North West (Loddon Mallee) Region

Emergency Response Plan

SES

Flood Sub Plan

Published by Victoria State Emergency Service

Melbourne, August 2019.

This publication is intended to be consistent with the State Emergency Response Plan (SERP), published by Emergency Management Victoria (EMV) in 2016.

Authorised by the Victoria State Emergency Service (VICSES),
168 Sturt Street,
Southbank VIC 3006.

An electronic version of the plan can be obtained at: https://www.ses.vic.gov.au/em-sector/vicses-emergency-plans.

.

Version Control
Loddon Mallee Region
Emergency Response Plan – Flood Sub-plan
Version 1.0, date August 2019
CD/19/32377

Mid West (Grampians) Region Emergency Response Plan – Flood Sub-plan Certification

The North West (Loddon Mallee) Region Emergency Response Plan – Flood Sub-plan deals with response to flood incidents within the North West (Loddon Mallee) area of responsibility.

The following plan is intended to provide the framework for North West (Loddon Mallee) Region to effectively and efficiently respond to future emergencies caused by floods, and will remain current until rescinded by authority of the VICSES Chief Officer Operations.

_____ Date: 10 October 2019

Tim Wiebusch
Chief Officer Operations

This plan is produced by VICSES and has been adapted from the SERP – Flood Sub-plan. All information contained in this plan was current at time of publication.

VICSES would like to acknowledge the significant contribution of key stakeholders to ensure the content contained within this plan is of a high quality to support response activities.

For further details about this plan, please contact North West (Loddon Mallee) Region:

Regional Manager – North West (Loddon Mallee) Region

Mr Mark Cattell

Victoria State Emergency Service
7 Rohs Road
East Bendigo 3550
Email: northwest@ses.vic.gov.au
Website: www.ses.vic.gov.au

State Emergency Management Priorities

The State Emergency Management Priorities are:

- Protection and preservation of life is paramount. This includes:
  - Safety of emergency response personnel.
  - Safety of community members including vulnerable community members and visitors/tourists.
- Issuing of community information and community warnings detailing incident information that is timely, relevant and tailored to assist community members make informed decisions about their safety.
- Protection of critical infrastructure and community assets that support community resilience.
- Protection of residential property as a place of primary residence.
- Protection of assets supporting individual livelihoods and economic production that supports individual and community financial sustainability.
- Protection of environmental and conservation assets that considers the cultural, biodiversity, and social values of the environment.

Table of Contents

1. Introduction

1.1. Purpose

The purpose of this plan is to provide strategic guidance for the effective emergency management of floods in the North West (Loddon Mallee) Region.

1.2. Objective

The objective of the North West (Loddon Mallee) Region Flood Emergency Response Plan is to outline the regional arrangements for ensuring an integrated and coordinated approach to the management of flood events across the North West (Loddon Mallee) Region, in order to reduce the impact and consequences of these events on the community, infrastructure and services.

1.3. Scope

This North West (Loddon Mallee) Region Emergency Response Plan – Flood Sub-plan includes:

- Description of potential risks and consequences of floods to the social, built, agricultural and natural environments within the North West (Loddon Mallee) Region.
- Regional specific emergency management arrangements for the management of floods.
- Links to sources of information where the reader can obtain further detail.

1.4. Authorising environment

The *Emergency Management Act (1986 and 2013)* is the empowering legislation for the management of emergencies in Victoria.

The Emergency Management Manual Victoria (EMMV) outlines policy and planning documents for emergency management in Victoria, and details the roles organisations play in the emergency management arrangements.

The SERP (Part 3, EMMV) identifies Victoria's organisational arrangements for managing the response to emergencies.

The North West (Loddon Mallee) Region Emergency Response Plan (yet to be developed) will detail specific arrangements for the management of emergencies within the North West (Loddon Mallee) Region. This plan has been developed as a subordinate plan of the North West (Loddon Mallee) Region Emergency Response Plan and the SERP – Flood Sub-plan. This plan has been shared with the Regional Emergency Management Committee for comment, and approved by the VICSES Chief Officer Operations.

Other relevant legislation includes:

- *Victoria State Emergency Service Act 2005*
- *Essential Services Act 1958*
- *Planning and Environment Act 1989*
- *Local Government Act 1989*

1.5. Activation of the plan

The arrangements in this plan apply on a continuing basis and do not require activation.

1.6. Audience

The audience for this plan comprises the Victorian Government and agencies within the emergency management sector, including business and community groups with a significant role in the management of the emergency.

Although the wider community is not the primary audience, community members may find the contents of this plan informative.

1.7. Linkages

This plan is a sub-plan of the SERP– Flood Sub-plan and the North West (Loddon Mallee) Region Emergency Response Plan (yet to be developed). It reflects legislation, the arrangements in the SERP, the strategic direction for emergency management in Victoria and the accepted State practice for managing emergencies.

This plan outlines regional response arrangements which impact arrangements detailed in Municipal Flood Emergency Plans (MFEPs) developed at a municipal level, and are also subordinate plans to Municipal Emergency Management Plans (MEMPs). It is likely that flood events will occur in conjunction with severe weather.

For more comprehensive management of severe weather events, refer to the SERP – Storm Sub-plan and North West (Loddon Mallee) Region Storm Sub-plan at www.ses.vic.gov.au.

Arrangements within this plan have not been repeated from the previously mentioned plans, unless necessary to ensure context and readability. All available VICSES plans can be accessed at www.ses.vic.gov.au, and more information on MFEPs can be accessed on respective council websites or as outlined in section 4.5 Municipal Flood Planning.

Arrangements for the management of secondary consequences are contained in the following:

- Health response – State Health Emergency Response Plan (SHERP)
- Rescue – Victorian Urban Search and Rescue (USAR) Response Arrangements

1.8. Exercising and evaluation

This plan will be exercised within one year of the date of approval and once every three years thereafter as part of a phased cycle. An example of a Regional Flood Scenario has been created to support this function, and is contained in Attachment 5.

Exercises will be evaluated and, where improvements to the emergency management arrangements in this plan are required, the plan will be amended and a revised version issued. Exercises will be conducted in accordance with the State Exercising Framework.

Any operational activity in North West (Loddon Mallee) Region requiring the management of a flood event will be regarded as exercising of the plan. The event is to be evaluated and reviewed, as outlined above.

1.9. Review

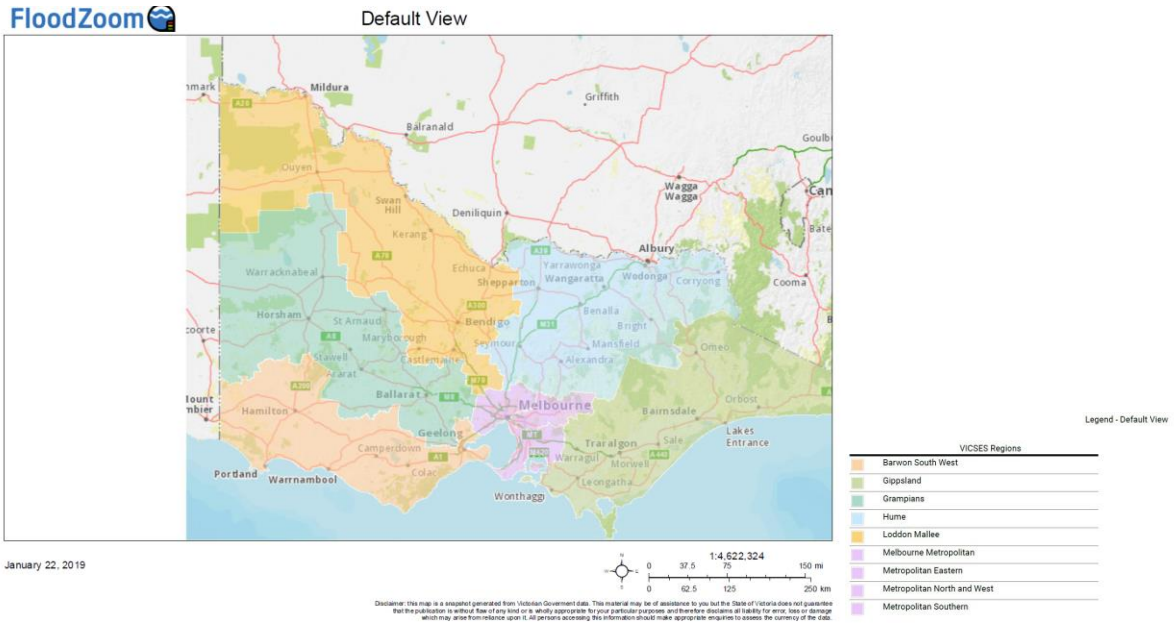
This plan was current at the time of publication and remains in effect until modified, superseded or withdrawn.

