



Project Resilience
Forbes, NSW
Upper Lachlan Catchment Area



Flooding in Forbes, New South Wales. Photo: NSW SES Lachlan Region

Our Intent

“Project Resilience” is a system (like a community) which is used to monitor disturbance and still retain a basic function and structure. Building resilience means intentionally guiding the system’s process of adaptation to preserve some qualities and allow others to fade away, all the while retaining the essence—or “identity”—of the system.

In a community, identity is essentially determined by what people value about where they live. However, what a community of people collectively value, is open to interpretation and subject to disagreement.

Although many resilience frameworks and tools for building community resilience are now available across Australia, no single approach will likely work for all communities and their varied social and economic contexts. Therefore, the Project Resilience Team has identified six foundations that, in our view, are essential—no matter where or how resilience-building efforts are undertaken, or which challenges are of most concern locally. The foundations support building community resilience, rather than achieving resilience as a fixed goal, to emphasise resilience building as an ongoing process.

How DRA Defines Resilience:



People: Resilient people are aware of situations, their own emotional reactions, and the behaviour of those around them. By remaining aware, they maintain control of a situation and think of new ways to tackle problems. In many cases, resilient people emerge stronger after such difficulties.



Making Sense: Making sense of a problem is essential for understanding the bigger picture. Making sense of things is a way to explore and develop effective future plans at a community level.



Bouncing Back: Resilient communities can bounce back from adverse situations. They can do this by actively influencing and preparing for economic, social and environmental change.



Striving Forward: As we look to the future, some challenges will be so big that it won't be possible for the community to simply adapt. Fundamental changes will be necessary, and the community will need to adapt.



Our Human Needs: A sustainable community is a place where people want to live and work, both now and in the future. The community needs of existing and future residents are sensitive to environment and contribute to a high quality of life. These communities are inclusive, well-planned, built and run, and offer equality of opportunity and good services for all.



Courage: Everyone within a community needs the courage to confront challenging issues and take responsibility for a collective future.

Based on: The Community Resilience Leader. Essential Resources for an Era of upheaval 2016

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1. Disaster Relief Australia Resilience Process

The Disaster Relief Australia (DRA) Resilience Process comprises four stages, each of which are broken down into multiple steps. The DRA Resilience Process provides guidance to each Disaster Relief Team (DRT) across Australia. A future DRA Resilience Framework is currently being developed and will function to:

- Support Disaster Relief Team (DRT) Managers in the assessment and prioritisation of community-based resilience projects.
- Establish a consistent approach to recognising what levels of vulnerability may exist within the regional operating areas of each DRT.
- Guide, lead, and mentor the Minderoo Foundation in the development of strategic and detailed analysis of where future resilience projects may be required.
- With DRTs as the strategic lead, create a targeted approach to building resilience through clear principles for decision making and prioritisation of future resilience workshops and adaption (or adaptation) that can be applied across the public, private and community sectors.
- Recognise national and international disaster risk reduction, mitigation, and adaptation approaches, including the Sendai Framework for Disaster Risk Reduction



Figure 1: Disaster Relief Australia Resilience Process

Increasing our knowledge and awareness of community vulnerabilities, strengthening our capability and capacity to provide relief when required, and tightening our community bonds are all key to DRA and the DRA Resilience Process. As an emerging area of culture and practice, DRA is leading the way in understanding, working with and empowering community led discussions and community-based forums. For many DRA members, these forms of community led discussions and forums are second nature due to their previous operational experience within the Australian Defence Force and consequent ability to assimilate risk and operational effectiveness on a battlefield. The big map discussion is based on a military wargame theory, serving as a tool for stimulating innovative thought.

2. The Big Map Event

Purpose:

Building resilience in communities in the context of a disaster event integrates prevention, preparation, and response; and recovery is a complex and continuous process, rather than a process with a definitive end point or 'destination'. The purpose of the 'Big Map' Capability is to combine local knowledge with our disaster management expertise to better understand a community profile based on the community's exposure to hazards / risks within an all-hazard environment¹.

By understanding how, when and where this region is impacted by flood and fire is vital to those who live here. Not just for safety, but for protecting livelihoods, property, and people. Businesses operating within the region also need to know how it works to make risk-informed investment and operational decisions in line with future Local Council objectives.

Managing flood and fire risk is a cooperative and coordinated effort between all sectors of the community including individuals, businesses, non-government organisations and governments.

The DRA End state:

Locally led and regionally coordinated resilience solutions will always address recent and emerging disaster risks and provide pathways for improving community resilience over time. Flood waters (or Disasters) don't respect boundaries. Therefore, it is critical to investigate ways we can better prepare for the future and keep our communities safe by coordinating efforts, sharing knowledge and capability, and setting a proactive agenda for improving resilience over time.

3. Understanding the Bigger Picture

The Australian continent is divided into topographical drainage divisions that are sub-divided into water regions and then into river basins (Figure 2). The data includes the name and number of each of the 245 basins / catchments, 77 regions, and 12 divisions. New South Wales (NSW) is divided into 45 river catchments, some of which encompass multiple Local Government Areas.

The Murray Darling Basin (MDB) is defined by the catchment areas of the Murray and Darling rivers and their many tributaries. The MDB covers three-quarters of NSW, more than half of Victoria, significant portions of Queensland and South Australia, and all of the Australian Capital Territory. It contains:

- around 440,000 km of rivers, of which 40,000 km are major
- some 30,000 wetlands, covering an area of around 25,000 km²
- about 60,000 km² of floodplain area, which represents approximately 6% of the MDB.

¹ <https://disasterreliefaus.org/big-map/>

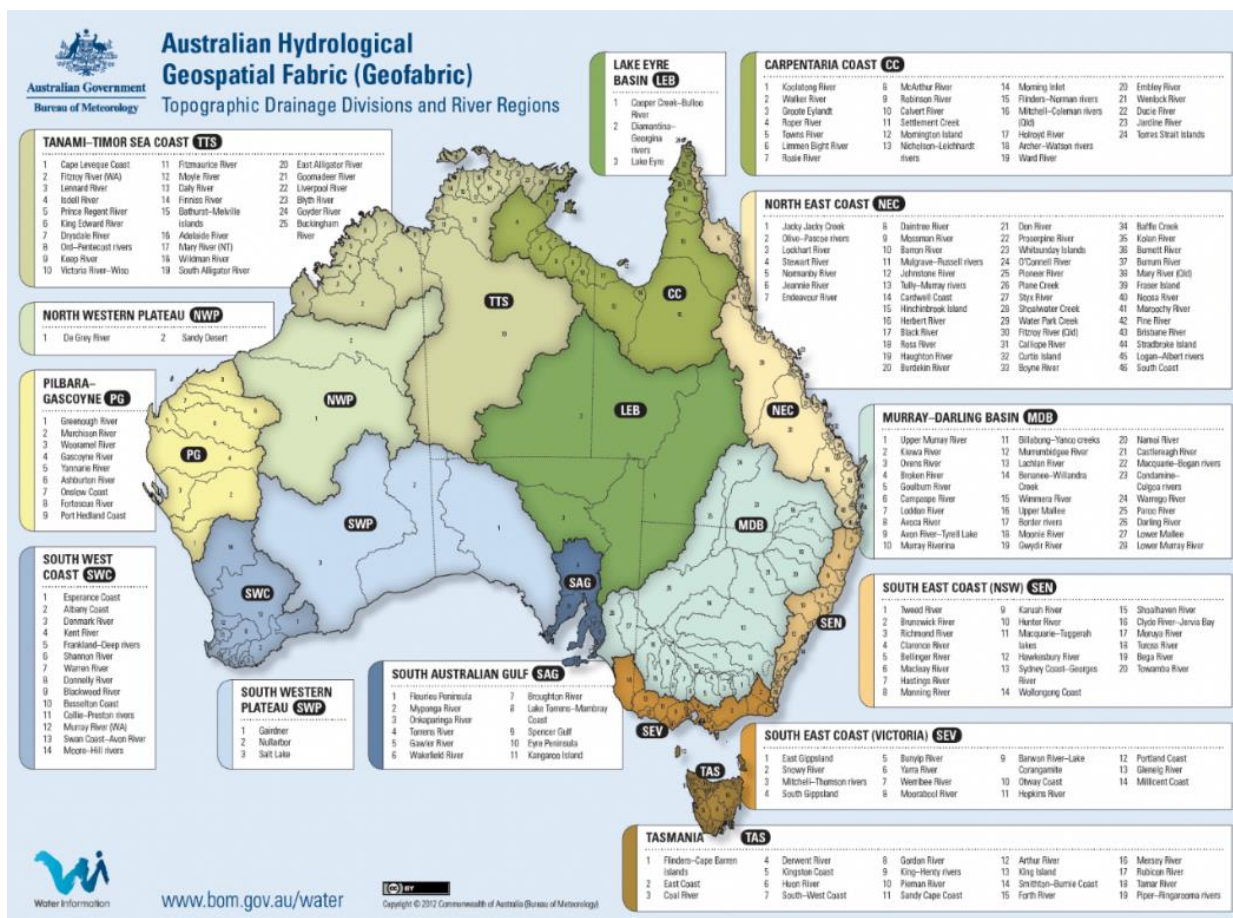


Figure 2 Topographic Drainage Divisions and River Regions of Australia²

The MD Basin covers 1,059,000 square kilometres or 14 per cent of Australia's land area. It includes the Australian Capital Territory, and parts of Queensland (15%), NSW (75%), Victoria (60%) and South Australia (7%). The Basin contains Australia's three longest rivers, the Darling (2,740 km), Murray (2,530 km) and Murrumbidgee (1,690 km). Significant proportions of the Basin's area are comprised of agricultural land (67%) and native forest (32%).

The MDB region presents a varied landscape, from semi-arid ephemeral river systems in the north to highly regulated river systems in the south fed from the Australian Alps. To the east and south, the highlands of the Great Dividing Range form the limit of the MDB region, while in the north, west, and southwest, the boundaries are much less distinct. The greater proportion of the MDB region is made up of extensive plains and low undulating areas; most of them are less than 200 metres above sea level.

¹ Australian Drainage Divisions and River Basin Boundaries, <http://www.bom.gov.au/water/geofabric/download.shtml>

4. The Lachlan River Catchment, Forbes NSW

The Lachlan River is the fourth longest river in Australia at 1,448 kilometres, starting near Goulburn in the Great Dividing Range at an elevation of around 1,200 metres and terminating at the Great Cumbung Swamp near Oxley. Its waterways flow north and then west through NSW, and are a source of water for stock, domestic and agriculture use, tourism and recreational activities and Aboriginal cultural values and practices. Water from the Lachlan reaches the Murrumbidgee only in high flood years.

The eastern end of the catchment has elevations up to 1,400 metres and an annual average rainfall in these cooler regions ranges from 800–1,000 millimetres. The western end of the catchment is located on warm-hot semi-arid plains, at an elevation of around 200 metres, and an annual average rainfall of 300 millimetres. Monthly rainfall is consistent across the year.

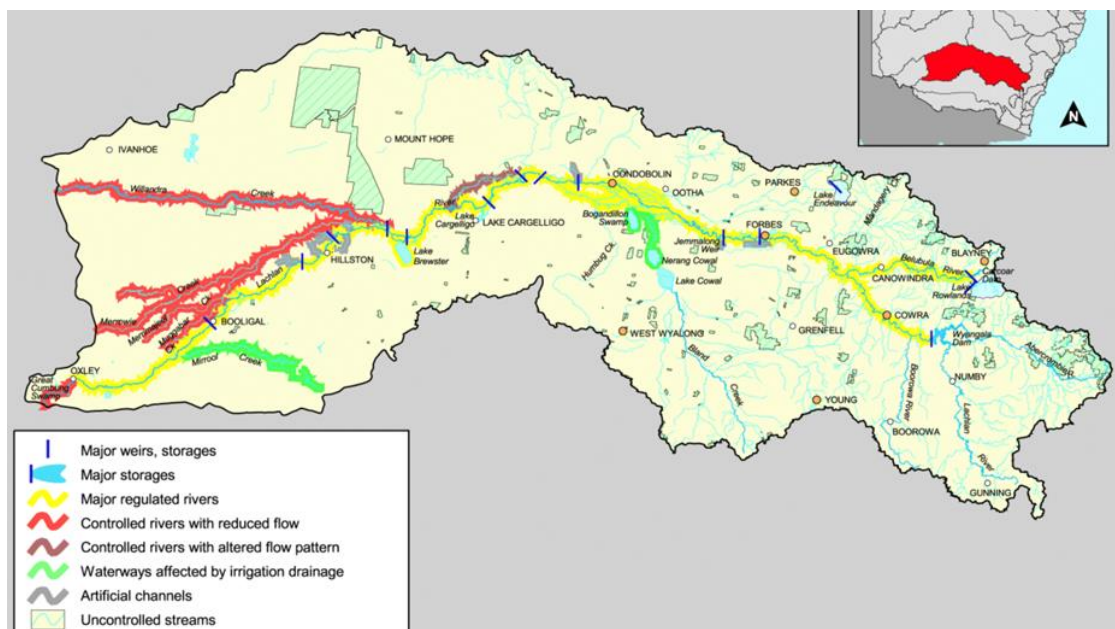


Figure 3 Map of the Lachlan River catchment located within the Murray Darling Basin

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The Lachlan River system, floodplains, swamps and wetlands provide habitat for birds including straw-necked ibis, glossy ibis, egrets, Australian painted snipe, pelicans, osprey and blue-billed duck, and a range of native fish including Murray cod, golden perch, silver perch, eel-tailed catfish and an endangered population of olive perchlet. These wetlands also feature areas of valuable river red gum forest and woodlands, blackbox woodland and lignum. The lower Lachlan floodplain is home to nine nationally important wetlands, including Lake Brewster, the Booligal Wetlands and the Great Cumbung Swamp.

The Great Cumbung Swamp, covering 20,000 hectares, contains one of the largest remnant examples of common reed (*Phragmites australis*) swamps and stands of river red gums in NSW. The main storage is Wyangala Dam, upstream of Cowra, with a capacity of 1,217,000 megalitres. The Lachlan River is

³ Lachlan River Catchment, <https://www.environment.nsw.gov.au/ieo/lachlan/maplg.htm> [retrieved 22 September 2023]

regulated by Wyangala Dam which is the major water storage in the valley. Wyangala Dam is located at the junction of the Lachlan and Abercrombie rivers about 48 kilometres upstream from Cowra in central west NSW. It provides a regulated flow along the length of the Lachlan River and into some of the distributary channels at the far end of the catchment.

Other water storages are Carcoar Dam on the Belubula River (36,000 ML), Lake Cargelligo (36,000 ML) and Lake Brewster, between Lake Cargelligo and Hillston (153,000 ML). The Lachlan catchment features a broad geographic diversity that includes the temperate forests, woodlands and grasslands of the east, and the semi-arid woodlands, mallee and shrublands of the west. A large range of native vegetation makes up 40 per cent of the catchment.

While major floods arise from Lachlan River flows, the Belubula River and Mandagery Creek can provide relatively localised high flood levels, however usually without enough flood volume to cause major flooding downstream. North of the river, the Southern Cross break feeds Lake Forbes, which passes through the town of Forbes. To the south the major anabranch of Bundaburrah Creek takes high level overflow to Bundaburrah Cowal before rejoining the Lachlan River at Jemalong Gap. Jemalong Gap provides a greatly reduced waterway area compared to the area downstream of Forbes. A major restriction to flood flows is the Forbes/Stockinbingal Railway which runs in a north–south direction across the floodplain. From Forbes to Jemalong Gap, flooding to the north occurs mainly when three local billabongs overflow. These billabongs are associated with Bocobidgle Creek, Broad Creek, and Carrawabbity Creek. Floodwaters overflowing from these billabongs pass north-west in a broad shallow sheet across the North Condobolin Road towards Gunning Gap. In the larger floods floodwaters can pass through Gunning Gap and join the Goobang Creek system.

In 2010-11 the catchment was still severely impacted by the millennium drought. Post-millennium drought, high natural flows (which triggered translucent flows, see below) and large-scale environmental watering events improved the conditions in the lower Lachlan catchment. Further high rainfall in winter and natural flooding in spring 2016 created wide scale inundation of the floodplain and wetlands in the mid to lower Lachlan further improving the catchment's post-millennium drought condition.

Over the last several years the Lachlan catchment has been impacted by lower-than-average rainfall which has resulted in a drying of the catchment. Through the second half of 2020-21 wet conditions returned to the catchment and continued throughout 2021-22 and 2022-23. During 2021-22, watering actions sought to complement other flows in the system to maintain the health of floodplain vegetation and be ready to support waterbird breeding events if required.

Land use in the Lachlan catchment is dominated by extensive agriculture with 75 per cent of the catchment used for livestock grazing and 15 per cent for dryland cropping. Major water users are local councils, water utilities, mining and agriculture, including dairy, wool, beef and lamb, as well as irrigated crops such as cereals, lucerne and cotton.

