveness of their positive impact on community continuity.

While we know Cloncurry Shire has shown significant resilience in the past, these actions can go toward creating an even stronger, even safer, and even more resilient Cloncurry.

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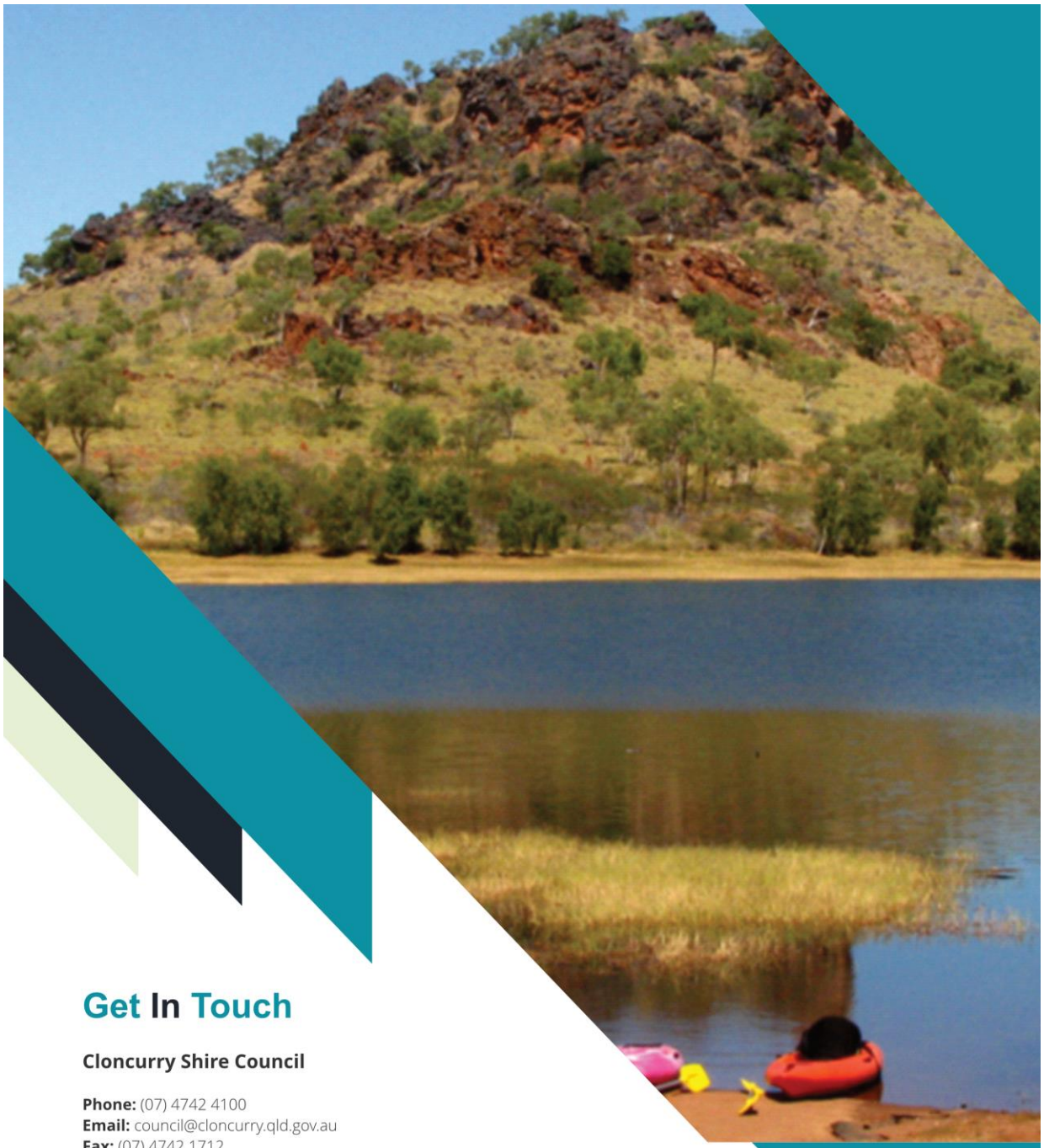

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