This plan will be reviewed and updated every three years. Consideration will be given to an earlier revision if the plan has been applied in a major emergency or exercise, or following a substantial change to the relevant legislation or arrangements.

2. Flood risk within the North West (Loddon Mallee) Region

2.1. Region description

VICSES Regional Map:



The North West (Loddon Mallee) Region of Victoria covers 59,000 square kilometres, and occupies more than one quarter of the area of Victoria. The region borders the states of South Australia (SA) and New South Wales (NSW).

The region's 10 municipalities include Macedon ranges, Mount Alexander, Central Goldfields, Greater Bendigo, Campaspe, Loddon, Gannawarra, Buloke, Swan Hill and Mildura. Municipal boundaries are accessible via the Emergency Management – Common Operating Picture (EM-COP) for registered users at https://cop.em.vic.gov.au.

Geographically this is a diverse region, including numerous towns and cities of varying sizes. The largest centres in the region are Bendigo with a population of 110,000, and Mildura with a population of 54,000. In total, the region has a population of approximately 332,000, 4.5% of which originate from non-English speaking countries.

The North West (Loddon Mallee) Region encompasses a significant number of National and State parks, and a number of culturally sensitive sites, particularly along the Murray River. A number of major rivers, highways, roads and rail systems also run throughout the region. An increasing number of people in the south of the region work in the capital of Victoria, Melbourne, and commute daily via these road and rail systems.

The northern part of the region encompasses significant areas of horticulture, viticulture, agriculture, dry land farming, mining infrastructure, wine and table grape production and stone fruit production. This area is also included as part of the Murray Darling Basin Authority.

Floods within the North West (Loddon Mallee) Region have the potential to impact Victoria's economic and business continuity, and possible future development opportunities.

2.1.1. Regional river system impacts

Flooding occurs as a result of heavy rainfall that could cause flash flooding or riverine flooding. The North West (Loddon Mallee) Region of Victoria is familiar with floods, and has a long history of recorded flood events throughout the last century, including the devastating wide-spread floods of 2010-2011. Communities throughout the region can recall the impact of floods in 1993, 1975, 1974 and 1956. Multiple technical mitigation measures have been implemented over time to minimise the impact of floods on communities and homes, however, some risks remain, and it is important to be prepared.

The impact of floods in the North West (Loddon Mallee) Region is vast in terms of livelihoods, agriculture and dairy industry setbacks, local economies, and damage to key infrastructure. Many communities are still recovering from the effects of the 2010-2011 floods (refer to Department of Health and Human Services (DHHS) Recovery Reports). The frequency of intense rainfall periods is increasing, as is the temperature, according to the Climate Commission Report in April 2013. The 2010-2011 rainfall records depict an increase in wider-spread riverine floods and flash flooding events throughout the North West (Loddon Mallee) Region.

Given this magnitude of flood risk, flood emergencies require a multi-agency response. VICSES works in partnership with government and private support agencies to ensure all elements of planning before, during, and after a flood emergency is managed effectively. It is vital that flood emergency planning incorporates a strong community education element, to raise awareness of risks and the preparedness levels of communities and households during floods and other emergencies.

2.2. The flood hazard

Flooding may be defined as an overflowing or influx of water from its normal confines onto land that is not usually submerged. Within the North West (Loddon Mallee) Region the following mechanisms may cause flooding:

- **Heavy rainfalls**, which cause runoff to enter watercourses, overtopping the banks of rivers and creeks, overflowing lakes, detention basins and stormwater drains, causing local overland flooding, or resulting in releases or spills from dams. Many factors contribute to the extent and nature of flooding caused by heavy rainfall, such as the amount and duration of rainfall, the spatial distribution of rainfall, prior weather conditions and characteristics of a catchment, including its size, shape, soil types, vegetation and land use. The characteristics of a river also influence the extent of flooding. These characteristics include the size and nature of the river, the presence of vegetation in and around the river, flood control structures, and embankments that may restrict floodwater and downstream river levels1[1].
- **Dam failure**, which involves the failure of a dam structure. There are a number of significant dams throughout Victoria that both store and provide water to communities across the State, which have the potential to cause flooding in the event of failure. While there are dam safety risk management processes in place and the possibility of dam failure is considered low, the consequences could be catastrophic in some circumstances.
- **Levee failure**, which involves the failure of a levee structure. There are a large number of levees across Victoria created to redirect flood water to minimise impacts of flooding. Levee failure can result from poorly created and/or maintained levee structures, or overtopping of levee structures due to significant water flows exceeding the structure's capacity.

Flooding in Victoria is influenced by our variable climate, typified by periods of wet and dry conditions. A major factor in this variability is the El Nino – Southern Oscillation phenomena. La Niña, the positive phase, is associated with colder than average sea surface temperatures in the central and eastern tropical Pacific region. La Niña is normally associated with higher than average winter, spring and early summer rainfall over much of Australia, and this can result in more flooding. Flooding in Victoria can also be influenced by the north/south movement of the strong westerly winds and their associated cold fronts. A shift northwards results in more storms over southern Australia.

Intense heavy rainfall over a short period of time can cause flash flooding to occur within minutes to hours. Flash flooding can be defined as "flooding occurring within about 6 hours of rain, usually the result of intense local rain and characterised by rapid rises in water levels" (Bureau of Meteorology (BOM), 2012)[2].

Flash flooding typically occurs in small catchments and can occur with little warning, making it difficult to predict and manage. In larger catchments, floods can occur over several days to weeks, making them easier to forecast and manage.

1 Queensland Government (2011) Understanding floods: Questions and Answers.

[2] Bureau of Meteorology (nd) Arrangements for Flood Warning Services in Victoria from the Weather Services Handbook, February 2001, [Available Online]

Aggregated data from Community Emergency Risk Assessments (CERAs) conducted across the ten municipalities within the North West (Loddon Mallee) Region indicates that the region has a high risk of being impacted by flood events. This is further substantiated by major historic events that have occurred in the following river systems over the last 100 or so years:

- Murray River – 1956 up to 2016
- Loddon River – 2011, 2016
- Avoca River – 2010, 2011, 2016
- Avon Richardson River – 2011
- Campaspe River – 2011

Attachment 2 contains a map of 1% Annual Exceedance Probability (AEP), otherwise known as a 1 in 100 year flood event, for the North West (Loddon Mallee) Region.

Additional information can be found in the relevant MFEPs, or via Floodzoom for registered units at https://www.floodzoom.vic.gov.au.

2.3. North West (Loddon Mallee) Region catchments, schematics and intelligence cards

The following major catchments are contained within the North West (Loddon Mallee) Region:

- Avoca River catchment
- Campaspe River catchment
- Loddon River catchment
- Wimmera River (this includes the Avon-Richardson River)
- Murray River downstream of Tocumwal
- River Murray, Murraylands

Maps of these catchments are located within the relevant MFEP, or via EM-Cop at https://cop.em.vic.gov.au – Situation – Data – Boundaries – River Systems – Catchments.

Catchment schematics for each of these catchments are located within the relevant MFEP or accessible to registered users via FloodZoom by selecting the search function in the documents tab at https://www.floodzoom.vic.gov.au.

Note: Due to the location of the Murray River bordering on NSW, the schematic for this system is not contained in Floodzoom, but can be found in Attachment 1 and relevant MFEPs. This schematic is maintained by NSW BOM. NSW BOM flood desk can be contacted on +02 9296 1587.