Groundwater in the catchment exists in alluvial deposits that extend along the Lachlan River from Cowra to Condobolin, as well as along tributaries of the Lachlan. However, the main resource of good quality (fresh) groundwater is in alluvial aquifers that spread across the western part of the catchment

from Lake Cargelligo to beyond Hillston – an area of around 3,300 km. There is streamflow leakage into alluvial groundwater within the catchment, which is expected to increase with increased groundwater use in the upper catchment.

5. Key Information Summary

Table 1: Key Information Summary - Lachlan River Catchment

Total length	1448km – Fourth longest river in Australia
Total area	Total Catchment Area = 84,700km ²
Formation point	Confluence of Hannans Creek and Mutmutbilly Creek in the Great Dividing Range at an elevation of 1200m.
Termination point	Murrumbidgee River at the Great Cumbung Swamp near Oxley
Tributaries	37 in total with principal tributaries, include the Abercrombie River, Boorowa River, Crookwell River, and Belubla River
Major water bodies	Wyangla Dam (1,217,000ML), Carcoar Dam on the Belubula River (36,000 ML), Lake Cargelligo (36,000 ML) and Lake Brewster (153,000 ML).
Major roads	Newell Highway, the Lachlan Valley Way and Henry Lawson Way.
Bioregion / s:	<ul style="list-style-type: none"> • Murray Darling Depression • Riverina • Cobar peneplain • NSW south-western slopes (Forbes) • South-eastern highlands
Local Government Areas	Upper Lachlan, Boorowa, Cowra, Weddin, Forbes, Lachlan
Communities	Major: Cowra, Parkes, Forbes, Young Minor: Crookwell, Grenfell, West Wyalong, Condobolin, Hillston, Lake Cargelligo

Significant Lachlan River Catchment Flooding and Flood History

In 1870 the river peaked at 15.9 metres (52 ft) at Cowra. Since 1887, the highest flood level at Forbes was in June 1952 when the river peaked at 10.8 metres at the Forbes Iron Bridge. More than 900 families were evacuated, with many rescued from rooftops by boat and helicopter. During the flood in August 1990, 132 houses in Forbes were affected by flood with their yards or their floors covered by water. Floods in 1992 did not reach the same levels at Forbes as in 1990, however, Lachlan Valley farmers lost about 30 percent of their lucerne crops just before harvest. At least 500 sheep were drowned on properties in the Eugowra/Trundle area and most of Eugowra's 400 residents were evacuated and some residents from Trundle.

Forbes has experienced a major flood on average every seven years, with major flooding occurring in June 1952 with a peak of 10.8 metres at the Forbes Iron Bridge; September 2016 with a peak of 10.67 metres; August 1990 with a peak of 10.65 metres; October 1955 with a peak height of 10.62 metres; March 2012 with a peak height of 10.55 metres; and in August 1998 with a peak height of 10.35 metres.

Table 2 Historical Flood Heights since 1887

Date	Flood Height (in metres)
June 1952	10.8
October 1955	10.62
August 1990	10.65
August 1998	10.35
March 2012	10.55
September 2016	10.67

Forbes' most recent major flood was in late September 2016 after heavy rain fell on much of inland NSW. During autumn and winter 2016 unseasonal heavy rainfall in most of the state centred on the catchment area of the upper Lachlan, resulting in Wyangala Dam water storage levels increasing from 38 per cent to 90 per cent. By early August, the Bureau of Meteorology (BOM) had issued flood warnings for the Orara, Macquarie, Bogan and Lachlan rivers. In late August, Water NSW began releasing up to 10,000 megalitres per day from Wyangala Dam ahead of expected daily rainfall in the range of 20 to 40 millimetres in the dam's catchment area.

Moderate to major flooding first hit Forbes and Condobolin in early September, and by mid-September predictions were for widespread flooding across most of inland New South Wales. By late September, flooding had peaked in Forbes at 10.67 metres, with 1,000 people evacuated, as the Newell Highway was cut north and south of Forbes' central business district. Forbes was declared a natural disaster zone after flash flooding occurred, resulting in some residents being without homes. As the Lachlan flowed into the Murrumbidgee River, major flooding occurred downriver during late October and early November at Hay, Darlington Point, Carrathool and Hillston.

Other significant years of floods were: 1891, 1916, 1951, 1956, 1961, 1974, 1976, 1993, 1998, 2012, 2016 and 2021.

Forbes Township

Forbes is a town in the Central West region of New South Wales, Australia, located on the Newell Highway between Parkes and West Wyalong. Located on the banks of the Lachlan River, Forbes is 245 metres above sea-level and about 380 kilometres west of Sydney. The district is a cropping area where wheat and similar crops are grown. Nearby towns and villages include Calarie, Parkes, Bedgerebong, Bundabarr, Corradgery, Daroobalgie, Eugowra, Ooma North and Paytens Bridge. Forbes is subject to a pattern of flooding, generally occurring to a significant level once every seven years, most recently including 2016 and 2022. Forbes lies at or near the confluence of the Newell Highway, the Lachlan Valley Way and Henry Lawson Way.

6. The Characteristics of Flooding around Forbes

Note: A vast majority of the information below has been extracted from the Forbes Shire Local Flood Plan

Flood conditions on the floodplain in the Forbes Local Government area are very complex and conditions from one flood to another may be markedly different for the same flood level on the Forbes Iron Bridge gauge. It depends largely on the volume of flow carried by the flood channels which leave the river upstream of the town, and outflows from Wyangala Dam (controlled and uncontrolled). Depths of flooding are generally in the order of one metre, with the main water flow capacity being reduced by the flow into Bundaburrah Creek to the south, the Lachlan River itself, and Lake Forbes and Battye Street (flowing along Lawler Street and back into the lake on the other side of town) floodways which pass through Forbes. The town itself can also reach these depths.

Upstream of Cowra, flooding is generally confined to the stream channels and small pockets of adjacent floodplain and flood peaks travel relatively rapidly along this section of the river. In the vicinity of Cowra, the river flows out of the 'slopes' and into the 'plains'. Below Cowra, inundation of low-lying areas is more extensive, but flood waters tend to subside reasonably quickly, and inundation periods do not generally exceed a week.

By the time the river reaches Gooloogong, a progressive reduction in main channel capacity has started. Consequently, significant overbank spillage occurs between Gooloogong and Forbes, and flood waters begin to spread over wide areas of the floodplain. Much of this water finds its way into natural depressions and billabongs that interconnect and form active flood runners.

The floodplain at Forbes is approximately 10 kilometres wide and floods in this reach of the river tend to have a flat peak, often extending for several days. Flooding can be made significantly worse here by inflow from the Belubula River, much of which moves across its own floodplain even during moderate flood flows. History has shown that any of the tributaries can cause minor floods and have been jointly responsible for major floods when combined with the main river, especially in the reach below the Wyangala Dam.

Lake Forbes has an important role during times of flood and is estimated to have carried approximately 26% of the total peak flow in both the June 1952, September 1974 and probably the March 2012 floods. Naturally, Lake Forbes is fed by rainfall from the north-east of Forbes (in the Back Yamma State Forest area); however, in times when the Lachlan River is in flood, the Lake can be fed from breakouts from the Lachlan River to the east of Forbes from Bathurst Street breakouts and Southern Cross breakouts as described below.

The 'Southern Cross breakout'

Water breaks out from the north bank of the Lachlan River in the vicinity of the locality known as the 'Southern Cross', approximately 16 kilometres upstream of Forbes. As flows from this breakout increase, flood waters flow north from the river, crossing the Forbes-Eugowra Road to the 'Southern Cross flood runner'. Further breakouts along the northern bank of the Lachlan River may occur at various points between the Southern Cross and Forbes to combine with the major flow from the

Southern Cross flood runner. The main flood runner then flows in a south-easterly direction, parallel to the main channel, before feeding into the northern end of Lake Forbes through the railway viaduct.

The Bathurst Street breakouts

In Forbes, the river overtops its bank adjacent to the railway bridge at Bathurst Street and flows northwest along the railway line entering Lake Forbes through two viaducts. The larger viaduct spans across Lake Forbes itself and the smaller is adjacent to Herbert Street. Flow from the smaller viaduct crosses Hill Street and enters Lake Forbes just upstream of the Camp Street Bridge. Flood waters from the Bathurst Street breakout may also enter the southern end of town and inundate the lower portions of Ooma, Oxford and Bandon Streets. Further breakouts from this section of the river also flow south to the Wongajong area and west through the old Botanical Gardens to lower Wambat Street. There is also a Lower Bathurst Street breakout to the east, which flows from Lower Bathurst Street northward along Torig Street across the Escort Way and north-west into Lake Forbes.

The Dukes Crossing breakout

The Dukes Crossing breakout leaves the southern bank of the Lachlan River about five kilometres upstream of Forbes. It flows across Wandary Lane via a culvert towards Dukes Crossing and Lachlan Valley Way, and then into Bundaburrah Creek. This creek flows west and eventually returns floodwater to the Lachlan River immediately to the east of Jemalong Gap through Bundaburrah Cowal and Jemalong Creek.

7. The Lachlan River downstream of Forbes

Flood waters from a wide expanse of area upstream of the Jemalong and Corradgery Mountain Ranges (the floodplain is approximately 10 kilometres wide here) are concentrated to pass through Jemalong Gap, which is only one kilometre wide. Consequently, the flood peak downstream of the Gap is often markedly reduced whilst flood levels upstream are increased and drainage of inundated areas, particularly adjacent to Jemalong Creek, is delayed. Water in the Jemalong Gap region is sourced from the Bundaburrah Creek, Lachlan River and from rainfall in the Pinnacles area; and all of this water backs up against the Jemalong Ranges.

To the west of Jemalong Gap, flood waters can also spread over a wide area through numerous flood runners which often carry far greater flows than the main channel during major floods. Some of these channels return to the river downstream, but the tendency is for the floodwaters to follow a northwesterly path towards the river. In the larger floods, backup water from Jemalong Gap may flow north along the Corradgery Range and pass through a second break in the range, known as Gunning Gap (or Gulgans Gap). This water then joins the Goobang Creek system before flowing back into the Lachlan River near Condobolin. The area between the Goobang Creek and the river is riddled by depressions, billabongs and anabranches which fill during floods and channel water towards Goobang Creek. From here, the water generally flows west and northwest. In major flooding, Goobang creek also spreads to the north to join the Gunningbland Creek. These flood waters eventually join the Lachlan River at Condobolin. These two creeks can also cause flooding independently of any Lachlan River overflow.

Peak travel times

Locations	Travel Time	Cumulative Travel Time
Wyangala Dam to Cowra	8 – 12 hours	8 – 12 hours
Cowra to Nanami	21 hours	29 – 33 hours
Nanami to Mulyandry	26 hours	55 – 59 hours
Mulyandry to Forbes Iron Bridge	22 hours	77 – 81 hours
Forbes Iron Bridge to Cottons Weir	4 hours	81 – 85 hours
Cottons Weir to Jemalong Weir (Downstream)	24 plus hours	105 – 109 hours

River peaks record 2022

Location	Peak during 2022 flood event	Previous record (m) and year record
Cowra	15	15.9 (1870)
Gooloogong	15	13 (1974)
Forbes (Iron Bridge)	11	10.8 (1952)
Forbes (Cottons Weir)	7	7.5 (1950)
Jemalong Weir	9	8.9 (1952)
Condobolin	8	7.4 (1952)
Mandagery Creek (Eugowra)	10	10 (1950)
Belubula River (Canowindra)	6	6.4 (1952)

8. Summary of Isolated Communities and Properties

Potential periods of isolation for communities in the Forbes Shire LGA during a major flood event

Town Area (River Basin)	Population / Dwellings	Flood Affect Classification	Period of isolation	Weeks					Notes
				1	2	3	4	5	
Bedgerebong	20 houses	High flood island	3-5 weeks						Resupply likely to be required after 5 days
Waroo / Garema	5 houses	High flood island	1-5 weeks						Resupply likely to be required after 5 days
Corinella	5 rural properties	High flood island	1-5 weeks						Resupply likely to be required after 5 days
Jemalong	16 houses	High flood island	3-5 weeks						Resupply likely to be required after 5 days
Wirrinya	9 houses	High flood island	2 days – 3 weeks						
Forbes Rural	Approx 100	High and low flood islands	2-5 weeks						

9. Lachlan River Catchment Flood Gauges

Forecast Gauges⁴

Location	BOM No	AWRC No	Station Operator	Flood Classification			Station Type
				Minor	Moderate	Major	
Cowra	63278	412002	WaterNSW	8.5	10.7	13.4	Automatic
Canowindra (Upstream)	565013	412195	WaterNSW	2.6	3.3	4.5	Automatic
Nanami	56500	412057	WaterNSW	7.4	9.7	10.7	Automatic
Eugowra	65086	412904	-	8.0	n/a	9.0	Manual
Forbes Iron Bridge	65088	412901	WaterNSW	8.8	9.5	10.55	Automatic
Cottons Weir	565003	412004	WaterNSW	3.5	5.3	6.6	Automatic
Jemalong Weir (Downstream)	565000	412036	WaterNSW	7.2	7.5	7.7	Automatic
Condobolin (Lachlan River)	550000	412006	WaterNSW	5.2	5.9	6.7	Automatic
Eubalong	49125	412903	-	6.4	n/a	6.8	Manual
Hillston Weir	575013	412039	WaterNSW	2.4	2.8	3.0	Automatic

Information Gauges

Location	BOM No	AWRC No	Station Operator	Flood Classification			Station Type
				Minor	Moderate	Major	
Canowindra	65087	412009	WaterNSW	4.0	4.5	5.5	Manual
Eugowra (Smithfield)	65095	412030	WaterNSW	6.5	8.1	8.5	Automatic
Lake Cargellico	575006	412011	WaterNSW	1.5	1.9	2.0	Automatic

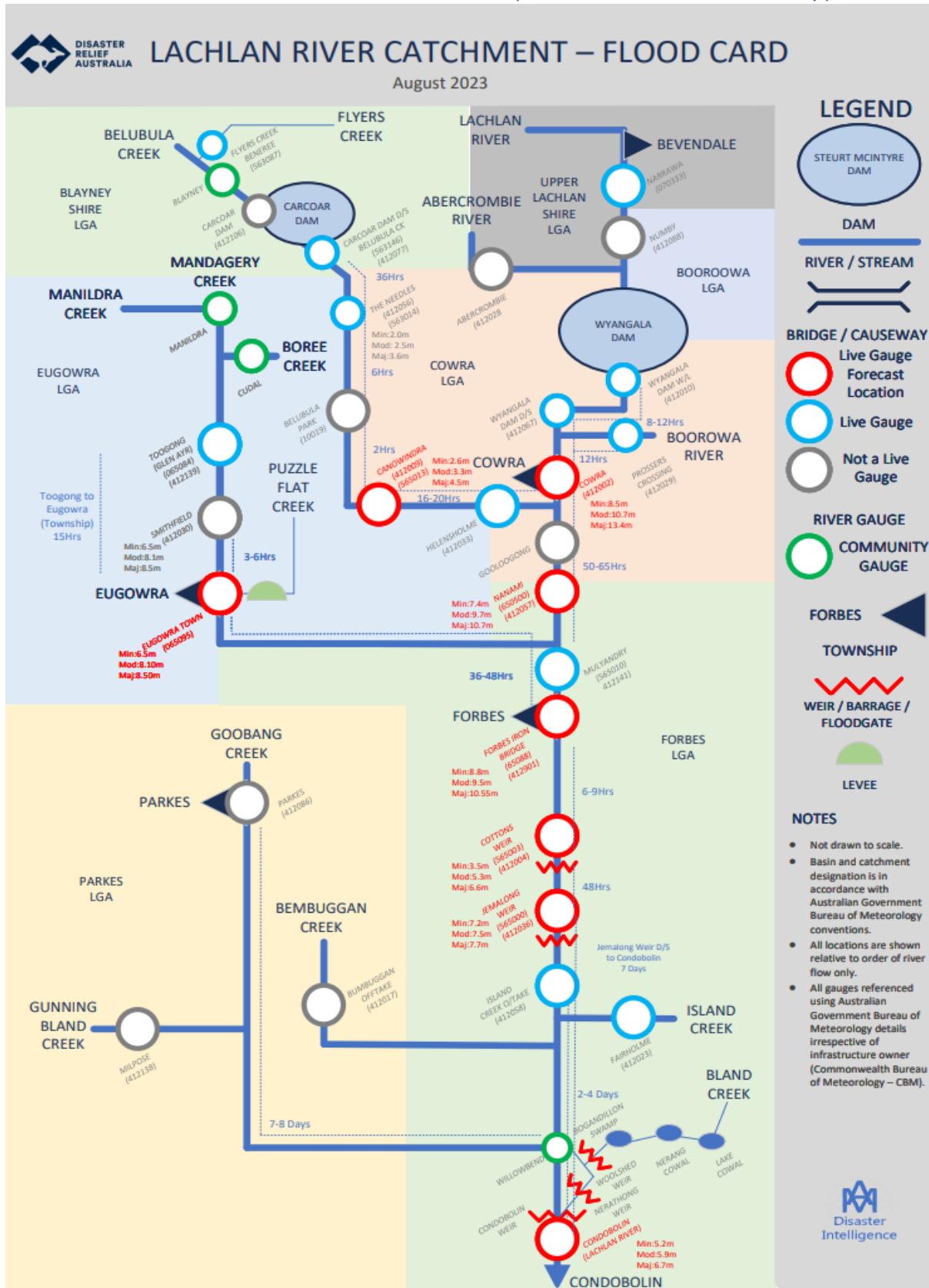
⁴ Service Level Specification for Flood Forecasting and Warning Services for New South Wales and the Australian Capital Territory – Version 3.13 http://www.bom.gov.au/nsw/NSW_SLS_Current.pdf