Flood intelligence cards for each of the North West (Loddon Mallee) Region catchments are contained in MFEPs. These can be accessed at:

- https://www.floodzoom.vic.gov.au (for registered users)
- www.ses.vic.gov.au
- Relevant council websites

2.4. Regional flood risks

Region flood risks including urban, rural and communities at risk of experiencing isolation in North East (Loddon Mallee) Region are outlined in respective MFEPs. These are accessible via:

- https://www.floodzoom.vic.gov.au (for registered users)
- www.ses.vic.gov.au
- Relevant council websites

The tables below provide a brief summary of key urban and rural communities at risk of flooding in the North West (Loddon Mallee) Region.

Urban flood risks:

City/ town	Population affected	Properties affected in 5% AEP event	Properties affected in 2% AEP event	Properties affected in 1% AEP event	Warning time approx (hrs)
River system: Loddon River from Newstead/Carisbrook to Little Murray River					
Castlemaine, Campbells Creek and Chewton (Castlemaine, Campbells Creek and Chewton Flood Management Plan 2015)	U/K	26	45	69	3-6 hours for riverine flooding. Flash flooding possible.
Newstead	U/K	U/K	U/K	81	2–4 hours from start of rain for initial stream rises. Travel time between Vaughn and Newstead: approx. 6 hours.
Carisbrook (Carisbrook Flood and Drainage Management Plan 2013)	U/K	26	54	258	Peak for McCallum Creek: 6 to 15 hours. Peak for Tullaroop Creek: 6–24 hours.
Dunolly (Dunolly Flood Investigation 2014)	U/K	52	58	65	Peak 1% approximately 10.5 hours. Flash flooding possible.
Bridgewater (Bridgewater Flood Study 2015)	U/K	64	104	130	16 hours from start of rise at Laanecoorie. 11 hours from peak at Laanecoorie.
Durham Ox	U/K	U/K	U/K	<5	Peak 1% for Loddon Weir to Durham Ox: 17 hours.
***Kerang**	<3000 potential isolation only				Peak 1% for Laanecoorie to Kerang: 4 – 11 days. Appin South to Kerang: 36 – 145 hours.

*Note: Kerang township is protected by a substantial strategic levee system protecting most of the town to 600mm above the 1% AEP event.

City/ town	Population affected	Properties affected in 5% AEP event	Properties affected in 2% AEP event	Properties affected in 1% AEP event	Warning time approx (hrs)
River System: Campaspe from Upstream of Redesdale to Murray River					
Heathcote (Heathcote Flood Study 2016)	U/K	34	70	109	Floods begin to rise 3-6 hours from start of rainfall. Peak within 10-12 hours of start of rise.
Rochester (Rochester Flood Management Plan 2013)	U/K	488	983	1144	Approximately 24 hours.
Echuca Township (Victorian Flood Database 1% AEP layer)	U/K	N/A	N/A	1388	24 hours or more from Campaspe River, longer from Murray River. Flash flooding possible.

City/ town	Population affected	Properties affected in 5% AEP event	Properties affected in 2% AEP event	Properties affected in 1% AEP event	Warning time approx (hrs)
River System: Avoca River from Avoca to The Marshes (including the Lalbert and Tyrell Creek systems)					
Charlton (Charlton Flood and Drainage Management Plan 2014)	U/K	402	425	426	15-18 hours from first forecast.
Quambatook (Quambatook Flood Management Plan 2014	U/K	90	162	173	Peak travel time from Yawong Weir: 3.5-6.5 days.

City/ town	Population affected	Properties affected in 5% AEP event	Properties affected in 2% AEP event	Properties affected in 1% AEP event	Warning time approx (hrs)
River System: Murray River from the Goulburn River Junction to the SA Border					
Echuca Township (Victorian Flood Database 1% AEP layer)	U/K	N/A	N/A	1388	24 hours or more from Campaspe River, longer from Murray River. Flash flooding possible.
Swan Hill	N/A	N/A	N/A	N/A	Township only affected by coincidental flooding of the Murray, Avoca and Loddon. Is well protected by a well maintained strategic levee system to 600 above the 1% AEP. From Echuca: 9–13 days.
Mildura				Nil	From Swan Hill to Mildura up to 28 days.

City/ town	Population affected	Properties affected in 5% AEP event	Properties affected in 2% AEP event	Properties affected in 1% AEP event	Warning time approx (hrs)
Flash Flood Risk only					
Bendigo Urban Area (Bendigo Urban Flood Study Report 2013)	U/K	9,040	12,245	15,000	<2 hours.

Rural flood risks:

Area	Description of flood risk
Loddon River floodplain between Bridgewater and Little Murray River	Downstream of Bridgewater, the Loddon River Floodplain becomes extremely flat and waters are known to spread wide distances along distributary creek systems and floodways. Outside of these flow paths, the majority of the floodplain experiences mostly shallow depths and low flood velocities. The flood waters can spread as wide as from Boort in the west, across to Pyramid Hill in the east, before reconverging downstream of Kerang. Access from Serpentine to beyond Kerang is compromised.
Avoca River floodplain downstream of Charlton	Similar to the Loddon River, the Avoca River begins to spread into distributary systems near Charlton and beyond. Some water actually exits the Avoca catchment and flows into the Mallee region via the Tyrell and Lalbert Creek systems to Sea Lake and Lake Timboram respectively. Access along the Calder Highway beyond Charlton may be impacted, whilst widespread flooding may also occur around Quambatook before entering the Avoca Lakes system west of Kerang. The Avoca Outfall near Mystic Park connects Avoca River flood flows back into the Loddon system, and eventually entering the Little Murray River at Fish Point.
Murray River floodplain from Torrumbarry to Tyntynder	The Murray River has the potential to flood vast tracts of rural land downstream of the Torrumbarry area. Unmanaged levee systems exist right through this area, and their failure or overtopping has unquantified consequences. Flood water breaches in levees at Torrumbarry may impact on the town of Cohuna and everything in between, as waters are trapped by the irrigation system. Levee breaches at Pental Island may see the majority of the island inundated. Similar conditions exist at Tyntynder where levees are very high and often in very poor condition. The Murray Valley Highway has a high level of service during floods, but some impassable sections may exist.
Pental Island	Pental Island relies on levees for protection from the Murray River and Little Murray River. Levees on the Little Murray River vary in their condition, and most are in reasonable condition after repairs from the January 2011 flood. Major work has been undertaken over the last several years, with a large section of the Levee from Wearne Road back towards Swan Hill undergoing significant remedial works, and is now in excellent condition. Responsibility for this levee system is a partnership between North Central Catchment Management Authority (CMA), Local Government and Department of Environment, Land, Water and Planning (DELWP).

Tyntynder Flats	Tyntynder Flats relies on a system of unmaintained rural levees for protection from the Murray River. The levees are known to protect the area from a flood equivalent to the 1975 flood event. This system is an uncontrolled levee system, and therefore no agency currently accepts responsibility for maintaining the levee (as of June 2017). It is known that local landholders have permission to maintain these banks to their current levels only, and most undertake the maintenance of their individual property banks. The structural integrity of these banks is unknown and cannot be relied upon.
Campaspe River	The towns most at risk of riverine flooding within the Campaspe municipality are Echuca, Rochester and Gunbower. Kyabram Tongala, Rushworth, Stanhope and Nanneella are all at risk during localised heavy storms. Large areas of rural land to the west of the Campaspe River, including in the Torrumbarry/Gunbower area and particularly in the eastern part of the municipality in the Deakin Basin (e.g. Kanyapella, Wyuna, Yambuna, Colbinabbin and Wanalta), can flood following locally heavy rain or periods of prolonged rainfall. From a flooding perspective, the Goulburn, Murray and Campaspe Rivers dominate. In Echuca flooding can result from rain falling over a single catchment or over several catchments. The timing, distribution, and amount of rainfall determine the magnitude and duration of flooding in Echuca. The western side of Echuca can be flooded from the Campaspe, while the northern and eastern sides can be flooded from the Murray. More than minor flooding of the Campaspe River in Echuca is unlikely unless Lake Eppalock is spilling. It should also be noted that just as the Murray River influences the Campaspe River, the Campaspe River can cause back-up effects in the Murray River as occurred in January 2011.

Communities at-risk of experiencing isolation:

City/town	Population impacted	Primary access routes
Kerang	3,500	Loddon Valley Highway
Charlton	1300	Calder Highway
Carisbrook	720	Pyrenees Highway
Maryborough	8000	Pyrenees Highway
Rochester	3100	Northern Highway
Culgoa	>150	Calder Highway
Coonooer Bridge	40	Charlton Street – Arnaud Road
Donald	1,700	Sunraysia Highway
Quambatook	220	Quambatook Road, Kerang

2.5. Major dams

While VICSES is not responsible for dam management, it is responsible for response to flooding caused by dam failure. This occurs when water overflows dam walls.

More information regarding dams in the North West (Loddon Mallee) Region may be accessed within the respective MFEPs listed in the attachment.

A list and description of major dams located within the North West (Loddon Mallee) Region:

Dam name	Location	Capacity (Megalitres)
Laanecoorie Reservoir	Located on the Loddon River, 40 km south west of Bendigo.	8,000Ml
Cairn Curran Reservoir	Located on the Loddon River, about 10km west of Maldon.	147,130Ml
Lake Eppalock	Located on the Campaspe River near Bendigo in central Victoria.	276,751Ml (304651Ml on GMW website)
Barkers Creek Reservoir	25km south of Bendigo, and north of Harcourt.	1,690Ml
Upper Coliban Reservoir	Located 9km west of Kyneton on the Coliban River.	37,770Ml (from Coliban website)
Lauriston Reservoir	Located 8km south west of Kyneton on the Coliban River.	19,790Ml (from Coliban website)
Malmsbury Reservoir	Located 1km south of Malmsbury on the Coliban River.	12,034Ml (from Coliban website)
McCay Reservoir	Located off the Pyrenees Highway, halfway between Chewton and Elphinstone townships.	1,400Ml
Sandhurst Reservoir	Located at Big Hill, 3km south of Kangaroo Flat.	2,600Ml
Spring Gully Reservoir	Located in Spring Gully, 3km south of Bendigo.	1,680Ml
Expedition Pass Reservoir (Golden Point Reservoir)	Located on Golden Point Road, about 3km from Chewton.	264Ml
Torrumbarry Weir	Located 30km north of Echuca.	36,810Ml
Crusoe Reservoir	Located upstream of Kangaroo Flat off Crusoe Road.	890Ml
Tullaroop Reservoir	Located 6km upstream of Carisbrook off Rodborough Road	72,950Ml (from GMW website)
Mildura Weir	North east corner of township on the Murray River.	36,600Ml (from GMW website)
Waranga Basin	East of the Rushworth township.	432,360Ml (from GMW website)
Campaspe Weir	South west of Rochester township on the Northern Highway.	252,000Ml (from GMW website)

2.6. Levee management

Significant levee systems exist within the North West (Loddon Mallee) Region. These are mainly located along the Murray, Avoca, Loddon, Campaspe, and Avon-Richardson river systems. A number of townships are protected by approved strategic levees.

Attachment 4 provides some information on levees at potential high risk locations. Please note that this is not a definitive list, and other information should be sourced before undertaking any actions.

Reference should be made to the MFEPs for guidance. This information is also contained in Floodzoom at https://www.floodzoom.vic.gov.au.

2.7. Regional resources

Key regional resources used for flood response can be found within the VICSES Resource Management System by contacting the VICSES RAC or RDO.

A list of key regional resources is shown at Attachment 7

Additional expert multi-agency resources may be accessed during operations through the Australasian Inter-Service Incident Management System (AIIMS) structure.

A map of VICSES Unit General Response Boundaries is accessible via EM-COP for registered at https://cop.em.vic.gov.au (Situation > Data > Boundaries > Emergency Services > SES Response Boundaries).

3. Consequences

3.1 Possible flood consequences

The North West (Loddon Mallee) Region has many flood prone communities. The effects of flooding on the community can include:

- Inundation of properties.
- Damage to essential infrastructure, public and private assets and property.
- Inundation of farmland, damage to crops, and loss of livestock and fodder.
- Short or long term displacement of people.
- Isolation of properties or communities.
- Disruption to essential services.
- Death and injuries.

Significant community disruption can occur as a result of damage to essential infrastructure, which may lead to cascading secondary consequences. For example, a loss of power may result in a loss of telecommunications, traffic signals and disruption to supply chains, amongst other impacts. Damage and flooding of road infrastructure may result in isolation of properties and/or communities.

3.2 Flood history

Information on historical floods within the North West (Loddon Mallee) Region where one or more of the consequences listed above have occurred:

Year	Catchments impacted	Description
2016 **2011** **1993** **1989** **1983** **1981** **1975** **1974** **1973** **1956** **1931** **1917** **1916** **1870** **1867**	Murray River	Varying degrees of impact from inundation of roads and rural land to flooding of residential properties. See the appropriate MFEPs for additional information (Attachment 6). Towns affected by the Murray River include: Echuca Koondrook Swan Hill Nyah Boundary Bend Robinvale Mildura
2016 **2011** **2010** **1993**	Campaspe River	Varying degrees of impact from inundation of roads and rural land to flooding of residential properties. See the appropriate MFEP for additional information (Attachment 6). Towns affected by the Campaspe River include:

1983 **1975** **1974** **1973** **1956** **1954** **1951** **1939** **1932** **1930** **1920**		Rochester Echuca
2016 **2011** **1996** **1993** **1989** **1983** **1981** **1975** **1974** **1973** **1956**	Loddon River	Varying degrees of impact from inundation of roads and rural land to flooding of residential properties. See the appropriate MFEP for additional information (Attachment 6). Towns affected by the Loddon River include: Baringhup Newstead Bridgewater Castlemaine Carisbrook Dunolly Durham Ox Kerang Benjeroop
2016 **2011** **2010** **1995** **1983** **1981** **1975** **1973** **1964** **1956** **1939** **1933** **1923**	Avoca River	Varying degrees of impact from inundation of roads and rural land to flooding of residential properties. See the appropriate MFEP for additional information (Attachment 6). Towns affected by the Avoca River include: Coonooer Bridge Charlton Culgoa Quambatook Mystic Park
2011 **2010** **1996** **1992** **1975** **1956**	Avon-Richardson River	Varying degrees of impact from inundation of roads and rural land to flooding of residential properties. See the appropriate MFEP for additional information (Attachment 6). The only town affected by flooding of the Avon-Richardson River is Donald.

4. Community Resilience

4.1 Shared and individual responsibility for action

The National Strategy for Disaster Resilience, developed by the Council of Australian Governments, provides high-level guidance on disaster management to agencies with a role in emergency management.

Foremost in the Strategy is the principle of all community members taking responsibility for preparing for disasters.

Examples in the context of flooding include:

- Individuals being aware of their flood risk, and following advice from emergency services when responding to warnings.
- Local governments and communities including flood risk within their CERA activities, including consideration within emergency management planning and land use planning.
- Industry and businesses planning for the risk of disruption, and ensuring arrangements are in place to maintain critical services and assist communities where possible.
- Government agencies undertaking:
    - Risk assessments to gain an appreciation of flood risk.
    - Engaging with the community regarding flood risk.
    - Working with communities to plan the management of flood risk.
    - Providing emergency information and flood warnings.
    - Ensuring an effective, well-coordinated response during floods.
    - Helping communities to recover and learn following a flood, and build resilience for future events.

The North West (Loddon Mallee) Region has developed and delivers a range of programs to achieve the goals outlined in the VICSES Community Resilience Strategy, and delivers programs to at-risk communities to provide information on what to do before, during and after floods. More information can be found at www.ses.vic.gov.au/get-ready.

4.2 Flood warning services

BOM and VICSES provide flood warnings and notifications to the Victorian community. Flood warning services provided by BOM are dependent on local infrastructure, including flood gauges.

The service is documented in the Service Level Specification for Flood Forecasting and Warning Services for Victoria, accessible at www.bom.gov.au/vic/flood/.