Data Gauges⁵

Location	BOM No	AWRC No	Station Operator	Station Type
Abercrombie No. 2	563091	41200209	WaterNSW	Automatic
Beneree	563087	412080	WaterNSW	Automatic
Carcoar Dam (Downstream)	563146	412077	WaterNSW	Automatic
Condobolin (Goobang Creek)	550003	412014	WaterNSW	Automatic
Corrong	549002	412045	WaterNSW	Automatic
Dudauman	573013	412134	WaterNSW	Automatic
Fairholme	550004	412023	WaterNSW	Automatic
Hadley No. 2	563018	412066	WaterNSW	Automatic
Helensholme	565006	412033	WaterNSW	Automatic
Island Creek Offtake	550006	412016	WaterNSW	Automatic
Mulyandry Creek	565010	412141	WaterNSW	Automatic
Narrawa	070333	412065	WaterNSW	Automatic
Prossers Crossing	573005	412029	WaterNSW	Automatic
The Bells	563023	412165	WaterNSW	Automatic
The Needles	563014	412056	WaterNSW	Automatic
Toogong (Glenayr)	065084	412139	WaterNSW	Automatic
Blockbank (Upstream)	549008	412129	WaterNSW	Automatic
Whealbah	575005	412078	WaterNSW	Automatic
Willandra Creek at Road Bridge	549007	412012	WaterNSW	Automatic
Willandra Weir	549003	412038	WaterNSW	Automatic
Wyangala Dam (Downstream)	563145	412067	WaterNSW	Automatic
Wyangala Dam	063267	412010	WaterNSW	Automatic
Jemalong Weir	565008	412172	WaterNSW	Automatic

⁵ As detailed above

10. Lachlan Catchment – Flood Card (above Condobolin only)



11. The landscape and its water

The headwaters of the Lachlan River are on the Breadalbane Plain between Yass and Goulburn, on the Great Dividing Range in central New South Wales. The river flows north and then west through diverse landscape ranging from temperate forests, woodlands and grasslands in the east to semi-arid woodlands, mallee and scrublands in the west.

The eastern end of the catchment has elevations up to 1,400 metres and an annual average rainfall in these cooler regions ranges from 800–1,000 mm. The western end of the catchment is located on warm-hot semi-arid plains, at an elevation of around 200 m, and an annual average rainfall of 300 mm. Monthly rainfall is fairly similar across the year.

12. People, industry and water use

The traditional people of the slopes and plains of the Lachlan catchment are mainly the Wiradjuri, whose nation is the largest Aboriginal Nation in NSW, extending from the Murray River to beyond Dubbo, and west to Balranald. Other parts of the catchment are the traditional lands of the Nari Nari, Ngiyampaa and Yita Yita nations.

European settlement of the Lachlan River catchment began in the 1830s, with the establishment of pastoral land holdings, and cropping began in the 1860s with a focus on wheat production. The wheat industry gave rise to milling and transport infrastructure, and additional fodder and grain crops such as oats, rye, maize and barley were established. Market gardening and fruit orchards in the upper Lachlan took advantage of the transport connections to Sydney, and a canning plant was established at Cowra in the 1940s. Viticulture was identified as a potentially productive activity at the turn of the 20th century, and a wine industry was established by the 1920s.

The Lachlan catchment is home to about 4 per cent of the population of the Murray–Darling Basin. The main towns or cities in the catchment service rural industry and the rural population, however residents often travel to larger centres in neighbouring catchments for some health, education and business services. The main centre of Cowra and Parkes have a population of about 10,000 people (ABS 2011) (LGA of Cowra population 12700, Parkes 14450, Forbes 9300 ABS2021) and Forbes has 7,000 people. Agriculture or rural industries provide the main source of employment in the catchment.

Agriculture is the main industry of the catchment, using more than 80 per cent of the land. The slopes and eastern plains support dryland cereal production and livestock grazing, while the tablelands and western plains support dry land grazing. Land along the river is irrigated for the production of fruit, vegetables, cotton, rice, fodder crops and cereal grains. Dairying, feedlots and piggeries also depend on river water.

The Commonwealth Scientific and Industrial Research Organisation (CSIRO) reports that 28 per cent of available surface water was extracted for use, which is moderately high compared with other catchments in the Basin. Groundwater use, on average, makes up 45 per cent of all water used in the catchment annually, and mainly used in the lower catchment around Hillston for irrigation.

13. Regulation of water in the catchment

The Lachlan River was regulated as part of the development of inland New South Wales in the early twentieth Century. The Wyangala Dam, near Cowra, was constructed in 1935 and the Jemalong Weir at Forbes was constructed in 1939 – both to provide a regulated source of water to towns along the river and to irrigators. After significant floods in the 1950s, and a burgeoning lucerne industry in the valley through the 1950–1970s, Wyangala Dam was enlarged from 360 gigalitres (GL) to 1,200 GL in 1970. A number of natural lakes in the catchment were dammed to store water in the lower catchment, including Lake Cargelligo and Lake Brewster. There are many other small weirs on tributaries of the Lachlan, as well as on the lower Lachlan.

14. Environmental importance

The Lachlan River and its floodplains provide a wide range of aquatic habitats such as pools, backwaters and billabongs, in-stream woody habitat and aquatic plants. The lower Lachlan floodplain has nine nationally important wetlands, including Lake Brewster, the Booligal Wetlands and the Great Cumbung Swamp. The latter features one of the largest stands of river red gums in NSW and is one of the most important waterbird-breeding areas in eastern Australia.

The Sustainable Rivers Audit 2 reported that the overall ecosystem health of the Lachlan River Valley was very poor. Drought has severely affected species abundance and diversity of fish, with the health of the fish community rated extremely poor. The macroinvertebrate community was rated as moderate condition throughout the valley. Riverine vegetation was rated as poor condition in the valley overall; however, condition was good in the lowlands zone but very poor in the slopes, upland and the montane (lower mountain) zones. The physical form of the river was rated ‘good’ but there was widespread channel straightening and enlargement, particularly in the slopes zone. Sediment loads have also increased since European settlement. Flow seasonality and variability was rated moderate in the valley overall, but poor in the lowland zone where flows were impacted by seasonality and extraction of supply for irrigation.

15. Government and Stakeholders Involvement in Flood Management

Flooding results in significant risk to many communities across New South Wales. This risk stems from human interaction with flooding through the occupation and use of floodplains.

Since 1984 the NSW Flood-prone Land Policy (the policy) has set the direction for flood risk management (FRM) in New South Wales. In 1986 the NSW Government released the first ‘Floodplain Development Manual’ to support policy implementation. The policy and manual have since evolved in response to significant flood events, reviews and improvements in national and international flood risk management practice.

On 30 June 2023, the State of NSW and the Department of Planning and Environment released the newly revised 'Flood Risk Management Manual'⁶. It provides for evaluation of strategies and formulation of plans that achieve effective flood risk management outcomes accounting for social, economic, ecological and cultural factors, together with community aspirations for the use of flood prone land. This manual provides for the development and implementation of sustainable strategies for managing human occupation and use of the floodplain, in accordance with section 733 of the *Local Government Act 1993* (LG Act); providing councils, statutory authorities, and state agencies and their staff, with indemnity for decisions they make and information they provide in accordance with the manual.

Other related documents are outlined in Attachment A.

- The management of flood risk in NSW is a partnership across governments, with local government generally leading flood risk management (FRM) in their LGA. The NSW Government provides councils with technical and financial support for eligible FRM activities under the FRM framework under funding programs. Funding applications are considered on a statewide priority basis. The NSW Government may consider taking on an expanded role in high priority areas.

The NSW Government also has an expanded FRM role in regional planning and in specific rural areas of the Murray–Darling Basin, as outlined in Section 5.2.3. The development of rural floodplain management plans in these specific areas is led by the NSW Government. It generally follows a process similar to the FRM process but differs in focus.

16. Flood and Water Data Collection

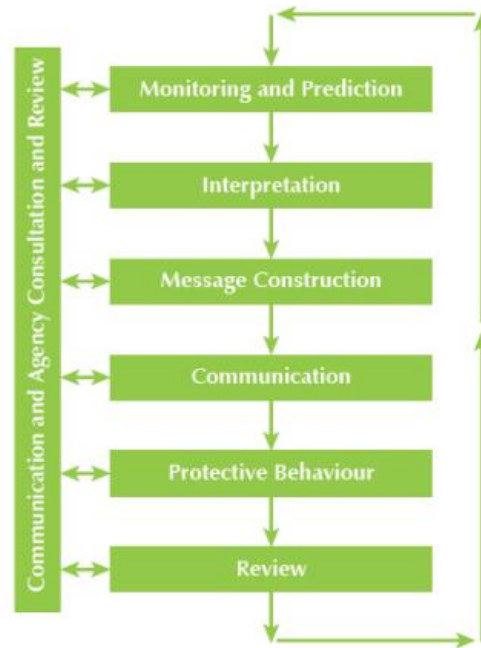
The Bureau of Meteorology

The Bureau of Meteorology (the Bureau) provides generalised, qualitative or quantitative flood predictions for agreed flood forecast locations across Australia. Information on flood conditions, heights and classifications are provided as per the 'Service Level Specification for Flood Forecasting and Warning Services for New South Wales and the Australian Capital Territory – Version 3.13.'⁷

The Bureau's flood forecasting, and warning services are provided within the context of the Total Flood Warning System as defined in the 'Australian Emergency Manuals Series, Manual 21 Flood Warning' (Australian Government, 2009 and illustrated below):

⁶ 2023 Flood Risk Management Manual, <https://www.environment.nsw.gov.au/research-and-publications/publications-search/flood-risk-management-manual>

⁷ http://www.bom.gov.au/nsw/NSW_SLS_Current.pdf



The components of the Total Flood Warning System (Australian Emergency Manual Series, Manual 21 Flood Warning, Australian Government 2009)

The collection and publishing of rainfall and river level data is an important component of the overall service. Apart from use by the Bureau for data analysis and its hydrological modelling for flood predictions, the data is also used by the emergency service agencies, numerous operational agencies, businesses, and the public to monitor rainfall and river conditions. To assist in describing the service, the locations where river height; dam, weir, or lake level; and tidal observations are made are categorised into three types; namely forecast location (Schedule 2), information location (Schedule 3a and 3b) and data location (Schedule 4).

The Bureau monitors the Lachlan River Catchment through several different monitoring stations and publishes this information on its website⁸. Figures 4 & 5 show the river gauge monitoring stations with the Lachlan River Catchment and the information that they display.

An example is located at Figure 4 – the blue triangles identify ‘minor, moderate, and or major flood heights at set locations with the catchment. The river height data is real-time operational data from automated telemetry systems. Most river height data is provided to the Bureau by other agencies.

⁸ Lachlan River <http://www.bom.gov.au/nsw/flood/centralwest.shtml>

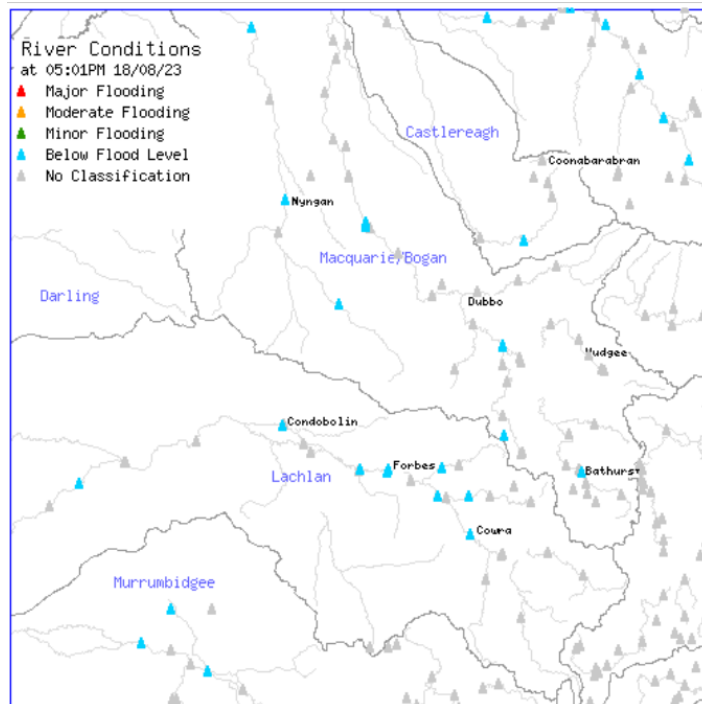


Figure 4 Example of the Bureau's display for river conditions in the Macleay River

Latest River Heights for Lachlan R at Forbes Iron Bridge

Issued at 4:46 pm EST Friday 18 August 2023

[About river height plots](#) | [About this Plot](#)

Station details: Station Number: 065088 Name: Lachlan R at Forbes Iron Bridge
 Flood levels: Minor: 8.80 Moderate: 9.50 Major: 10.55

Data from the previous 4 days.

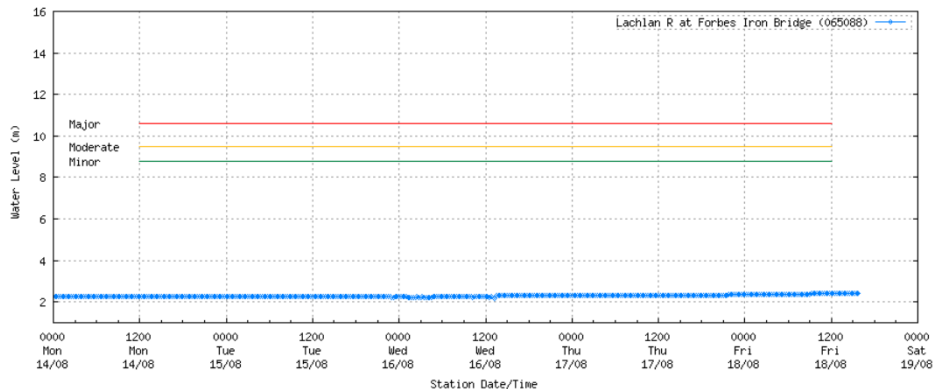


Figure 5 Example of the Bureau's display for river heights for the Lachlan River from Forbes Iron Bridge flood gauge

These stations report their data to the Bureau through a combination of satellite and fixed data infrastructure. They contribute to information collection about the likelihood of a flood event, but they cooperate with other government authorities like the SES and NSW Water to deliver Flood Warnings. These warnings are issued through Flood Warning Centre⁹.

⁹ [Flood Warning Services: National flood forecasting and warning service: Water Information: Bureau of Meteorology \(bom.gov.au\)](https://www.bom.gov.au/flood-warnings/)

Flood Warnings and Flood Watch

The Bureau issues two kinds of warning, a Flood Warning, and a Flood Watch. A Flood Warning is issued when the Bureau is more certain that flood is expected, often when rainfall has started to fall¹⁰. A Flood Warning will generally include specific predictions of the severity of the expected flooding.

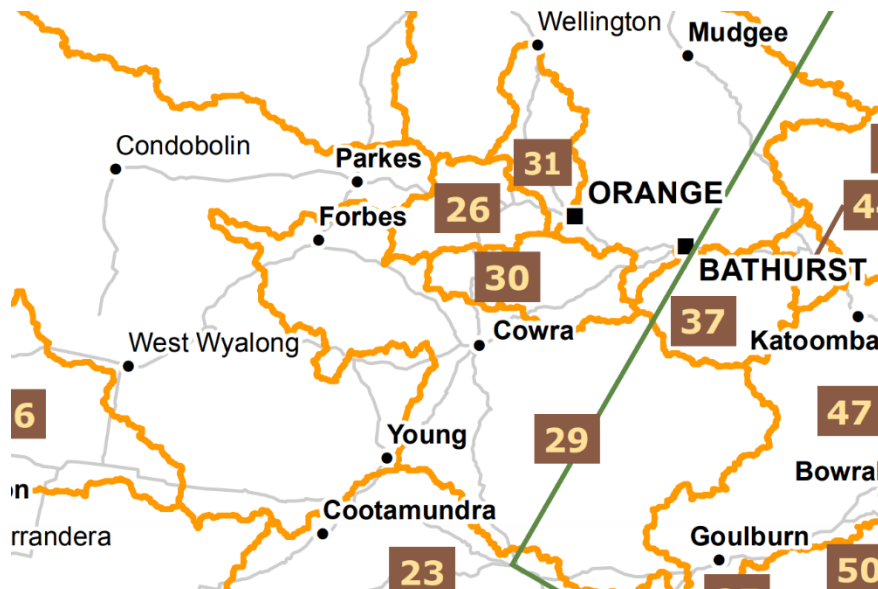


Figure 6: Bureau Flood Watch Areas in NSW. Lachlan River Catchment is #29¹¹

A Flood Watch is issued when forecast rainfall information suggest that local and/or riverine flooding is possible across the Flood Watch area¹². A Flood Watch may cover a large area due to uncertainty associated with the location and amount of forecast rainfall. A flood watch may also refer to the type of flooding that may be experienced in the catchment being highlighted. The Bureau then uses three different types of Flood Classification.

These are:

Minor flooding

Causes inconvenience. Low-lying areas next to water courses are inundated. Minor roads may be closed, and low-level bridges submerged. In urban areas inundation may affect some backyards and buildings below the floor level as well as bicycle and pedestrian paths. In rural areas removal of stock and equipment may be required.

Moderate flooding

In addition to the above, the area of inundation is more substantial. Main traffic routes may be affected. Some buildings may be affected above the floor level. Evacuation of flood affected areas may be required. In rural areas removal of stock is required.

¹⁰ [Flood Warning Services: National flood forecasting and warning service: Water Information: Bureau of Meteorology \(bom.gov.au\)](http://www.bom.gov.au/water/floods/image/BOM_Flood_Watch_Areas_map_NewSouthWales_2017.pdf?v3)

¹¹ http://www.bom.gov.au/water/floods/image/BOM_Flood_Watch_Areas_map_NewSouthWales_2017.pdf?v3

¹² [Flood Warning Services: National flood forecasting and warning service: Water Information: Bureau of Meteorology \(bom.gov.au\)](http://www.bom.gov.au/water/floods/image/BOM_Flood_Watch_Areas_map_NewSouthWales_2017.pdf?v3)

Major flooding

In addition to the above, extensive rural areas and/or urban areas are inundated. Many buildings may be affected above the floor level. Properties and towns are likely to be isolated and major rail and traffic routes closed. Evacuation of flood affected areas may be required. Utility services may be impacted¹³.

In addition to warning services for riverine flooding, the Bureau provide technical assistance to Councils establishing local flash flood warning systems through its Flash Flood Advisory Resource (FLARE). The Bureau maintains FLARE, which is an online resource created to assist agencies to design, implement and manage fit-for-purpose flash flood warning systems.

Gauges are essential for monitoring stream flow, water levels and rainfall. Data collected from gauges provides real-time data to the Gauge Owner and the Bureau.

17. Forbes Shire Local Flood Plan

The Forbes Shire Flood Emergency Sub Plan is a sub plan of the 'Forbes Shire Local Emergency Management Plan' (EMPLAN). It has been prepared in accordance with the provisions of the *State Emergency Service Act 1989 (NSW)* and is authorised by the Local Emergency Management Committee in accordance with the provisions of the *State Emergency and Rescue Management Act 1989 (NSW)*.¹⁴

This plan covers preparedness measures, the conduct of response operations and the coordination of immediate recovery measures from flooding within the Forbes Shire LGA. It covers operations for all levels of flooding within the council area.

18. Bushfire

The typical/average climate in the Mid Lachlan Valley area generally consists of hot dry summers, with dry lightning storms frequently occurring during the bush fire season. Winters are normally cool to cold with moist south to southwest winds. The bush fire season generally runs from October to March. Prevailing weather conditions associated with bush fires in the Mid Lachlan area consist of very high daytime temperatures, strong north to north-westerly winds and very low humidity.

The Lachlan Catchment is composed of three distinct landscapes: **tablelands** (part of the Southern Eastern Highlands bioregion), **slopes** (part of the NSW Southwestern Slopes bioregion) and **plains** (containing parts of the Cobar Peneplain, Riverina and Murray Darling Depression bioregions). Elevation in the catchment varies from over 1300 metres above sea level (asl) on the south-western slopes of Mt Canobolas near Orange to approximately 140 metres as in the Great Cumbung Swamp at the confluence of the Lachlan and Murrumbidgee Rivers.

¹³ [Rainfall and Flood Map - additional notes \(bom.gov.au\)](https://www.bom.gov.au/rainfall/flood-map/)

¹⁴ The Forbes Shire Flood Emergency Sub Plan: <https://www.ses.nsw.gov.au/media/5293/forbes-shire-flood-emergency-sub-plan-november-2021-endorsed.pdf>

The Lachlan Valley is one of the most heavily agriculturally developed catchments in NSW. The majority of pre-European ecosystems across the catchment have been degraded or removed by over a century and a half of agricultural land use (OEH VIS spatial data).

Synergistic pressures leading to the extinction of numerous native mammal species include invasion and occupation by feral animals and weeds, serious degradation to land and water resources and the imposition of inappropriate fire regimes.

There are several landscapes in the Lachlan catchment where relatively large areas of native vegetation remain. This includes the “discontinuous corridors” of native vegetation linking the World Heritage listed Blue Mountains National Park and the Abercrombie River National Park. Further discontinuous forested corridors occur in a generally north-south alignment in the mid reaches of the Lachlan catchment between Goobang, Nangar, Conimbla, Dannanbilla and Weddin Mountains conservation reserves.

Many landscapes in the Lachlan catchment have been entirely cleared; as a result, they have little biodiversity or conservation value. Notably the fertile and lower slope sections of the Southeastern Highlands and NSW Southwestern Slopes have no high-quality remnant vegetation. The eastern and southern parts of the Cobar Peneplain Bioregion have been heavily cleared, as have the more fertile floodplains and lower slopes of the Riverina and Murray Darling Depression Bioregions. The western and southwestern parts of the catchment contain a relatively high proportion of native vegetation primarily chenopod shrublands, although this vegetation cover varies widely in response to prevailing climatic conditions.

Why do bushfires occur?

Bushfires can be started by natural causes, such as lightning strikes, or by people (accidentally or on purpose). Weather conditions and fuel conditions play a part in bushfires happening.

Materials such as leaf litter, bark, small branches and twigs, grasses and shrubs can provide fuel for bushfires. Dry fuel is more likely to catch fire and burn easily; damp or wet fuel may not burn. The type of fuel that is available to burn, how much of it there is, and how dry or moist it is will influence bushfire conditions.

The Mid Lachlan Valley Bush Fire Management Committee (BFMC) area has on average 200 bushfires per year, of which one on average can be considered a major fire.

The main sources of ignition in the Mid Lachlan Valley area are:

1. Lightning storm activity
2. Farm machinery, slashing/cutting operations and harvest operations.
3. Vehicle accidents and exhausts coming in contact with vegetation along major roads, particularly along the Newell Highway.
4. Power lines clashing and equipment failure.
5. Incidents associated with storage of hay, including spontaneous combustion.
6. Careless acts by individuals, particularly welding and grinding during adverse fire weather.

Fires are predominantly grass/crop fires. Most of these fires are contained reasonably quickly, although with unfavourable weather conditions the loss of fencing, stock and outbuildings is a concern (possibility).

Every five to ten years a major fire occurs in the eastern range, usually from a lightning strike. Such an event tends to coincide with drought periods due to drier fuels and dry electrical fronts. Major fires have occurred in the National Park areas, Vacant Crown Land, on private property, in the steep hills throughout the area and the ranges in the east. These fires have the potential to escape into adjoining fire districts.

What are the risks?

Bushfires can cause serious property and infrastructure damage and lead to loss of life. The fire itself is only one element of the danger. Other impacts from bushfires include the effects of radiant heat and smoke.

- Fire embers can spread many kilometres from the location of a large bushfire, causing smaller spot fires to break out.
- Radiant heat can be felt more than 100m away from a large bushfire and has the potential to melt or fracture objects including parts of cars, glass windows, etc.

Toxic fumes and heavy smoke produced from bushfires can impair vision and impact on air quality and create difficulties in breathing. Due to the unpredictable nature of fast-moving fires, people are likely to be encouraged to evacuate from their homes as quickly as possible to ensure they can reach safety. It is important to follow any local alerts and warnings.

19. Mid Lachlan Valley Bush Fire Risk Management Plan 2016

In accordance with Part 3 Division 4 of the *Rural Fires Act 1997*, this plan has been prepared by the BFMC and was endorsed at their meeting on 9 May 2018 for submission to the Bush Fire Coordinating Committee.¹⁵

The Mid Lachlan Valley Bush Fire Risk Management Plan (BFRMP) is a strategic document that identifies community assets at risk and sets out a five-year program of coordinated multi-agency treatments to reduce the risk of bushfire to the assets. Treatments may include such things as hazard reduction burning, grazing, community education, fire trail maintenance and establishing community fire guard groups.

¹⁵ https://www.rfs.nsw.gov.au/_data/assets/pdf_file/0003/2379/APPROVED-Mid-Lachlan-Valley-Bush-Fire-Risk-Management-Plan-2016_updated.pdf

20. The Big Map Exercise – in the Community

Disaster Relief Australia (DRA) in collaboration with the Minderoo Foundation's Resilient Communities Initiative conducted the Big Map Event in Lachlan Catchment, NSW on 11 and 12 August 2023. Attendees for 11 August 2023 included Local Government representatives, operational staff, key partners, and other stakeholders. A second Big Map event was conducted on 12 August 2023, members of the community were invited to attend.

Walking the catchment on both days

Prior to both exercises, 10 forecast locations (Cowra, Canowindra, Nanami, Eugowra, Forbes Iron Bridge, Cottons Weir, Jemalong Weir, Condobolin, Eubalong, and Hillston Weir) and 25 data locations were identified and placed onto the 'big map'. The Big Map was then used as a focal point for discussion. Attendees were invited to move to the locations of their interests: local government representatives to their LGA, landowners to their property, infrastructure representatives to their applicable structures etc. This enabled attendees to better understand the responsibilities of other people at the event, who they might be representing and what their interests might be. Flood and fire were the two natural hazards discussed during this big map exercise.

21. 11 and 12 August 2023 – Forbes Local Government / Partners / Stakeholders

First Activity, Previous Flood events 2022

Once all partners and stakeholders walked onto the map the opportunity was taken to highlight the importance of a catchment response' for flood preparation, monitoring and response events. The catchment response sees all stakeholders working together to prepare for future flood events with appropriate mitigation and plans to prevent damage to infrastructure and loss of life, monitoring for the likelihood of a flood event and then taking evacuation actions accordingly.

Once the exercise commenced, it became apparent that many of the key representatives from the Local Government Areas (LGAs) upstream of Forbes and Eugowra could not attend along with other key partners such as Water NSW and the Bureau of Meteorology. Unfortunately, representatives from Parkes Shire Council could also not attend. For this reason, it was therefore difficult to have a discussion around the operational effectiveness of the entire catchment when in flood. Based on the attendance (Day one only) the following could not be discussed in significant detail and in some cases not at all:

- The identification and the number of flood models used across the Catchment,
- Fully understanding the strengths and weaknesses that align to the national standard for flood warning infrastructure,
- Flood mapping as opposed to operational plans,
- Assets and flood infrastructure: purpose, locations, ownership, and maintenance,
- The timings, flood heights and the flow times with regards to a flash flood event in Mandagery Creek upstream of Eugowra.

- The flash flood event in Eugowra.
 - The national Flash Flood Advisory Resource (FLARE) is an authoritative resource created to assist agencies with flash flood warning responsibilities, such as councils and emergency services, to design, implement and manage fit-for-purpose flash flood warning systems.
 - Limited to no flood infrastructure exists on Goobang Creek, and Yarrabanda Creek, within the Parkes Regional Council. Significant flash flooding occurred within the small community of Tichborne. No infrastructure exists along this small tributary upstream of this small community.
- Network efficiency (prior, during and after) and did it do what it was supposed to?
- Discuss the various levels of understanding of how the network operates for flood impacts and flood classifications across the entire catchment,
- Data collection,
- Data mapping and data sharing across the various partners, stakeholders, the LGAs and the community,
- Data management (software, formats, flood programs and flood software), and
- Data use: flood warning, messaging, and communication.

As the Big Map activity commenced, the DRA team were humbled by the level of professionalism and integrity displayed by the Senior SES and RFS staff in attendance. Their knowledge of the Lachlan River and its characteristics whilst in major flood provided invaluable insights which subsequently guided the conversation throughout the entire day. As the emergency leads, they accounted for the events that occurred in, what was briefed as, three separate but interlinked flood events within three separate locations in the upper realms of the Lachlan Catchment, above Forbes, Eugowra and Parkes.

In just over 24 hours on Monday 14 November 2022 almost 120 millimetres of rain fell over Forbes into an already saturated landscape, raising fears it could experience its highest flood in 70 years. The town watched as floodwaters rose and inundated main streets. The Lachlan River at Forbes peaked at 10.6 metres, just above the major flooding levels, but below the 1952 level of 10.8 metres.

The nearby town of Eugowra recorded a similar rainfall amount between 12 and 13 November. One of the two river gauges upstream of the town showed the Mandagery Creek was rising by up to 88 centimetres an hour on Saturday 12 November, as rain poured over the northeastern reaches of the Lachlan basin. The creek peaked at 9.8 metres two days later, surpassing the previous record of 9.6 metres in 1950.

The township of Forbes and the surrounding communities were experiencing their second major flood within a fortnight. The Lachlan River at Forbes was anticipated to reach 10.8 metres, peaking on Thursday and reaching levels similar to the 1952 flood. The flooding started on Tuesday and continued through to the weekend. Around 500 to 600 homes and businesses were inundated and impacted at various levels. A downpour of rain caused the Wyangala Dam to spill at record levels, with 230,000 megalitres being released a day and greatly exacerbating river water flow downstream. The nearby small town of Eugowra, with a population of 800 residents, had water inundate each house at roof height just hours later. Torrential rain in a different part of the Lachlan (Mandagery Creek) reportedly doubled the height of the creek subsequently causing a flash flood impacting Eugowra significantly.

The impacts were devastating, destroying roads and infrastructure, upturning cars and caravans, homes subsequently washed away, and structures knocked over due to the extremely strong flow of water. The most devastating news was the fact that many residents were uninsured as premiums grew up to \$40,000 a year due to the high flood risk with the town being in a designated floodplain.

Day two of the workshop in Forbes was far more community focused / attended. Within the Forbes region, DRA has completed over 200 work orders to help devastated homeowners get back some semblance of normality and begin the road back to recovery. This is only a small proportion of the amount of work required in the area and we have been humbled to participate in a small proportion of this community's long road back to recovery. Members of the community were invited to attend and participate on the following:

- Utilise the map to identify their home and /or property and slowly discuss what occurred during the flood event.
- At a very basic level discuss the current flood gauge network and the Lachlan Catchment geographically.

Floods are a natural part of the Australian landscape and the Lachlan Catchment. The varying tributaries, flood plains, and wetlands all vary in size, dynamics, and behaviours. A key take-away on both days of the activity was that no flood is the same, and as such flooding events within the Lachlan will have different impacts. The Lachlan Catchment has seen its fair share of flood events over the years.

The Use of Local Knowledge

Whilst discussing the flood gauge network across the catchment the topic turned to timings of water flow between gauges or known landmarks. During a riverine flood event, predictions are typically for expected stream levels at specific times at key locations on a river, in this case the Lachlan River. Predictions can be of:

- flood stages (the levels reached at specified times as the flood rises towards the peak),
- flood classification levels (when the river is expected to reach, or exceed the minor, moderate or major flood level),
- the peak flood levels, and
- particular significant levels that reach a threshold (e.g. the lowest point on the crest of a levee) that will be reached or exceeded as the river rises. These can be tipping points for changes in the impacts on the community and for community response to an event.

Like all communities it was identified that some community members adhere to and listen to council information and communication, whilst other members adhere to and readily listen to what they are being told by emergency services. There were also community members that listened to property owners and other members of the community with this trusted information and data. It was identified that no single point of truth was being utilised and trusted.

Knowing river heights or expected water levels at specific times at key locations on a river (forecast location) enhances situation awareness and more importantly allows emergency responders to understand the threat and warn the community downstream as required.

During a flood event, warning lead time is the time between the issuing of a warning containing a prediction and the time when the predicted height is reached or when the stream peaks below that height. The longer the lead time, the more time there is to undertake protective behaviour and action (Community awareness).

The value of flood prediction is determined by both the accuracy of the prediction itself and the amount of warning lead time provided. The potential warning lead time depends on the hydrology of the catchment draining to the forecast location and the technical components of the flood prediction system. Where a location can be flooded by runoff from small catchments which respond very quickly to rainfall (flash flooding) the potential warning lead time is very small (from less than an hour up to several hours). In these situations, forecast rainfall is often utilised to increase the available lead time, but this can be at the expense of forecast accuracy.

Another key discussion point on the map was the railway line that runs north to south through Forbes and south adjacent to Henry Lawson Way. Some property owners indicated that the railway line acted like a levy bank therefore causing significant flood impacts.

School activity - 22 August 2023

Our revisit to Forbes two weeks after the main exercises provided us with a valuable opportunity to engage with Year 3 and 4 students. This experience underscores the critical importance of involving Australian children in disaster preparedness and building resilience from an early age. As we delve into this engagement, it is essential to incorporate data from Australian examples and studies that shed light on best practices for nurturing resilience in children in the context of disaster preparedness.