A map of flood gauges can be found in both EM-Cop and Floodzoom as follows:

- EM-Cop: https://cop.em.vic.gov.au >Situation > Weather > River Heights.
- Floodzoom: https://www.floodzoom.vic.gov.au

VICSES provides warnings and emergency information to the community by publishing flood community notifications using EM-COP Public Publisher on the VicEmergency website, via www.emergency.vic.gov.au/respond/.

Flood community notifications are informed by BOM, North Central and Mallee CMAs, and local information and intelligence.

4.3 North Central and Mallee CMAs and Melbourne Water Regional Catchment Strategies

The CMA Regional Catchment Strategy outlines how flood management agencies will work together to manage flood risks and increase community preparedness. It is aligned with the Victorian Floodplain Management Strategy, emergency management arrangements and planning policy.

Note: Melbourne Water is responsible for the southern boundary east of Gisborne.

Mallee CMA Regional Catchment Strategy: http://www.malleecma.vic.gov.au/resources/corporate-documents/mallee-regional-catchment-strategy-2013-19/view?searchterm=catchment+stra.

North Central CMA Regional Catchment Strategy: http://www.nccma.vic.gov.au/sites/default/files/publications/nccma-78628_north_central_cma_rcs_-_may_2013_web_0.pdf

Melbourne Water Flood Strategy: http://www.melbournewater.com.au/yourfloodstrategy

To provide additional supporting information, below are links to the relevant CMA Floodplain Management Strategies. These strategies build on the above documents, adding emphasis on:

- Assessment of regional flood risk.
- Developing priority actions for each municipality to reduce flood risk.
- Developing a monitoring, evaluation and reporting framework to support decision making and continuous improvement.

Mallee CMA Floodplain Management Strategy: http://www.malleecma.com.au/resources/corporate-documents/mallee-floodplain-management-strategy-2018-28

North Central CMA Floodplain Management Strategy: http://www.nccma.vic.gov.au/plans-studies#node-1536

4.4 Flood intelligence

Flood intelligence supports decision making and planning for flooding by providing reliable and accurate information relating to:

- The level, depth and velocity of floodwater and its consequences.
- Determination of actions to be undertaken in response to the identified consequences.

VICSES works closely with CMAs, DELWP, other agencies, and trusted local sources to ensure available resources and platforms containing flood information and intelligence are utilised.

DELWP maintains the Victorian flood intelligence platform FloodZoom. This is a web-based platform that assists VICSES and other emergency services agencies to identify the possible local consequences of flooding, and supports CMAs in land use planning and flood risk assessments.

EMV maintains the online multi-agency operational platform, EM-COP, which is used for sharing flood intelligence with the sector, before, during and after flood emergencies.

Where there are gaps in telemetered stream and rainfall monitoring networks, the North West (Loddon Mallee) Region works closely with local contacts to ensure that local knowledge provided is incorporated into decision making before, during and after flood events.

The only known formal local flood observer network is located within the Gannawarra Shire. This consists of local people who have a particular knowledge of the flood risk within their area. Full contact details for these officers are located within the Gannawarra Flood Emergency Response Plan.

Flood observers (where implemented) will be listed within the relevant MFEP.

VICSES has developed a Local Knowledge Policy (10.02), which can be found on the VICSES intranet, (Hub > Libraries > Policies and standing orders).

4.5 Municipal flood planning

Municipal Flood Emergency Planning is managed by Municipal Emergency Management Planning Committees. MFEPs are created by municipalities that are considered to have a high susceptibility to flooding. MFEPs can be found online at respective council websites, FloodZoom for registered users, and on the VICSES website at www.ses.vic.gov.au.

4.6 Community engagement

Community engagement programs to build community resilience for flooding are conducted in accordance with the VICSES Community Resilience Strategy, as outlined in section 4.1 Shared and Individual Responsibility for Action.

North West (Loddon Mallee) Region community engagement involves, but is not limited to:

- Delivering Community Education Facilitator (CEF) courses twice a year to equip volunteers with the required tools, skills and knowledge to build awareness in their local communities.
- Engagement from CEFs in a Community Education Advisory Group where they support and share ideas on activities used to engage with the community.
- Participation in flood studies conducted across the region to identify high risk areas and the impacts to various communities.
- Creation and distribution of Local Flood Guides (LFGs) for locations that have been identified as having a high flood risk. LFGs explain local flood risks for communities and advise on how to prepare for and respond to flood events, and are available at www.ses.vic.gov.au/get-ready.
- Awareness building during the rollout process of new LFGs, such as targeted doorknock delivery in high risk areas.
- Provision of support to local councils to advise on flood risks to identified communities who have chosen to create a Local Incident Management Plan. This includes:
    - Events conducted within the community by local VICSES unit members with tailored activities to generate a discussion before, during and after to reinforce the flood risk message.
    - Participation in multi-agency activities including municipal flood education responsibilities.
    - Participation in community led emergency planning.
    - Building resilience and capacity within communities, for example, effective sandbag filling and laying techniques and cache locations.

4.7 Household and business plans

The Emergency Management Commissioner encourages every household and business to have a written emergency plan. For information on the development of household and business plans go to www.ses.vic.gov.au.

Local caravan owners can prepare for emergencies through use of the online planning tool, available at www.ses.vic.gov.au/get-ready/caravan-park-information.

4.8 Community safety advice

VICSES provides advice to the community in the form of key safety messages for minor, moderate and major flooding, including advice for safe evacuation. A full list of community safety advice messages can be viewed online via EM-COP, located in the IMT Toolbox.

5. Managing a flood event

5.1 Roles and responsibilities

Roles and responsibilities of agencies involved in responding to floods are detailed in the SERP – Flood Sub-plan.

5.2 Concept of operations

The concept of operations for responding to floods is detailed in the SERP – Flood Sub-plan.

During an incident municipalities will be requested to provide an Emergency Management Liaison Officer (EMLO) to support operations at an identified location. This could be a Divisional Command Point (DCP) or an Incident Control Centre (ICC), depending on the nature and location of the event.

5.3 Escalation and notification

BOM publishes flood watches and warnings on its public website (www.bom.gov.au), as detailed in section 4.2.

These watches and warnings are also provided to pre identified agencies, organisations and media outlets, including pager and email warning messages to VICSES at a state and regional level.

Upon the receipt of a warning, the Regional Duty Officer (RDO) will notify the potentially affected and/or affected communities by issuing flood community notifications, and the Regional Agency Commander (RAC) will notify the Regional Controller (RC) and/or Regional Emergency Management Team (REMT) members for flood response.

The escalation and notification process for flood response is operationalised within the VICSES Standard Operating Procedure (SOP) 009 – Flood Notification and Activation Process.

5.4 Strategic response planning

The actions listed below are the responsibility of VICSES at regional and state tiers. Responsibility for these actions may transition to the RC to support multi-agency response when significant impacts caused by a flood event occur.

Associated flood readiness levels and ICC footprints can be accessed within JSOP 2.03 Incident Management Team (IMT) Readiness Arrangements, the VICSES Flood Readiness and Activation Trigger Considerations (v3.0) or via Attachment 2 – IMT Readiness Levels – Flood.

On receipt of advice from BOM of the potential for significant flooding, the RAC will undertake strategic level planning in anticipation of an event. Key considerations will include:

- Establishing the control structure for managing the event.
- Consulting and informing the RC to determine the level of preparedness and response.
- Provision of warnings and emergency information to the community.
- Preparations for possible evacuations, including implementation of evacuation and emergency relief plans and identification of evacuation points.
- Confirming agencies at all tiers are activated and appropriate response arrangements are in place.
- Identifying the likely consequences of the flood event and any interdependencies that may affect planning.
- Confirming agencies have adequate resources in place to fulfil their responsibilities and are planning for sustainment and surge capacity, including identification of need for inter-state assistance.
- Ensuring that flood mitigation structures have been checked and any issues identified.
- Identifying any mass gatherings and large public events that may be at risk, and necessary arrangements to ensure the safety of individuals attending.