1. Education as the Cornerstone: Our interaction with the students reaffirmed the pivotal role of education in resilience building. According to research from organizations like the Australian Red Cross, providing children with age-appropriate information about disaster risks and preparedness is fundamental¹⁶. The 'Get Prepared' program in Australia, for instance, has demonstrated that children who receive disaster education at school are better equipped to understand and respond to emergencies. This underscores the importance of incorporating disaster education into the Australian school curriculum.

2. Inclusive Planning: One of the remarkable findings from our discussion with the students was their emphasis on pets and animals as vital considerations during disasters. This aligns with the recommendations of studies like the 'Australian Natural Disaster Resilience Index', which emphasizes the need for inclusive disaster planning. Involving children in planning discussions not only unveils unique perspectives but also empowers children to advocate for their needs, such as the welfare of pets, in disaster plans.

3. Psychological Resilience: Beyond physical preparedness, fostering psychological resilience in Australian children is paramount. Research conducted by organizations like the Australian Psychological Society reveals that providing psychosocial support to children before, during, and after disasters is essential for their well-being. Schools and communities should incorporate mental health

¹⁶ Children are positive change agents, <https://www.redcross.org.au/pillowcase-workshops/>

education and resources to help Australian children cope with stress and trauma associated with disasters.

4. Community Engagement: Our experience underscores the importance of involving the entire Australian community in resilience-building efforts. The "Resilient Australia Report" highlights community engagement as a core element of resilience. Engaging children in disaster discussions can instil a sense of responsibility and community cohesion, aligning with the report's emphasis on inclusive community planning.

5. Social Connections: The significance of nurturing social connections among Australian children was evident in our engagement. According to research from the Australian Institute of Family Studies, social support is a key factor in promoting resilience in children. Encouraging strong relationships with peers, teachers, and neighbours can provide crucial emotional support during and after disasters.

6. Practice and Simulation: Best practices for building resilience in Australian children often include regular disaster drills and simulations. The "Emergency Management Australia" organization recommends these activities to familiarize children with emergency procedures and build their confidence. Schools can play a vital role in conducting these exercises.

7. Community Resources: Resilience-building efforts should connect Australian children and families with essential community resources. Research by the Australian Red Cross indicates that informing children about emergency shelters, food distribution centres, and medical services can empower them to take proactive steps in a disaster.

8. Role Models: Encouraging Australian children to look up to local heroes, such as first responders, can inspire and motivate them. Research conducted by the University of Melbourne suggests that positive role models can enhance children's resilience. Recognizing and celebrating local heroes can be a powerful way to achieve this.

In conclusion, our interaction with Year 3 and 4 students in Forbes serves as a testament to the importance of integrating Australian children into disaster resilience efforts. When we combine our experiences with data-driven best practices from Australia, we create a holistic approach that not only protects Australian children's physical safety but also nurtures their emotional and psychological resilience. This, in turn, strengthens the overall resilience of the Australian community, ensuring that children are better equipped to understand, adapt to, and recover from disasters on their home turf.

22. Critical Infrastructure identified by the community post a disaster event (Recovery)

Once the discussion around the flood gauge network finished, the discussion then turned to critical infrastructure. Participants from the workshops were asked to identify what they believed critical infrastructure was within the Lachlan River Catchment. Figure 7 shows how disruption to one essential service can trigger failures in dependent services. For example, a damaged powerline can cause a power outage to a mobile telecommunications tower, which can then cause an outage in mobile telecommunications coverage. Road closures can impede the ability for communities to evacuate during a disaster and disrupt the transportation of essential goods, such as food, across the country – impacting relief and recovery efforts.

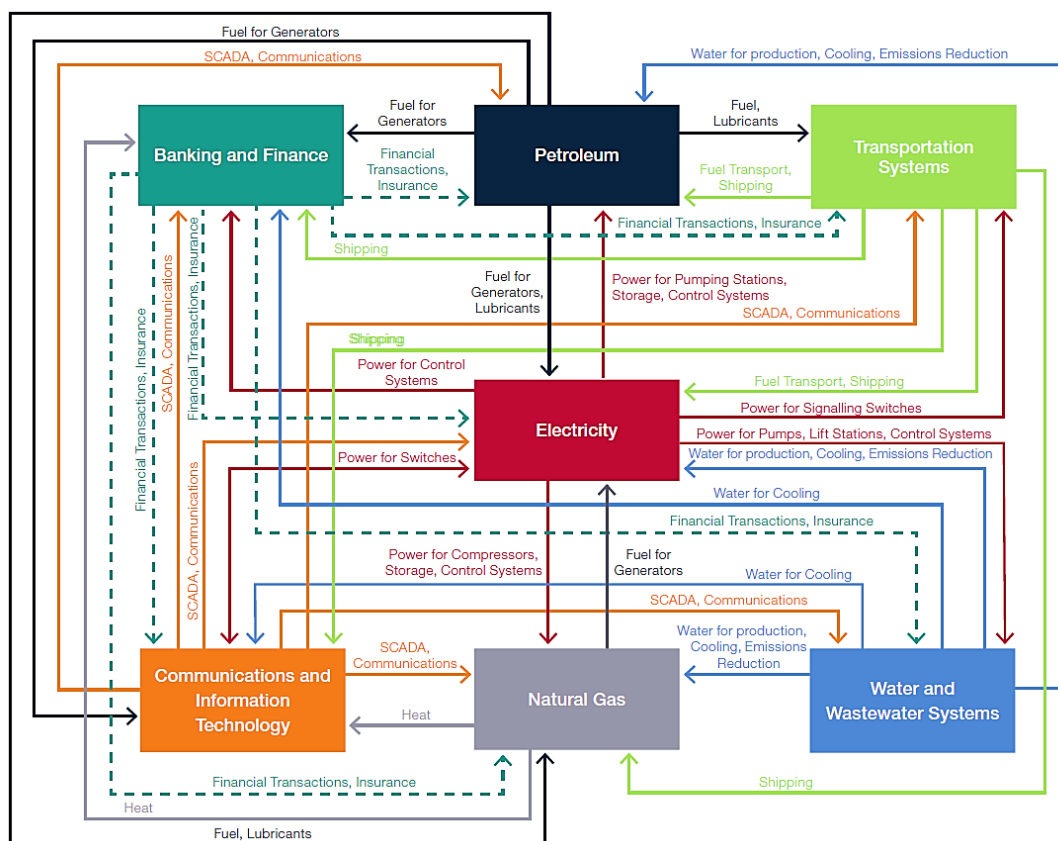


Figure 7: Example of interdependencies post a disaster event¹⁷

This sparked several conversations at various levels and to keep it community focussed and at a very localised level the following critical infrastructure was identified by the community post a disaster event (the relief and recovery):

Schools

Schools are seen as an essential empowerer immediately following a disaster event. Communities that can immediately start cleaning up and getting on with their life always appear stronger and more resilient. During this clean up phase, having children able to attend school helps re-establish

¹⁷ <https://naturaldisaster.royalcommission.gov.au/publications/html-report/chapter-09>

their routine, and eases the burden on parents as they struggle to clean up and deal with the impacts.

Supermarkets / food items

Access to food and essential items is vital in the early recovery phase. Supermarkets become the critical enabler within the community. The sooner these can be up and running, the better the community will be in the long term.

Primary Health Care Services

Immediate access to basic medical services is essential to the wellbeing of any community after a disaster event.

In the immediate aftermath of a disaster, it is normal for many people to experience intense stress reactions. These reactions are not necessarily pathological. While most people eventually recover over time, a sizeable proportion will experience changes in their mental health in the months or years after the initial event. The most common mental health conditions reported across a range of disaster events are post-traumatic stress disorder (PTSD), depression, anxiety, substance abuse, and complicated grief. Some may also experience heightened suicidal risk, intense negative effect, acute stress, physical health or somatic concerns, and poor sleep quality.

Waste Transfer Station

The collection, transport and disposal of solid, liquid and hazardous waste is an essential consideration during a disaster, particularly during the recovery phase. Traditionally, local governments have had the responsibility of managing waste and clean-up operations post-disaster. Typically, local governments manage this service professionally and to a high standard via the engagement of local waste contractors.

The waste streams from commercial and industrial facilities that are likely to require particular consideration following a flood impact are:

- Organic waste. Food waste if not collected early will putrefy and result in public health risks and will become progressively harder to manage. Odour is also a major issue for community reports/complaints which can result in redirecting resources from the vital needs of cleaning up to deal with these complaints. Sources of such waste include supermarkets, poultry farms, food processing operations, abattoirs, meat and freezer stores, cold rooms and organic material stores.
- Liquid waste. A number of sources of liquid waste need to be considered during a disaster response these include, but are not limited to, petroleum waste particularly from petrol station sites and contaminated stormwater from electrical pits.
- Hazardous waste. Although probably already known and identified, the places where hazardous materials are manufactured, stored and disposed of require special attention and management to ensure they are not disposed of in normal waste streams. Strategies need to be developed to identify large volumes of hazardous waste at the initial collection point to ensure the safety of the community and contractors collecting the waste at both the waste collection and receiving ends of the process.
- Domestic Waste. The types of domestic hazardous waste that are typically found following a natural disaster include:
 - Asbestos in buildings damaged by natural disasters, especially older structures, can be released into the environment if asbestos-containing materials are disturbed.
 - Chemicals and household products such as cleaning agents, pesticides, fertilizers, paints, solvents, and other chemical products stored in homes.

- Electronic devices and appliances damaged in a disaster event may contain hazardous materials like lead, mercury, or other heavy metals.

Drinking water

Access to fresh running water is essential and a key requirement for a community dealing with flood.

Essential Services

Essential services are relied on by every individual, household and community for meeting basic, everyday needs. The provision of essential services is especially critical before, during and after a natural disaster – when people are at their most vulnerable.

Essential services are especially important in the lead-up to, during and after a natural disaster. For example, electricity and telecommunications outages can prevent communities from receiving timely information, advice or warnings about the threat posed by nearby flood impacts and or fires. They can prevent communities from making informed decisions about how best to ensure their own safety, or the safety of those in their care (e.g. when to evacuate).

Supply chains, being the distribution of essential goods and services across the country, are critically important to our economy. Working supply chains deliver petrol to service stations, fresh food to supermarket shelves, household waste to landfill and essential pharmaceuticals to hospitals. In a natural disaster, the continuity, or rapid restoration, of supply chains is vital to the response and recovery phases.

Industrial Estate

When flooded, industrial facilities present direct (damage to buildings, tanks, pipes, storage of raw materials and finished products, pumps, electrical, thermal and mechanical equipment) and indirect (business interruption, temporary unemployment, rising insurance premium) consequences. The damage may cause major accidents within industrial plants such as the release of hazardous material, soil or water pollution by substances hazardous to the environment, fires, explosions, dispersion of toxic clouds.

In the preparation and preparedness phase of disaster management, it is vital that industrial plant operators and owners improve their understanding of potential impact of a natural disaster on their facility.

Reserves and parks

Some reserves and or parks within a community may be built within flood prone locations and may well be within river flow diversions, and or the flood impacted area.

Land that adjoins rivers, creeks, estuaries, lakes and wetlands is known as riparian land (often called 'frontage'). Riparian land can vary in width from a narrow strip to a wide corridor and is often the only remaining area of remnant vegetation in the landscape. Riparian corridors provide habitat for rare or threatened species, connecting larger patches of remnant vegetation and a corridor for the movement of animals and native plants.

Natural disasters can interrupt transport routes. During the 2019-2020 bushfires, some firefighting assets could not be transported between communities due to fires and road closures, which had a direct impact on the emergency response. Road closures also impeded the ability for communities to evacuate during the bushfires and disrupted the transportation of essential goods, such as food, across the country – impacting relief and recovery efforts¹⁸.

Key Infrastructure discussion

A key part of the 'Big Map' exercise is the identification of key infrastructure. Local Government and key stakeholders are asked to place a white sticker on what they believe to be is key infrastructure. The same exercise is repeated on the second day however this time it is with community members. The entire exercise outlines the disparity between what Council and stakeholders think critical infrastructure is and what the community believes is critical to them. Comparing the infrastructure assets that were recognized as important before an event and after an event provides insights into how the community's priorities and needs may have shifted in response to the event. Such a comparison can help assess the impact of the event on the community's infrastructure and its adaptation strategies. Here's a breakdown of the assets in both scenarios:

Infrastructure considered important to stakeholders before an event but lost significance after the event may indicate a shift in priorities or a reassessment of needs in the aftermath of the event. Below is some of the changes in importance to key infrastructure for Stakeholders

- **Church (Before: 1, After: 0):** Stakeholders considered the church important before the event, possibly for spiritual and community reasons. However, its importance decreased after the event, suggesting that other priorities took precedence during the recovery phase.
- **Doctor (Before: 1, After: 0):** Access to a doctor was important to stakeholders before the event, likely for regular healthcare needs. The decreased importance after the event might indicate changes in healthcare access or a shift in focus to more immediate concerns during recovery.
- **Emergency Services (Before: 1, After: 0):** Stakeholders recognized the importance of emergency services before the event, which is crucial for disaster preparedness and response. The decreased importance afterward might indicate that the immediate crisis had passed, and long-term recovery became the focus.
- **Hospital (Before: 2, After: 1):** The hospital remained important but slightly less so to stakeholders after the event, possibly indicating that stakeholders perceived the healthcare system to have adapted to the crisis, and healthcare priorities shifted toward recovery and stabilisation.
- **Houses (Before: 1, After: 0):** Stakeholders considered houses important before the event, likely emphasising housing needs. However, the importance of houses decreased after the event, suggesting that other priorities took precedence during recovery.

¹⁸ <https://naturaldisaster.royalcommission.gov.au/publications/html-report/chapter-09>

These changes in importance reflect the evolving needs and priorities of stakeholders during the recovery phase. After a significant event, stakeholders may reevaluate what is most critical for the community's well-being and adapt their priorities accordingly.

Assets / Infrastructure that became important to the community after an event but were not as significant before the event suggest a shift in priorities or an increased awareness of specific needs due to the event's impact. Below are the changes in importance to assets / infrastructure for the community

- **Accommodation (Before:0, After: 1):** The need for accommodation became important after the event, likely because of temporary housing requirements for disaster-affected individuals.
- **Airport (Before:1, After: 0):** The community's importance rating for the airport decreased after the event, possibly indicating that immediate transportation needs lessened, and other concerns took precedence.
- **Bridge (Before:0, After: 1):** The construction of a bridge gained importance after the event, emphasising its role in improving accessibility during and after crises.
- **Evacuation centre (Before:1, After: 0):** The importance of an evacuation centre decreased after the event, suggesting that the immediate need for mass sheltering had diminished.
- **Farms (Before:0, After: 1):** The development of farms post-event suggests a focus on food security and agricultural resilience as a response to the event's impact.
- **Hospital (Before:0, After: 1):** The increased importance of a hospital to the community after the event reflects a heightened need for healthcare services during recovery.
- **School (Before:0, After: 2):** The community recognised the importance of schools after the event, possibly indicating a focus on education and community support during the recovery phase.
- **Shops (Before:0, After: 1):** The importance of shops for the community increased after the event, suggesting an emphasis on local commerce and access to essentials.
- **Support Services (Before:2, After: 0):** The community's importance rating for support services decreased after the event, possibly because immediate needs had been addressed, and longer-term recovery priorities were different.

These shifts in importance reflect the community's adaptive response to the event's impact and the evolving needs that arose during the recovery phase. It highlights the community's resilience and ability to prioritise critical infrastructure and services that are most relevant to their post-event well-being and recovery.

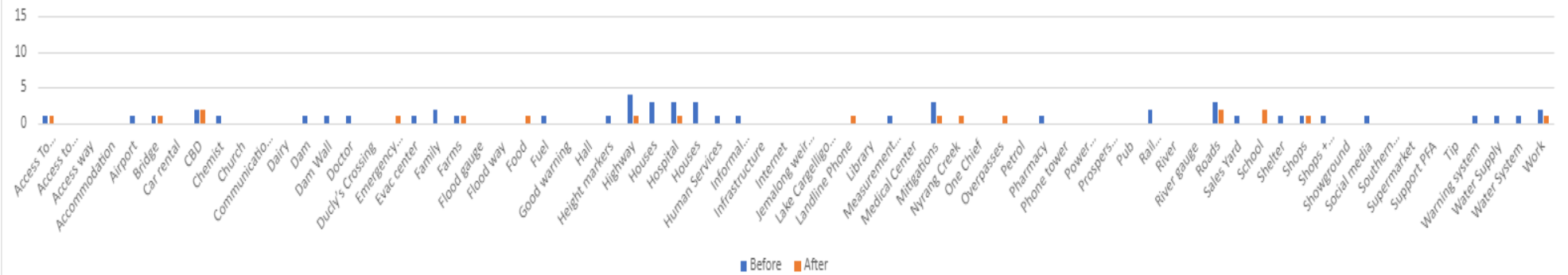
To compare stakeholder responses with community responses regarding the importance of various infrastructure before and after an event, we can analyse the differences in importance ratings. Here's a summary of the differences between stakeholder and community responses for each asset / infrastructure:

Comparing perceptions of importance of Assets/Infrastructure between Stakeholders and Community (Before vs. After):

- **Accommodation:** Both Stakeholders and Community increased its importance from 0 to 1 This indicates that both groups recognised the need for accommodation after the event.
- **Airport:** Stakeholders increased its importance from 3 to 4, while the community's importance decreased from 1 to 0. This suggests that stakeholders saw the airport as more critical for recovery, whereas the community's view shifted.
- **Bridge:** Both stakeholders and the community increased its importance from 0 to 1 after the event, aligning their views.
- **Evacuation centre:** Stakeholders maintained its importance at 2, but the community's importance decreased from 1 to 0. This suggests a shift in priorities, with stakeholders valuing the evacuation centre more.
- **Farms:** Both stakeholders and the community increased its importance from 0 to 1 after the event, aligning their views.
- **Hospital:** Stakeholders decreased its importance from 2 to 1, while the community increased its importance from 0 to 1. This indicates a difference in perception, with stakeholders seeing the hospital as less critical post-event.
- **Houses:** Stakeholders decreased its importance from 1 to 0, while the community maintained its importance at 0. This suggests that stakeholders shifted their focus away from housing needs.
- **Mitigations:** Stakeholders increased its importance from 0 to 3, whereas the community maintained its importance at 1. This indicates that stakeholders recognised the need for mitigations more than the community.
- **Sales Yard:** Stakeholders decreased its importance from 1 to 0, while the community maintained its importance at 0. This suggests a decrease in the perceived importance of a sales yard for both stakeholders and the community.
- **School:** Stakeholders decreased its importance from 4 to 3, while the community increased its importance from 0 to 2. This shows a shift in perception, with the community valuing schools more after the event.
- **Shops:** Stakeholders maintained its importance at 0, while the community maintained its importance at 1 after the event. This indicates that the community recognise the value of shops for recovery.
- **Support Services:** Stakeholders increased its importance from 2 to 5, while the community's decreased to 0. This suggests that stakeholders attached higher significance to support services.
- **Work:** Stakeholders and the community both increased its importance after the event, aligning their views.

In summary, there are differences in perception between stakeholders and the community regarding the importance of certain assets before and after the event. Stakeholders, in some cases, recognised the increased importance of specific assets for recovery more than the community did, while in other cases, both groups aligned their views. These differences may reflect varying priorities and perspectives on post-event recovery and adaptation.

Community



23. Community Assessment & Prioritisation

Building Back Better - Looking to the future

We formalise processes and systems to enable effective assessment of post-disaster damages and needs to more accurately quantify and characterise the recovery needs and to formulate broad recovery strategies across all the communities.

Outcomes of the Community Assessment and Prioritisation Activity

The Community Assessment and Prioritisation Activity was designed to shape a holistic conversation and assessment about the communities within Forbes and the surrounding areas of Eugowra, Condobolin and Parkes and the perceived strengths and weaknesses. This analysis is somewhat flawed however since not all the communities that reside within the area shown on the map could attend.

Stakeholders

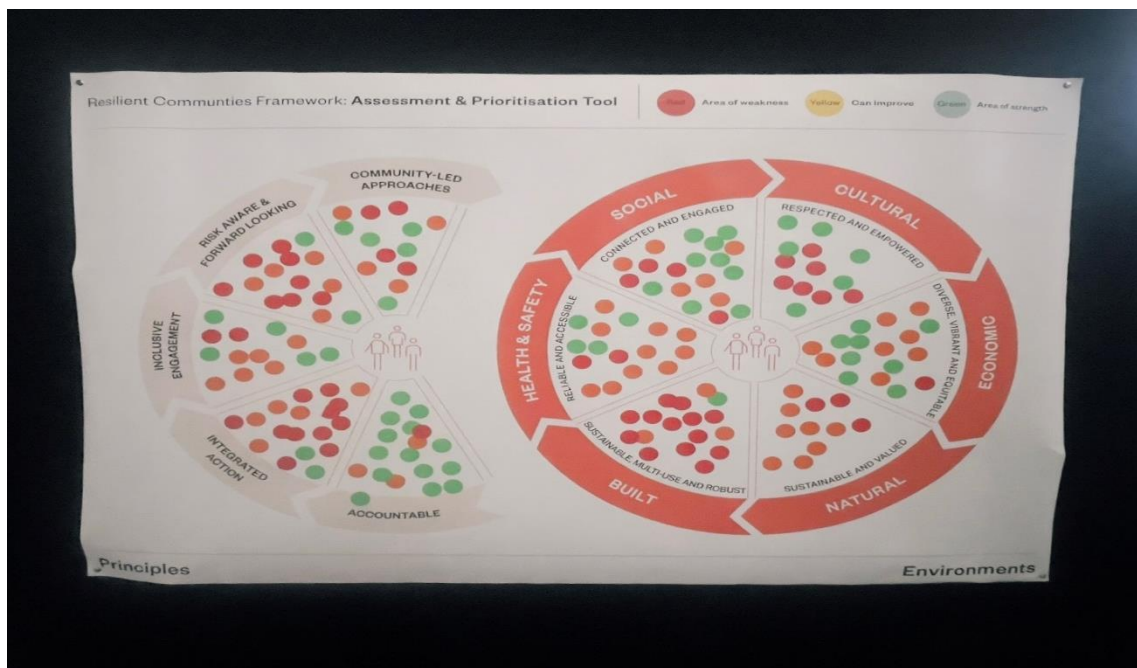


Figure 8: Resilient Communities Framework: Assessment and Prioritisation Tool completed by stakeholders from the Forbes and Surrounding regions at the Forbes Big Map exercise.

Principles

The insights gathered from our stakeholders' perspectives during our discussions are instrumental in understanding their perceptions of the principles guiding our initiatives. These insights help refine our strategies to better align with stakeholder expectations. In this section, we will delve into the key observations made by our stakeholders:

Principle of “Accountability”

Stakeholders have overwhelmingly and unanimously endorsed the principle of accountability as fundamental for all parties involved in the matter at hand. This consensus underscores a shared belief that each stakeholder should shoulder responsibility for their actions and decisions. This commitment to accountability not only promotes transparency but also ensures that each stakeholder actively participates in identifying and resolving challenges and issues as they arise.

Risk Awareness and Forward-Looking Integration:

A majority of the stakeholders have expressed concerns regarding the areas of risk awareness and forward-looking integration. This collective sentiment indicates there is a perceived need for improvement in these domains. Stakeholders believe there is room for enhancing the level of awareness and preparedness when it comes to identifying, assessing, and mitigating risks related to the project or initiative. Additionally, there is a recognition that our forward-looking integration needs further development to ensure adaptability and responsiveness to changing circumstances.

Principle of "Risk Awareness"

Stakeholders have emphasized the importance of a comprehensive understanding of potential risks and their implications. They believe that a heightened focus on risk awareness can better equip us to navigate and mitigate risks effectively within the project or initiative.

Principle of "Looking Forward" or Forward-Looking Integration:

The concept of "looking forward" involves strategic planning and anticipating future challenges and opportunities. Stakeholders concur that this aspect requires more attention and development to ensure that our project or initiative remains agile and responsive in the face of evolving circumstances.

Community-Led Approaches and Inclusive Engagement:

In contrast to the unanimous agreement on accountability and the concerns regarding risk awareness and forward-looking integration, the feedback regarding "Community-Led Approaches" and "Inclusive Engagement" is more varied. There is no clear consensus among stakeholders in these areas, indicating a wide range of opinions and perspectives.

Principle of “Community-Led Approaches”

Some stakeholders may feel that the current approach adequately empowers and involves the community, while others may have reservations or suggestions for improvement. The mixed feedback suggests that further discussion and collaboration among stakeholders are needed to refine and enhance our community-led approach.

Principle of “Inclusive Engagement”

Similarly, "Inclusive Engagement" has received mixed feedback. While some stakeholders believe that inclusivity is well-prioritized, others see room for improvement. This diversity of opinions underscores

the complexity of achieving true inclusivity and the need for ongoing dialogue to ensure that all voices are heard and valued.

In conclusion, the consensus on accountability among stakeholders underscores the importance of shared responsibility across all parties. However, the perceived weaknesses in risk awareness and forward-looking integration, along with the lack of a clear consensus on community-led action and inclusive engagement, highlight areas that require further discussion, refinement, and collaboration among stakeholders. These insights will serve as a valuable foundation for shaping our future strategies and ensuring a more comprehensive and effective approach that meets the diverse expectations of our stakeholders.

Environments

In our recent assessment of community by stakeholders, representatives highlighted the undeniable beauty of the environment in which they live. However, there is growing concern that this natural beauty is not being adequately preserved for future generations due to unsustainable practices. The majority of participants in the assessment pointed to the built environment as a crucial area in need of improvement. Additionally, the concept of "Building Back Better" emerged as a potential strategy to enhance the built infrastructure, making it more resilient to natural hazards. Health and safety concerns were another prominent issue, echoing a common thread in many regional and rural areas. On a positive note, the social environment of the community was widely regarded as a source of strength, fostering a sense of connectedness and engagement. In contrast, opinions on the economic and cultural environments were more divided, with participants evenly split between viewing them as areas of strength and areas in need of improvement.

The Built Environment: Building Back Better

The built environment encompasses the physical infrastructure of a community, including housing, roads, utilities, and public spaces. While our assessment noted the community's aesthetic appeal, it also exposed shortcomings in terms of sustainability and resilience. The idea of "Building Back Better" gained traction during discussions, suggesting a collective aspiration to improve infrastructure in a way that can withstand natural hazards and environmental challenges. This approach aligns with the principles of sustainability and resilience, ensuring that future development prioritises environmental preservation and safety.

Health and Safety: A Regional Challenge

Participants expressed significant concerns about health and safety within the community, echoing a common theme seen in many regional and rural areas. This issue encompasses various aspects, including healthcare access, emergency services, and overall safety measures. Addressing these concerns should be a priority to enhance the quality of life for community members and provide them with the essential services they need.

Social Environment: A Source of Strength

One of the standout findings from our assessment was the strong sense of community in the area. Participants consistently reported feeling connected and engaged within their social environment. This social fabric provides a valuable foundation for addressing other challenges, as a united community can work together to create positive change. Leveraging this strength can help build resilience and address other areas in need of improvement.

Economic Environment: Mixed Perceptions

Perceptions of the economic environment were divided, with some participants viewing it as a source of strength and others believing there is room for improvement. This divergence may reflect different economic circumstances within the community or varying perspectives on economic development. A comprehensive analysis of the economic environment, including opportunities for job creation and economic diversification, may shed light on potential strategies for improvement.

Cultural Environment: A Three-Way Split

Opinions on the cultural environment were equally divided, with participants falling into three distinct groups: those who see it as a source of strength, those who believe it needs improvement, and those who are uncertain. This indicates a complex cultural landscape that may require further exploration to better understand the community's cultural aspirations and how they can be supported.

Conclusion

In conclusion, our community assessment by stakeholders revealed a beautiful yet fragile environment that requires sustainable management. Building Back Better in terms of infrastructure, addressing health and safety concerns, and leveraging the strong social fabric are essential steps toward creating a more resilient and thriving community. The mixed perceptions of the economic and cultural environments highlight the need for tailored strategies that consider the diverse perspectives and needs of community members. By working collaboratively, the community can strive for a future that combines its natural beauty with sustainable practices and enhanced quality of life for all residents.

Discussion

The discussion on principles highlights the importance of accountability, the need for improvement in risk awareness and forward-looking integration, and the diversity of opinions on community-led approaches and inclusive engagement. Regarding environments, there is a call to balance the aesthetic appeal of the built environment with sustainability, address regional health and safety challenges, leverage the strong social community for resilience, and conduct thorough analyses of the economic and cultural environments to support community aspirations.

Community

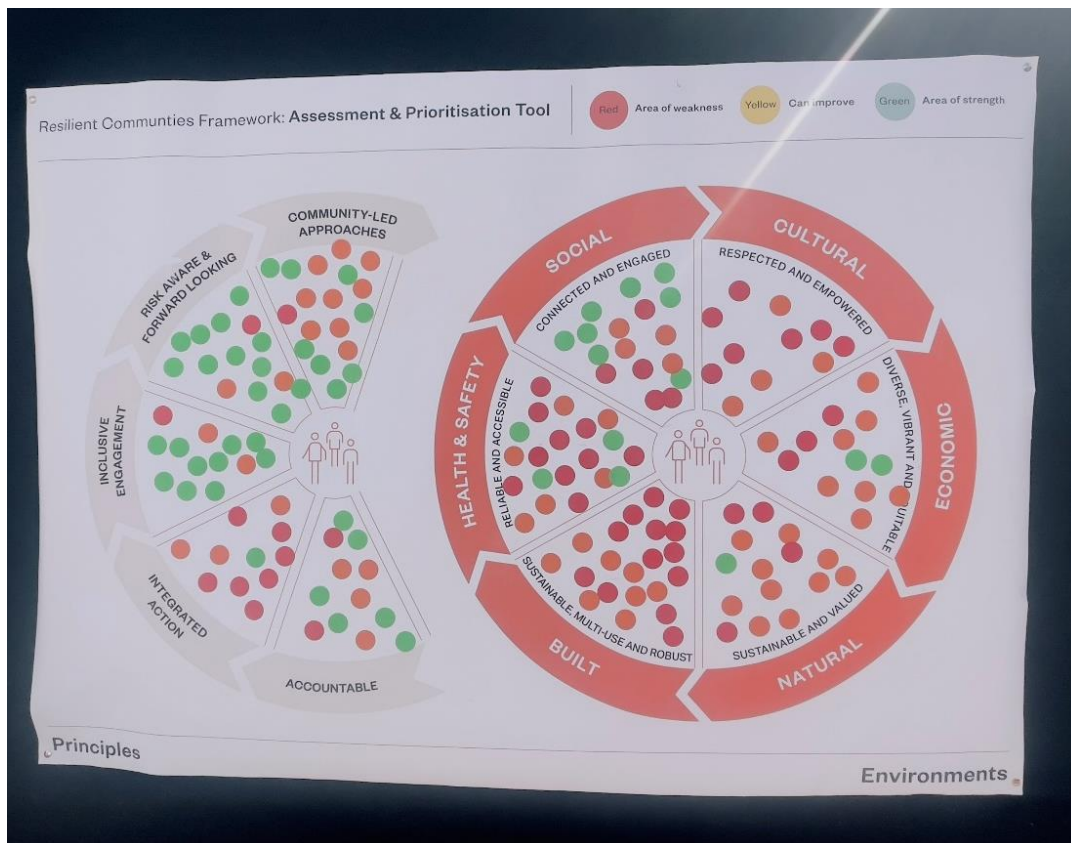


Figure 9: Resilient Communities Framework: Assessment and Prioritisation Tool completed by community members at the Forbes Big Map exercise.

Principles

Our comprehensive community engagement assessment has yielded a wealth of insights derived from participant feedback. These insights offer a valuable perspective on the strengths and weaknesses inherent in the principles guiding our initiatives. They play a pivotal role in shaping our future community engagement strategies, ensuring they remain closely aligned with the ever-evolving needs and expectations of our community stakeholders. In the following sections, we will explore the findings related to each of the specified principles:

Principle of "Accountability"

This principle elicited a balanced set of responses from community participants, resulting in mixed ratings. This variance implies that while some stakeholders may express satisfaction with our current level of accountability, others harbour concerns or expectations that have not been fully met. Thus, it is imperative for us to conduct a thorough examination of our accountability mechanisms, to foster greater clarity and transparency. This will serve to bridge any existing gaps in perception and expectations.

Risk Awareness and Forward-Looking:

Echoing the optimism surrounding inclusive engagement, participants have lauded our approach to risk awareness and forward-thinking. This acknowledgment suggests that we have successfully honed our ability to identify and proactively address potential risks associated with our initiatives. Simultaneously, we have demonstrated a keen focus on forward-looking solutions that are instrumental in shaping a sustainable future.

Principle of “Integrated Action”

Regrettably, the feedback from the majority of community participants signals a need for improvement in the realm of integrated action. This underscores the urgency of our efforts to streamline and harmonize the multifaceted initiatives we undertake. By fostering synergistic interactions among these endeavours, we can work toward the realization of overarching goals and maximize the impact of our community engagement initiatives.

Community-Led Approaches and Inclusive Engagement

Principle of “Community-Led Approaches”

Feedback pertaining to community-led approaches reveals a notable divergence of opinions among participants. Some view this as a strength, emphasizing our successful empowerment of the community to assume ownership of initiatives. Conversely, there is a concurrent acknowledgment that improvements are required in this domain. To address this, we must redouble our efforts to enhance support for community-led initiatives, ensuring that our guidance and available resources align seamlessly with the unique needs and aspirations of our community stakeholders.

Principle of “Inclusive Engagement”

The resounding consensus among community participants is that our steadfast commitment to inclusive engagement is a standout strength. This unequivocal affirmation underscores the recognition and appreciation of our endeavours to encompass a diverse spectrum of stakeholders, providing them with a platform to express their voices and ensuring that their contributions are not only heard but also valued.