- Confirming agencies with call taking responsibilities have resources in place and back up arrangements to cope with the expected call load.
- Positioning of EMLOs from key support agencies to the State Control Centre (SCC) and Regional Control Centres (RCCs), where appropriate.
- Arranging for regular meetings of the REMTs and Incident Emergency Management Teams (IEMTs).
- Providing situation reports to the State Control Team (SCT).

5.5 Cross border arrangements

Cross border arrangements exist with NSW State Emergency Service (SES) and SA SES. This is supported by a Memorandum of Understanding (MOU) that outlines how VICSES will request assistance from NSW SES or SA SES.

- In the case of an event within the immediate border area, the VICSES Assistant Chief Officer or delegate will request from the NSW SES Murray Regional Controller or SA SES Murraylands Controller, or delegate such support as is immediately required and notify the VICSES State Duty Officer (SDO).
- In the case of an event within Victoria but outside the immediate border area, the request will be escalated to VICSES Chief Officer Operations or delegate.

Interstate arrangements also exist with neighbouring states, including, NSW and SA. These arrangements can be found at https://cop.em.vic.gov.au – under the Library Tab.

In relation to flooding along the Murray River, effective cooperation and joint community messaging is essential. This should be facilitated by regular communication with both or either NSW SES or SA SES and include the North West (Loddon Mallee) REMT. ICCs that are managing Murray River flooding should request a relevant state SES EMLO.

During significant flood events it is common for additional VICSES units to be deployed to neighbouring regions, with reciprocal arrangements in place to support the North West (Loddon Mallee) Region.

5.6 Regional Control Centre

The following pre-determined facilitates are suitable for the establishment of a Regional Control Centre (RCC) for the management of flood events.

- North West (Loddon Mallee) Region – Regional Control Centre, Valentines Walk, Bendigo.

The RCC backup facility is located at:

- VICSES Bendigo Regional Office, 7 Rohs Road, East Bendigo.

A map of RCC footprints can be viewed in EM-Cop (Situation Tab > Data/Boundaries > Emergency Services>Victorian EM Regions).

5.7 Incident Control Centres

The Regional Response Plan outlines ICC locations pre-determined for emergency response, including flood response, in the North West (Loddon Mallee) Region. These are detailed as follows:

Location	Catchments within footprint	Local Government Areas within footprint
DELWP offices Level 3,Thirteenth Street Irymple Mildura	Murray River, downstream of Tocumwal (to Wentworth NSW) River Murray Murraylands (SA)	Campaspe Shire *Gannawarra Shire Swan Hill Rural City Council Mildura Rural City Council
DELWP offices	Avoca River	Buloke Shire

Level 3, Calder Highway Epsom	Campaspe River Loddon River Murray River downstream of Tocumwal (to Wentworth NSW)	Macedon Ranges Shire Council Greater City of Bendigo Mt Alexander Shire Council Central Goldfields Loddon Shire *Gannawarra Shire

Note: Gannawarra Shire may transition between ICCs as the water moves through the system. This is due to access/transport routes being inundated as the water moves downstream, severely limiting access from either the south or north. A consultation process will occur between the RC and IC to arrange transition as required.

A map of ICC footprints can be viewed in EM-COP (Situation Tab > Data > Boundaries > Emergency Services > ICC Footprints – Flood/Storm) or JSOP - J02.03.

5.8 Divisional Command Points

Identified VICSES endorsed DCPs within the North West (Loddon Mallee) Region are contained in VICSES SOP 070, available at www.ses.vic.gov.au.

Note: Other suitable facilities may be utilised at the discretion of the Incident Controller.

The following table details the current predetermined DCPs:

Location	VICSES units within footprint	Local Government Area
Bendigo (VICSES)	Bendigo Marong Wedderburn	Bendigo
Swan Hill (VICSES)	Swan Hill Robinvale	Swan Hill
Wycheproof (VICSES/ Country Fire Authority (CFA))	Wycheproof Birchip Woomelang (St Arnaud MW)	Buloke
Mildura (VICSES)	Mildura Ouyen Murrayville	Mildura
Castlemaine (CFA)	Castlemaine	Castlemaine
Maryborough (DELWP/CFA)	Maryborough Dunolly	Central Goldfields
Kyneton (CFA)	Woodend	Macedon Ranges
Kerang (CFA)	Kerang	Gannawarra
Echuca (CFA)	Echuca Rochester Kyabram Rushworth, Echuca/Moama SRS	Campaspe
Gisborne (CFA)	Gisborne	Macedon Ranges
Pyramid Hill (CFA)		Loddon

DCP footprint maps can be found on the VICSES intranet at https://hub.ses.vic.gov.au via My State > Operations > Command and Control facilities (VICSES members only).

Transfer of Control

There are circumstances where an incident should be managed by an IC based in an ICC and supported by an IMT with specialist skills and equipment, rather than by a field-based IC. Refer to Joint SOP (JSOP) J03.15 for full details.

These circumstances include when an incident is a major emergency or has the potential to become a major emergency, or where there is the need to do one or more of the following:

- Issue warnings and advice to the community.
- Evacuate the community.
- Protect the community.
- Manage significant risks or consequences, for example to:
    - The community.
    - Community infrastructure.
    - Essential services such as electricity and water.
    - The economy.
    - Significant environmental or conservation assets.
- Manage a large number of personnel and other resources such as aircraft.
- Produce incident predictions.
- Implement health and safety systems for response personnel.
- Provide direction to multiple response agencies.
- Manage multiple incidents within the area.

5.9 Regional resource requirements

Resource requirements for significant flood activity within each ICC footprint are not predetermined and will be allocated as required.

Refer to the Victoria Emergency Management Operations Handbook via www.emv.vic.gov.au/publications/victorian-emergency-operations-handbook-2017 for agreed resourcing levels.

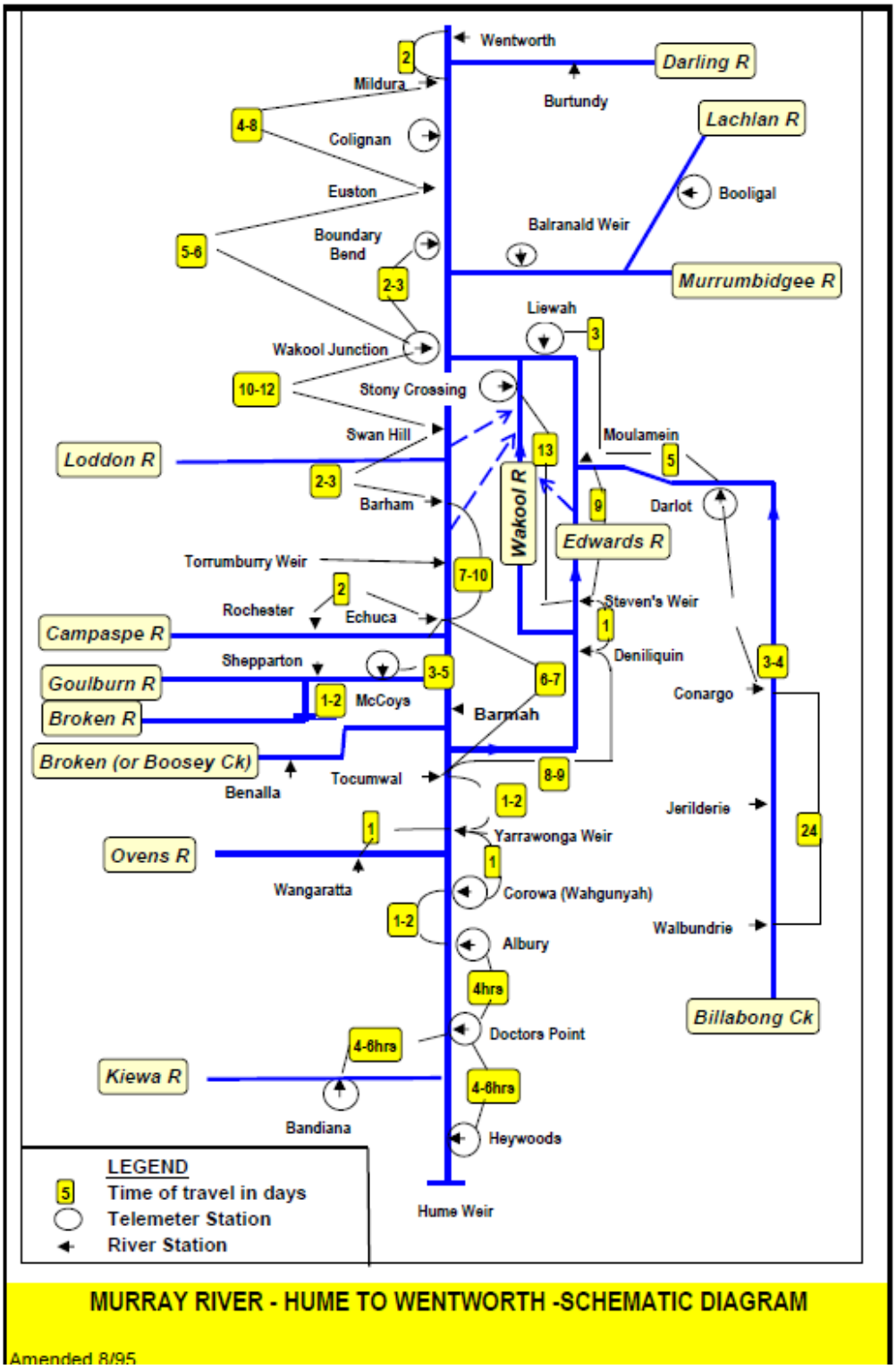
For guidance on how to place resources requests, view JSOP 3.09 – Resource Request Process at http://files.em.vic.gov.au/JSOP/EMV-JSOP.htm.