In summary, our community engagement endeavours have earned commendation in the realms of inclusive engagement, risk awareness, and forward-thinking. However, the need for improvement is apparent in the areas of integrated action, accountability, and community-led approaches. To effectively address these identified weaknesses, we must contemplate the implementation of targeted strategies, establish clearer lines of communication, and remain steadfast in our commitment to fostering collaboration with the community. This feedback will undoubtedly serve as an invaluable

compass guiding our journey toward enhancing our community engagement initiatives, while also strengthening the partnerships we forge with our diverse and vital stakeholders.

Environments

In our comprehensive assessment of the community's various environments, it is evident that community members hold diverse perspectives on the strengths and weaknesses within these domains. The assessment encompassed the social, built, natural, economic, cultural, and health and safety environments. The following section provides an in-depth analysis of these environments based on community feedback.

Social Environment: A Source of Strength with Room for Improvement

The social environment emerged as the only environment most of the community identified as a clear area of strength. However, it is essential to note that this consensus was achieved by a narrow margin, indicating that many community members also perceive room for improvement in this regard. Despite the closely contested vote, the strong sense of community and connectedness remains a valuable foundation for addressing other challenges within the community. Leveraging this sense of unity can potentially help build resilience and foster positive change.

Built Environment: An Area of Weakness Requiring Immediate Attention

In stark contrast to the social environment, the built environment was unanimously seen as either an area of weakness or an area in dire need of improvement. Not a single participant rated the built environment as a strength. This collective sentiment underscores the urgency of addressing issues related to the physical infrastructure of the community. While the community's aesthetic appeal is recognized, sustainability and resilience issues must be urgently addressed. The concept of "Building Back Better" gained traction during discussions, reflecting a collective aspiration to enhance infrastructure in a way that can withstand natural hazards and environmental challenges.

Natural Environment and Economic Environment: Shared Need for Improvement

The natural environment and economic environment both garnered a clear majority of ratings indicating a need for improvement. Community members expressed concerns about preserving the natural beauty of their surroundings, highlighting the importance of sustainable practices and environmental conservation efforts. Similarly, perceptions of the economic environment were divided, with a significant majority indicating that it requires enhancement. This divergence may be attributed to varying economic circumstances within the community, necessitating a comprehensive analysis to identify opportunities for job creation and economic diversification.

Cultural Environment and Health and Safety Environment: Areas of Weakness with Differing Perspectives

The cultural environment and health and safety environment were both predominantly rated as areas of weakness by community participants. However, it is important to note that a certain percentage of participants felt that the health and safety environment was actually a strength. These varying perspectives underscore the complex nature of these environments, which may require further

exploration to better understand the community's cultural aspirations and the strengths and weaknesses of their health and safety measures.

Conclusion

The community assessment revealed a community that values its social environment but acknowledges the need for improvement. Urgent attention is required to address the shortcomings in the built environment, while the natural and economic environments also demand concerted efforts for enhancement. The cultural and health and safety environments present complex challenges, with varying perceptions that warrant further investigation. Addressing these environmental concerns will require collaboration, strategic planning, and a commitment to building a more sustainable and resilient community for future generations.

Discussion

The comprehensive community engagement assessment has generated significant discussion points regarding the guiding principles. Notably, the resounding consensus on the strength of Inclusive Engagement highlights its role as a platform for diverse stakeholders to voice their opinions. Positive feedback on Risk Awareness and Looking Forward underscores the community's ability to proactively address risks and focus on sustainable solutions. Conversely, the call for improvement in Integrated Action emphasises the need to streamline initiatives for greater impact, and the mixed ratings on Accountability point to the importance of clarity and transparency.

Divergent opinions on Community-Led Approaches prompt stakeholders to better align support with community needs. In the assessment of community environments, the acknowledgment of the Social Environment as a strength, albeit with room for improvement, suggests potential for building resilience. In contrast, the unanimous concern over the built environment underscores the need for urgent action. The majority's call for improvement in the natural and economic environments highlights the importance of sustainability and economic diversification. The cultural and health and safety environments present complex challenges that warrant further exploration. In conclusion, these discussion points provide invaluable insights to enhance community engagement and build a more resilient community.

Comparison

Comparing community outcomes and stakeholder outcomes, the comprehensive community engagement assessment has revealed several key principles that provide valuable insights into the strengths and weaknesses of our initiatives.

In terms of the "Principles of Inclusive Engagement," the community perceives their commitment to inclusive engagement as a standout strength. They appreciate the active involvement of diverse stakeholders and see it as a testament to Stakeholders dedication to providing a platform for their voices to be heard and their contributions to be valued. Stakeholders, in turn, benefit significantly from this approach, as they are given a meaningful opportunity to express their perspectives and insights.

Regarding "Risk Awareness and Looking Forward," both the community and stakeholders have expressed positive sentiments. The community has lauded the ability of local stakeholders to identify

and proactively address potential risks associated with their initiatives. Stakeholders appreciate the forward-thinking approach, recognizing its role in shaping a sustainable future.

However, when it comes to "Integrated Action," feedback from the community suggests a need for improvement. There is a clear signal that we must urgently streamline the various initiatives and foster synergistic interactions among them. This alignment is seen as crucial in realising overarching goals and maximising the impact of our community engagement initiatives.

In terms of "Accountability," the picture is more mixed. Community feedback indicates varying levels of satisfaction with accountability mechanisms among stakeholders. Where some express satisfaction, others have concerns or unmet expectations. This underscores the importance of enhancing clarity and transparency in the accountability processes to bridge any existing gaps in perception and expectations.

Lastly, "Community-Led Approaches" have generated diverse opinions among participants. Some view this as a strength, emphasising the successful empowerment of the community to take ownership of initiatives. However, there is also acknowledgment that improvements are required. To address this, we must redouble any efforts to enhance support for community-led initiatives, ensuring that guidance and the available resources align seamlessly with the unique needs and aspirations of our community stakeholders.

In conclusion, this comparative analysis provides a comprehensive overview of how our community engagement strategies are perceived by both the community and stakeholders. It highlights areas of strength and areas that require improvement. To effectively address these identified weaknesses, we must contemplate the implementation of targeted strategies, establish clearer lines of communication, and remain steadfast in the commitment to fostering collaboration with the community. This feedback will undoubtedly serve as an invaluable compass guiding the journey toward enhancing the community engagement initiatives while also strengthening the partnerships forged with diverse and vital stakeholders.

24. Establishing a Community Core

At the end of the workshop the idea of developing a localised community-led Community Core was discussed. Community members run a Core without official assistance - it's essentially a place for neighbours to help neighbours in a coordinated way. The primary role of the Community Core is to act as the link between the associated Local Government and the community.

Each Core is based at the community level, and it explains how to organise an emergency relief and recovery effort based on community expectations, needs, and associated local requirements. It also sets out and describes the different roles needed.



Figure 10 Community Core Model

Following a disaster event, the community will naturally come together to support one another as required. Strong, connected communities are better prepared to respond to and recover from disasters when they occur. In a major emergency, official responders will always need to prioritise the most urgent issues, so it is likely that for the first few days the community will need to help each other within the disaster. The Community HUB is a designated place where they can gather, connect with one another, and solve problems using the skills and resources which already exist among their community.

During this workshop it was clear that if a Community Core was established the Five Pillars of the DRA Recovery model could easily be implemented and fully utilised. The Five Pillars of the DRA Recovery model are as follows:

Human and Social - This relates to the emotional, social, physical, and psychological health and well-being of individuals, families and communities following a disaster. The Human and Social pillar within a community aims to:

- Gain access to timely information from the Local Government
- Aid in providing assistance to reconnect with families, friends, and community networks

- Enable community members to manage their own recovery through access to information and the knowledge of where to find Local, Regional and State services and/or practical assistance, including financial assistance for those individuals and households who are most vulnerable and do not have the means to finance their own recovery.
- Act as the lead for the community and the vital link between Local Government and the community to access emotional, psychological, and mental health support at individual, family, and community levels (psychosocial support).

Tasks include:

- Identify and select a Community HUB leader
- Identify a suitable location and secondary location to act as a community HUB / community centre immediately post a disaster event
- Understand the roles and responsibilities of the Australian Red Cross, St Vincent De Paul, Disaster Relief Australia, other Community Groups, GIVIT, State and Federal Recovery and Funding Arrangements, and Local Government Relief and Recovery arrangements.
- Understand and identify the location of the critical care members of the Community, and
- Lead and interpret the needs and requirements of the community when outside assistance arrives.

Economic - The effects of a disaster on the economic environment can be classified in terms of direct and indirect impacts. The tangible impacts can usually be given a monetary value and may include loss of tourism, employment opportunities and reduction in cash flow for businesses. Each community has a business lead and chamber of commerce established. A community member from these groups is always very well connected and fully understands the community in which they live. A Community Hub with this type of leading community member is always a great asset to have.

Tasks include:

- Identify and understand the key economic drivers of the community.
- Identify what's unique to this community and if it is impacted how will this impact the community over the next 3, 6 months if lost or damaged?
- Understand the [State and Federal Recovery and Funding Arrangements](#).

Environmental – Impacts to the environment may include damage or loss of flora and fauna, poor air quality, reduced water quality, land degradation and contamination, or damage to heritage listed places. A representative from the community who understands these impacts and is willing to step forward and guide the Local Government as required.

Tasks include:

- Identify and understand the environmental impacts across the community
- Identify what these impacts have on farming, businesses and / or private landowners.
- Understand localised flood mitigation options, bushfire mitigation strategies etc

Building - The effects of a disaster on the built environment often result in damage and disruption which inhibits the capacity of essential services and services such as housing, accommodation,

education, and health facilities. A representative from the community (local builder, plumber etc) who understands these impacts and is willing to step forward and guide the Local Government as required.

Tasks include:

- Identify what has been damaged or impacted in the community (Minor, Moderate Major).
- Determine if there are likely to be insurance issues?
- Explore if outside contractors impact the community if utilised?
- Identify what building capabilities exists within the community?

Roads and Transport - The effects of a disaster on transport networks, including road, rail, aviation and maritime normally result in difficulty accessing communities and disruption to critical supply chains (both within and outside of the impacted area). Restoration of these networks, or the identification of alternatives, is a priority in disaster recovery. A representative from the community who understands these impacts and is willing to step forward and guide the Local Government as required.

Tasks include:

- Identify what local roads, bridges and or access routes have been impacted?
- Determine what is the result of these impacts (can't access property, roads damaged, bridges damaged etc)?

Utilising the DRA Resilience Framework




In the last decade, resilience has evolved from a specialist term used largely in materials science and environmental studies to become a concept employed frequently and passionately by policymakers, practitioners, and academics in various disciplines. The concept has become embedded in laws, government, doctrines, and plans, and universities across the world have established resilience centres, institutes, and research programs.




Within DRA, we believe a resilient community is one whose members are connected to one another and work together in ways that enable it to function in the face of stress and trauma. A resilient community has the ability to adapt to changes in the physical, social, or economic environment, and the potential to learn from experience and improve over time. A resilient community can also be self-sufficient, at least for a time, if external assistance is limited or delayed.

As communities are complex and dynamic social structures, levels of community resilience are not static. It is important that those utilising the concept of community resilience make efforts to regularly measure it. Everyone has a unique combination of capabilities and capacity to prepare, respond and recover from disaster, which means they are vulnerable and resilient in different ways. Each level of society has aspects of resilience or vulnerability embedded within it. Central to this is a better understanding the systemic nature of risk and Australia's vulnerability¹⁹.

¹⁹ Risk reduction: A shared responsibility, The Second National Action Plan to implement the National Disaster Risk Reduction Framework, https://nema.gov.au/sites/default/files/inline-files/28605%20NEMA%20Second%20Action%20Plan_V10_A_1.pdf [Retrieved 9 September 2023]

The first step towards enhancing the resilience of a community involves understanding the community's strengths and vulnerabilities, as well as its physical characteristics (e.g., local infrastructure), procedural characteristics (e.g., disaster policies and plans) and social characteristics (e.g., level of community cohesion).

	<p>People - Resilient people are aware of situations, their own emotional reactions, and the behaviour of those around them. By remaining aware, they can maintain control of a situation and think of new ways to tackle problems. In many cases, resilient people emerge stronger after such difficulties.</p>
<p>What does success look like</p>	<p>We are resilient within a community when: We have access to people that can assist when required and provide situational awareness when we need it. We understand the weaknesses and vulnerabilities across our community. Our community understands and is involved in disaster risk management. Our community is at its strongest when we work together.</p>
<p>Our commitments to the community</p>	<p>We act with every possible kindness and humanity, and no matter what, hold ourselves to a higher standard. Be respectful: Be respected. Swift mobilisation to rapidly deploy Disaster Relief Teams in the wake of a natural disasters to assist the community. Increase community awareness and preparedness for all hazards through community engagement. Show, through action, how the latent leadership and service potential of our nation's veterans and emergency service specialists can be harnessed to build disaster resilience and relief capability.</p>
	<p>Making Sense – Making sense of the problem is essential for understanding the bigger picture. It can be used as a way of exploring and developing effective future plans at the community level.</p>
<p>What does success look like</p>	<p>We are resilient within a community when: We know that beyond the next hill is a river and beyond the river another hill. Yet we will march undaunted until we reach those who need us. We understand that the community is connected and / or influenced by internal and external factors. We understand that local economic activity, relationships among different social groups, local cultural patterns all influence the community from the inside out The challenges we face are complex, we understand that we cannot approach them as if they were linear problems. Systemic thinking helps us understand the complex crises before us.</p>
<p>Our commitments to the community</p>	<p>Identify and connect with change leaders in the NGO and disaster relief sectors to ensure we are constantly at the cutting edge of both technology, practice, and the community. The conduct of disaster risk mitigation and preparedness activities in Australia and overseas, particularly in under resourced and high-risk areas of operation. Recognised leader in spontaneous volunteer management throughout Australia and a proven track record of connecting businesses to communities through corporate volunteering.</p>
	<p>Bouncing Back - Resilient communities can bounce back from adverse situations. They can do this by actively influencing and preparing for economic, social, and environmental change.</p>
<p>What does success look like</p>	<p>We are resilient within a community when: Our disaster management systems are scalable to accommodate the future changes and risk. Our community looks to the future and continuous improvement. We take a proactive approach to resilience building, rather than a reactive one.</p>
<p>Our commitments to the community</p>	<p>Operating within existing international disaster relief frameworks across the Asia Pacific Region, supported by established relationships with government, industry, and local communities. We act without fear or favour in the best interests of the communities we serve and each other. We embrace a culture of ongoing improvement through regular monitoring and information sharing.</p>

	Striving Forward – As we look to the future, some challenges will be so big that it won't be possible for the community to simply adapt; fundamental changes will be necessary, and the community will need to transform.
What does success look like	We are resilient within a community when: We know that transformation must occur. Our ability to transform as a community will not be successful unless the community involved recognise the need for it. We will need options for change. New ideas for dealing with new situations will only be available if there is room for them to be developed and tested. Transformative change needs support from higher scales and depends on having high levels of all types of capital—natural, human, built, financial, and social.
Our commitments to the community	We serve without expectation of personal gain, recognition, or reward. Provide a steady-state engagement model that provides continuous touch points with our Tribe between disaster relief missions. Deploy highly trained personnel in the wake of natural disasters to deliver timely and effective disaster relief wherever and whenever it is needed.
	Our Human Needs - A sustainable community is a place where people want to live and work, now and in the future. The community needs of existing and future residents are sensitive to their environment and contribute to a high quality of life. These communities are inclusive, well planned, built and run, and offer equality of opportunity and good services for all.
What does success look like	We are resilient within a community when: Sustainability helps us understand in a more general sense our extremely complex relationship with the natural world, and the consequences of getting that relationship wrong. Identify adaptation opportunities following disasters and in anticipation of climate change. We explore how our actions impact the biosphere, how the biosphere in turn impacts us, and how our actions need to change over the long term.
Our commitments to the community	Promote a culture of creativity, continuous learning, a bias for action and trust over control. Ensure we have mechanisms to listen to the views of our stakeholders, communicate effectively and continuously learn to improve our performance. A world class provider of Remotely Piloted Aircraft capability, aerial damage assessment, mapping, and Geographic Information Systems (GIS), in Australia and overseas.
	Courage – Everyone within a community needs courage, we need courage to confront challenging issues and take responsibility for our collective future.
What does success look like	We are resilient within a community when: We know that we need to face problems head on. Resilience building makes us grapple with complex problems that don't have easy or obvious answers. We know it's hard enough to work on these issues as individuals and households; it's harder still to work on them as a community, with people who may see things differently.
Our commitments to the community	We act without fear or favour in the best interests of the communities we serve and each other. We embrace a culture of ongoing improvement through regular monitoring and information sharing. Courage brings us back around to the first foundation, People, because it is the people of the community who will build resilience—and they are the ones who need courage for all the pieces of resilience building.

25. Some ideas for next steps

What does a Disaster Resilient Community look like? Community resilience can be defined in many ways. Rather than define disaster resilience, we can focus on the common characteristics of disaster resilient communities, individuals and organisations. These characteristics are:

- functioning well while under stress
- successful adaptation
- self-reliance, and

- social capacity.

Resilient communities also share the importance of social support systems, such as neighbourhoods, family and kinship networks, social cohesion, mutual interest groups, and mutual self-help groups.

Communities that develop a high level of resilience are better able to withstand a crisis event and have an enhanced ability to recover from residual impacts. Communities that possess resilience characteristics can also arrive on the other side of a crisis in a stronger position than pre-event. For example:

- a community with well-rehearsed emergency plans,
- superior fire mitigation processes in the cooler months,
- appropriate building controls, suitable to local hazards and risks,
- widely adopted personal and business financial mitigation measures (e.g. insurance suitable to the risks) and,
- is likely to suffer less during an extreme fire or flood event and is likely to be able to recover quickly; financially, physically and as a community.

Developing a catchment approach

As detailed in the newly released 'NSW Flood Risk Management (FRM) Guideline AG01', flood risk management is a partnership across governments, with primary responsibility resting with local councils in their service areas. Local government responsibilities for FRM are outlined in the guideline. These responsibilities are derived from both the *Local Government Act 1993 (LG Act)* and the policy. Local government also has responsibilities for considering flooding in decisions that come through other Acts and documents. All local governments within the Lachlan Catchment should consider coming together and having an open discussion about future flood events. This discussion could consider the following:

- Future flood infrastructure investment,
- Flood classifications, and
- Warnings and alerts.

Leading change as a coordinated effort

Developing a catchment approach across the entire Lachlan Catchment will require significant leadership and time investment. Leadership is needed across all Local Governments with a footprint in the Lachlan, to drive improvements in disaster resilience. The responsibility for community leadership should be taken by all partners within their sphere of influence in a coordinated manner, to maximise the benefits from limited resources.

- Risk assessments are undertaken for priority hazards (flash flooding and flooding) and widely shared among at-risk communities, stakeholders and decision makers.
- Risk assessments consider risks and vulnerabilities and capabilities across the social, economic, built and natural environments.
- Partnerships are in place which support improved access to risk information and more effective collaboration in assessing and monitoring hazards and risks common across jurisdictional boundaries.

- Local Governments, community leaders and individuals routinely share information and maps on risks, for the benefit of the community. This will reinforce strong networks across sectors and regions to fill information gaps, share information and build understanding at all levels.
- Existing and, where necessary, improved data and tools for assessing hazards and risks, enable communities to better understand and act on their own risks as required.

Community level of risk-awareness in the catchment

This aligns with Outcome 1 in the ‘Second National Action Plan to Implement the National Disaster Risk Reduction Framework’ (the National Action Plan) – an increased understanding of disaster risk across Australian society²⁰. Creating clear, consistent information on risk across all hazards, including sources to assist in risk reduction, which meets the needs of community members, and helps those in the catchment take steps to reduce their risk.

- Local Governments within the Lachlan River catchment look at innovative ways to improve public awareness of, and engagement with, disaster risks and impacts.
- Identify and address data, information and resource gaps.
- Address technical barriers to data and information sharing and availability.
- Integrate plausible future scenarios into planning.
- Develop cohesive disaster risk information access and communication capabilities to deliver actionable disaster risk data and information.
- Support long-term and solution-driven research, innovation and knowledge practices, and disaster risk education, and
- Improve disclosure of disaster risk to all stakeholders.

Development of community action plans

Each community is different. All localised community plans would benefit from further development to ensure appropriate and sufficient consideration is given to disaster recovery. Local Recovery plans established before an event should consider likely effort required across all functional recovery groups at a very localised level. National Action 6 aims to support the creation of hazard mitigation plans, from individual and household plans to community, regional and state plans, which establish proactive mitigation priorities. Taking a participatory approach to planning is vital, including representation from everyone the plans will cover, in developing, reviewing, updating and implementing, to ensure priorities are grounded and shared²¹.

Developing, funding and empowering community-led groups

Adopting and empowering a community-led action group as the source of emergency information for their neighbourhood. National Action 11 aims to strengthen the capability and capacity of individuals and communities to become leaders and make informed risk reduction decisions relevant to their local

²⁰ Priority 1 – Understanding Disaster Risk, Second National Action Plan to Implement the National Disaster Risk Reduction Framework, https://nema.gov.au/sites/default/files/inline-files/28605%20NEMA%20Second%20Action%20Plan_V10_A_1.pdf, [retrieved 25 September 2023]

²¹ National Action 6, https://nema.gov.au/sites/default/files/inline-files/28605%20NEMA%20Second%20Action%20Plan_V10_A_1.pdf [retrieved 25 September 2023]

context²². This can be done by encouraging place-based, community-led, locally implemented and regionally-coordinated approaches to disaster risk reduction. This could lead to the development of locally-led flood groups within flood-prone areas, or bushfire groups in bushfire-prone areas. If supported and empowered these groups could conduct the following:

- Evacuation exercises involving community members to help them understand what is required and be better prepared for the next flood and fire event.
- Adopting the activities used for annual bushfire awareness to increase flood preparedness including street meetings and letterbox drops.
- Bespoke communities establishing relationships with local government.
- Local governments holding annual seminars on planning and preparedness or providing local businesses and new residents with information about potential flood or fire risk.
- Develop a localised register of vulnerable community members (Note: This may have privacy implications.)
- Installation of more flood gauges positioned further upstream of communities to potentially provide earlier warning.
- Maintaining a network of key community contacts for community-initiated recovery after a disaster event.
- Helping community members to establish their own 'go bag' in the event an evacuation is required.

Empowering individuals and communities to exercise choice and take responsibility

Fundamental to the concept of disaster resilience is that individuals and communities should be more self-reliant and prepared to take responsibility for the risks they live with. For a resilient community, all members need to understand their role in minimising the impacts of disasters, and have the relevant knowledge, skills and abilities to take appropriate action. A resilient community will understand and could use local networks and resources to support actions required during an emergency and to support recovery efforts.

Community education. The Australian Institute for Disaster Resilience (AIDR) identifies that community engagement is a key element for disaster resilience. The Standard indicates that communities that are educated and understand local risks are more likely to be better prepared and make informed choices as a disaster event unfolds. Community education and engagement programs provided by local government, state agencies and NGOs play a vital role in engaging and educating communities.

Educating the next generation. Utilise the DRA 'Big Map' to lead and manage a campaign to educate and mentor the next generation across and schools and high schools within the Lachlan River Catchment. Identify ways to communicate with this age bracket via social media and other outlets. A better understanding of how younger community members want to be communicated with during a disaster event. The Youth Affairs Council of Victoria have written a Youth Focused Disaster Recovery Protocol which provides guidance on key matters for consideration and inclusion of young people in

²² National Action 11, https://nema.gov.au/sites/default/files/inline-files/28605%20NEMA%20Second%20Action%20Plan_V10_A_1.pdf [retrieved 25 September 2023]

post-disaster recovery and rebuilding. This aims to ensure positive outcomes for young people who have been affected directly and/or indirectly by a disaster²³. A similar approach can be applied across the aged care fraternity.

Review the flood classifications at all 11 forecast locations within Lachlan River catchment. Moving forward Local Governments within the Lachlan Catchment could first check the current flood classifications and when they were last reviewed/updated. Once this has been identified, the councils should work together, where possible, to then determine how the existing flood classifications were established (i.e. based on past floods, survey details, or detailed flood mapping). The flood classifications require regular review to ensure they continue to reflect the expected or known flood impacts. Local development or changes to infrastructure (e.g. bridges/levees) are common reasons that flood classifications may require review. Getting flood classifications right at the grassroots level ensures that accurate and authoritative risk information is provided and tailored to the needs of the community.

Improving the flood warning infrastructure network. In conjunction with the Bureau, engage the other local governments across the Lachlan River Catchment to identify and produce a future network investment plan to identify gaps and recommend improvements to flood warning systems, and design improved networks for the river systems and sub catchments in which they are located.

Refinement of flood warning timeliness. There appears to be an issue with flood alert timeliness, specifically, that notification of a flood event is not sent out with enough time for stakeholders to prepare. It is difficult to discern when conditions are going to cause a flood, or if the weather will change and preparatory actions will occur without a flood happening. Warnings should be timely, targeted and tailored to describe the expected effects on a community including advice on what people should do. A solution may be refinement of the notification systems (i.e. who is told, and under what conditions, that a flood may be likely with enough time to allow for preparations). This will require multiple stakeholders from Council to the Bureau and SES.

Combination of data-driven flood monitoring and local knowledge. There may be an advantage for all stakeholders in the Lachlan River Catchment to meaningfully combine local knowledge across all regions of the catchment. An opportunity exists for local council representatives, landowners, emergency services and Bureau representatives to discuss how this may occur to inform preparation, monitoring and anticipation of future flood events. There is also the opportunity to integrate undervalued or non-traditional forms of knowledge and ways of knowing, including traditional knowledge, local knowledge, community feedback, lived experience, and transdisciplinary approaches such as sociology, and support the use of scenarios which extend the imagination²⁴.

Local Government Disaster rehearsals to include liaison with SES representatives and community leads. It would be beneficial for Councils in the Lachlan River Catchment to liaise with other agencies

²³ Youth-Focused Disaster Recovery Protocol, February 2020. <https://www.yacvic.org.au/assets/Uploads/Youth-Focused-Disaster-Recovery-Protocol-February-2020.pdf>

²⁴ National Action Plan, p 12

as part of the disaster Prevention, Preparedness, Response and Recovery (PPRR) model. When rehearsals and exercises to refine procedures are conducted, the involvement of the SES and lead community members will be crucial to ensure their support can strengthen the disaster PPRR model. Creating opportunities for people to work in partnership with emergency management agencies, their local authorities, and other relevant organisations before, during and after emergencies will assist the community in developing a high level of resilience²⁵.

Social media is another way to inform people before and during a fire and or flood emergency. Social media and the communications infrastructure in the catchment is one of the most accessible means for Forbes Local Government, the SES and the State Emergency Centre to distribute information to communities on the flood and or fire situation and what actions they should take to protect themselves, their families and their property. Media and communications advice should be sought on the most suitable means for mass communications.

Landowners in the catchment need to be engaged about how they can assist in flood and water management. Landowners interact with the Lachlan River catchment as part of the use of their property. Construction of dams and rural levees, use of the water for irrigation and recreation are all ways that the Lachlan River interacts with landowners – but their uses also affect how the river can behave during floods.

Recovery efforts must prioritise services, power and communications towers for mobile phones. Any damage to communications infrastructure will slow the rate of response and affect the coordination of the response and emergency services. Accordingly, communications sites need to be located in areas without floodwater impact, and if they are impacted, need to be hardened to mitigate the risk of the destruction or dam.

Make use of Local Government membership that is included in the NSW Flood Warning Consultative Committee.

The New South Wales and the Australian Capital Territory Flood Warning Consultative Committee provides the Bureau's key stakeholders with a consultation mechanism for its flood forecasting and warning services. As such, the committee is responsible for reviewing this Service Level Specification on an annual basis or as required.

The overall role of the New South Wales and the Australian Capital Territory Flood Warning Consultative Committee is to coordinate the development and operation of flood forecasting and warning services in New South Wales and the Australian Capital Territory, acting as an advisory body to the Bureau and participating State and Local government agencies. Membership and terms of reference for this committee in New South Wales and the Australian Capital Territory.

²⁵ National Action 12, the Second National Action Plan to implement the National Disaster Risk Reduction Framework, https://nema.gov.au/sites/default/files/inline-files/28605%20NEMA%20Second%20Action%20Plan_V10_A_1.pdf [Retrieved 9 September 2023]

The New South Wales Flood Warning Consultative Committee was formed in late 1989, and in 2016 was extended to include Australian Capital Territory. The Committee's role is to coordinate the development and operations of the State's flood forecasting and warning services. It is an advisory body and reports to the Bureau of Meteorology and participating state and local government agencies as required. The membership includes:

- Bureau of Meteorology (Chair/Secretariat)
- New South Wales State Emergency Service
- New South Wales Office of Environment and Heritage
- Floodplain Management Australia
- WaterNSW
- Sydney Water
- Australian Capital Territory State Emergency Service

Flash Flood. Flash flooding is defined under Schedule 3 of the 'Inter-Governmental Agreement on the Provision of Bureau of Meteorology Hazard Services to the States and Territories' as:

'Any Flooding of short duration with a relatively high peak discharge in which the time interval between the observable causative event and the Flood is less than six hours'²⁶.

Section 6.5 of the Inter-Governmental Agreement on the Provision of Bureau of Meteorology Hazard Services to the States and Territories (Council of Australian Governments, 2018) states that 'all levels of government will collaborate in preparing the community for the potential of Flash Flooding'. It goes on to note that the responsibility for flash flood warnings lies with the State in partnership with local government. The Bureau is responsible for providing 'forecasts and warnings for severe weather conditions and potential heavy rainfall conducive to Flash Flooding and to carry out applied research and development to improve the provision of severe weather information'. It is also responsible for providing riverine flood warnings.

These arrangements, whereby local government is responsible for providing flash flood warnings and the Bureau is responsible for providing riverine flood warnings, creates the potential for gaps and overlaps in resourcing, and provision and communication of forecasts and warnings. Further, the widely distributed responsibility for creating and issuing flash flood forecasts will always result in inconsistent standards for delivery of both tasks.

²⁶ <https://federation.gov.au/about/agreements/intergovernmental-agreement-provision-bureau-meteorology-hazard-services-states>

Attachment A

- [Administration Arrangements guideline AG01](#)²⁷

This guideline provides supplementary advice to the Flood Risk Management Manual. It outlines the current guidance and tools in the flood risk management toolkit to support councils to understand and manage flood risk through the flood risk management framework. It also provided advice on current state agency flood risk management roles and responsibilities, relevant legislative links and a glossary of additional terms used in guides in the toolkit.

- [Delivery under the flood risk management framework FG01](#)²⁸

This guideline describes delivery of the flood risk management framework as well as key steps in undertaking flood risk management projects under the flood risk management process and identifies how other flood risk management guides and tools can assist.

- [Understanding and Managing Flood Risk FB01](#)²⁹

This guideline provides advice on how the flood risk management process can assist in understanding and managing existing, future and continuing risk to reduce the residual risk to the community.

- [Flood Function FB02](#)³⁰

This guideline provides advice on the categorisation of areas of the floodplain into floodways, flood storage areas and flood fringe based on their flood function. This information can inform flood risk management, emergency management and land use planning.

- [Flood Hazard FB03](#)³¹

This guideline provides advice on flood hazard categorisation so this information can inform flood risk management, emergency management and land use planning.

- [Flood Risk Management Measures MM01](#)³²

This guideline aims to support effective consideration and decision-making for recommendation of flood risk management measures as part of the flood risk management process.

- [Support for Emergency Management Planning EM01](#)³³

This guideline also provides advice on how the flood risk management process can provide advice to support flood emergency management planning by the NSW State Emergency Service.

- [Flood Impact and Risk Assessment LU01](#)³⁴

This guideline provides advice on the scope and scale of a flood impact and risk assessment. It does not replace the processes or requirements of the consent authority. It should be read in conjunction with and address any other assessment requirements for the development proposal/application.

²⁷ <https://www.environment.nsw.gov.au/research-and-publications/publications-search/flood-risk-management-guide-administration-arrangements>

²⁸ <https://www.environment.nsw.gov.au/research-and-publications/publications-search/delivery-under-the-flood-risk-management-framework>

²⁹ <https://www.environment.nsw.gov.au/research-and-publications/publications-search/understanding-and-managing-flood-risk>

³⁰ <https://www.environment.nsw.gov.au/research-and-publications/publications-search/flood-function>

³¹ <https://www.environment.nsw.gov.au/research-and-publications/publications-search/flood-hazard>

³² <https://www.environment.nsw.gov.au/research-and-publications/publications-search/flood-risk-management-measures>

³³ <https://www.environment.nsw.gov.au/research-and-publications/publications-search/support-for-emergency-management-planning>

³⁴ <https://www.environment.nsw.gov.au/research-and-publications/publications-search/flood-impact-and-risk-assessment>

Attachment B

The Bureau of Meteorology Flood classifications (Minor Moderate, Major):

- MINOR - Causes inconvenience. Low-lying areas next to watercourses are inundated. Minor roads may be closed, and low-level bridges submerged. In urban areas inundation may affect some backyards and buildings below the floor level as well as bicycle and pedestrian paths. In rural areas, removal of stock and equipment may be required.
- MODERATE - In addition to the minor effects, the area of inundation is more substantial. Main traffic routes may be affected. Some buildings may be affected above the floor level. Evacuation of flood affected areas may be required. In rural areas, removal of stock is required.
- MAJOR - In addition to the moderate effects, extensive rural areas and/or urban areas are inundated. Many buildings may be affected above the floor level. Properties and towns are likely to be isolated and major rail and traffic routes closed. Evacuation of flood affected areas may be required. Utility services may be impacted.