Glossary

AEP	Annual Exceedance Probability
AIIMS	Australasian Inter-Service Incident Management System
ARI	Average Recurrence Interval
BOM	Bureau of Meteorology
CFA	Country Fire Authority
CMA	Catchment Management Authority
DCP	Divisional Command Point
DELWP	Department of Environment, Land, Water and Planning
EM-COP	Emergency Management – Common Operating Picture
EMLO	Emergency Management Liaison Officer
EMMV	Emergency Management Manual Victoria
EMV	Emergency Management Victoria
ICC	Incident Control Centre
IEMT	Incident Emergency Management Team
IMT	Incident Management Team
JSOP	Joint Standard Operating Procedure
MEMP	Municipal Emergency Management Plan
MFEP	Municipal Flood Emergency Plan
NSW	New South Wales
RAC	Regional Agency Commander
RC	Regional Controller
RCC	Regional Control Centre
RDO	Regional Duty Officer
REMT	Regional Emergency Management Team
SA	South Australia
SCC	State Control Centre
SCT	State Control Team
SERP	State Emergency Response Plan
SOP	Standard Operating Procedure
USAR	Urban Search and Rescue
VICSES	Victoria State Emergency Service

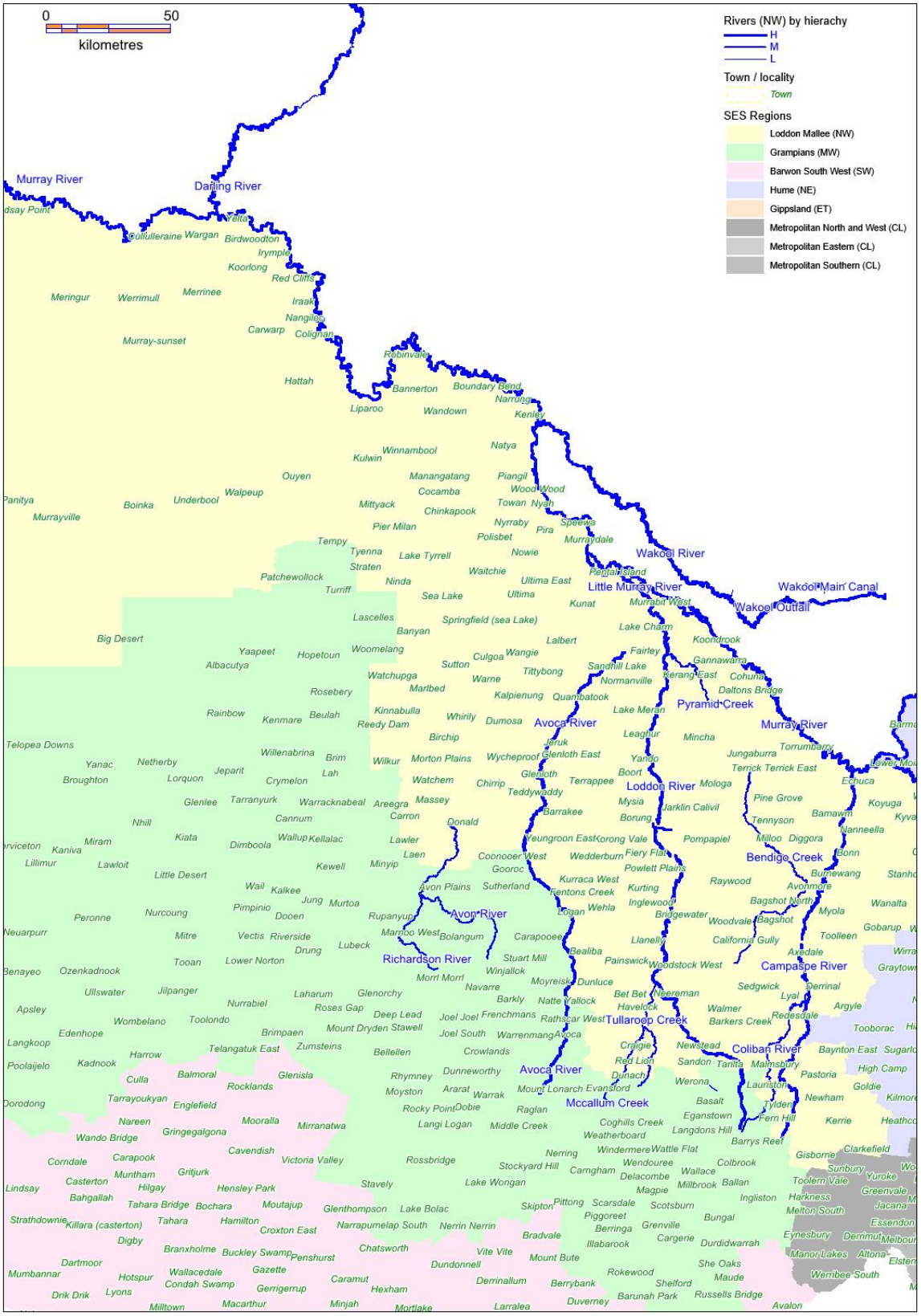
Attachments

Attachment 1 – Murray River Schematic

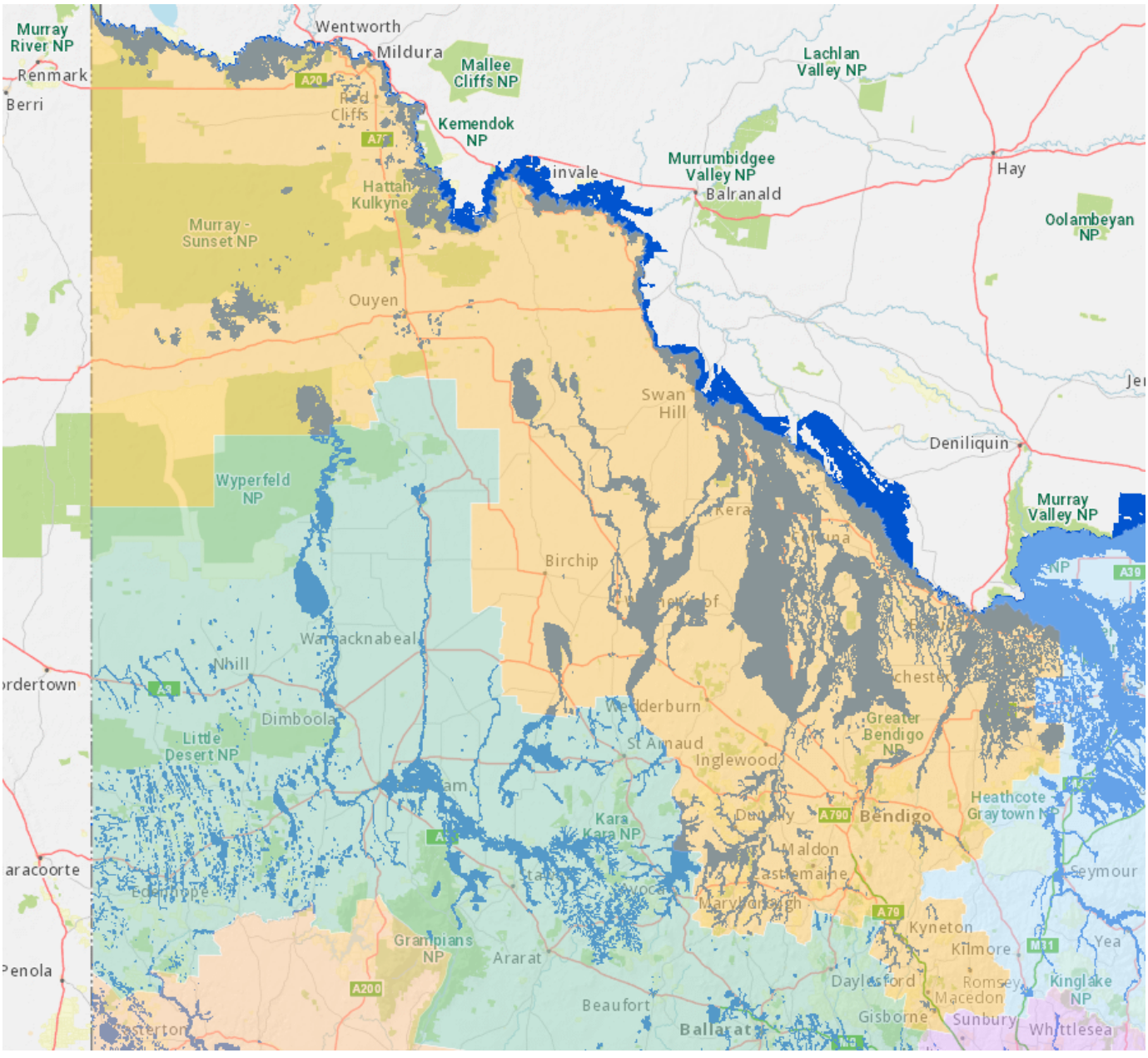


Note: This schematic is maintained by NSW BOM

Attachment 2 – North West (Loddon Mallee) Region Victorian rivers and relevant NSW rivers



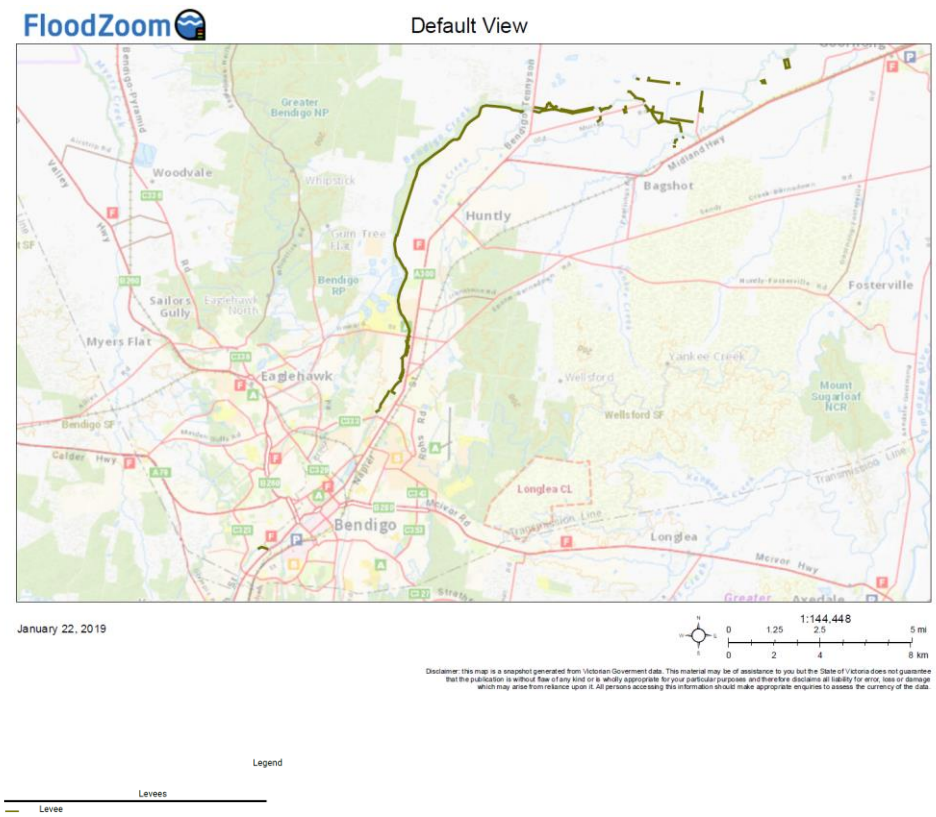
Attachment 3 – 1% AEP flood extent – VICSES North West (Loddon Mallee) Region



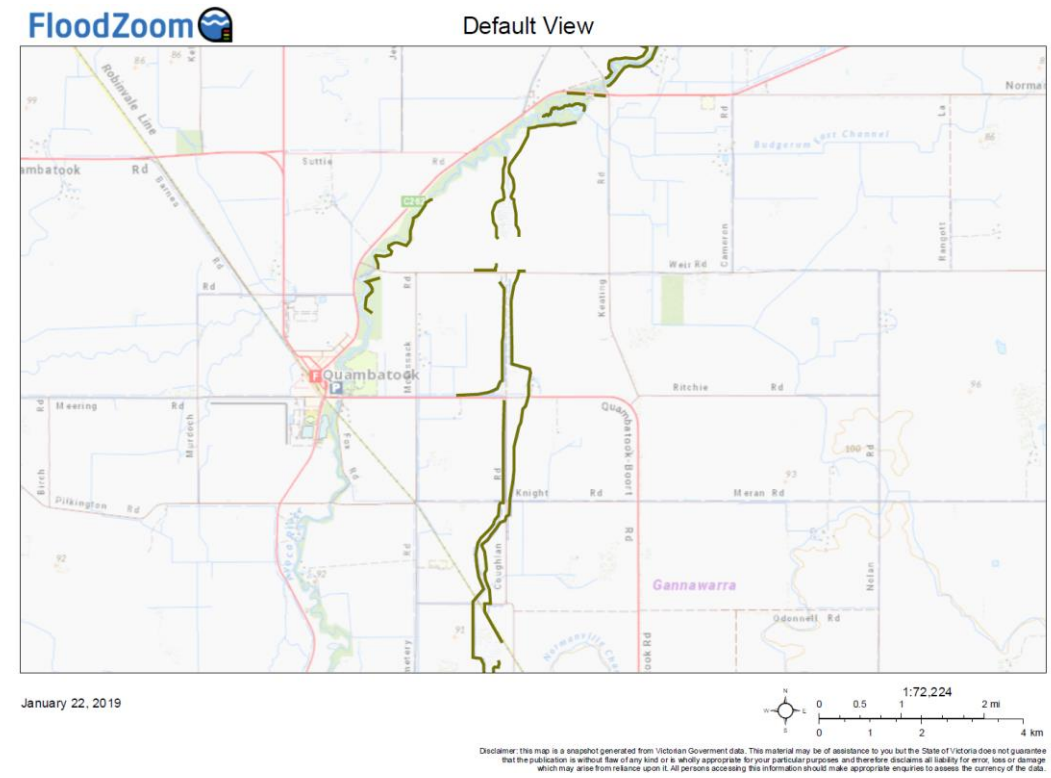
Attachment 4 – Levee system and locations

Note: The following is not a definitive list of levees within the region, but an indication of some of the high risk areas.

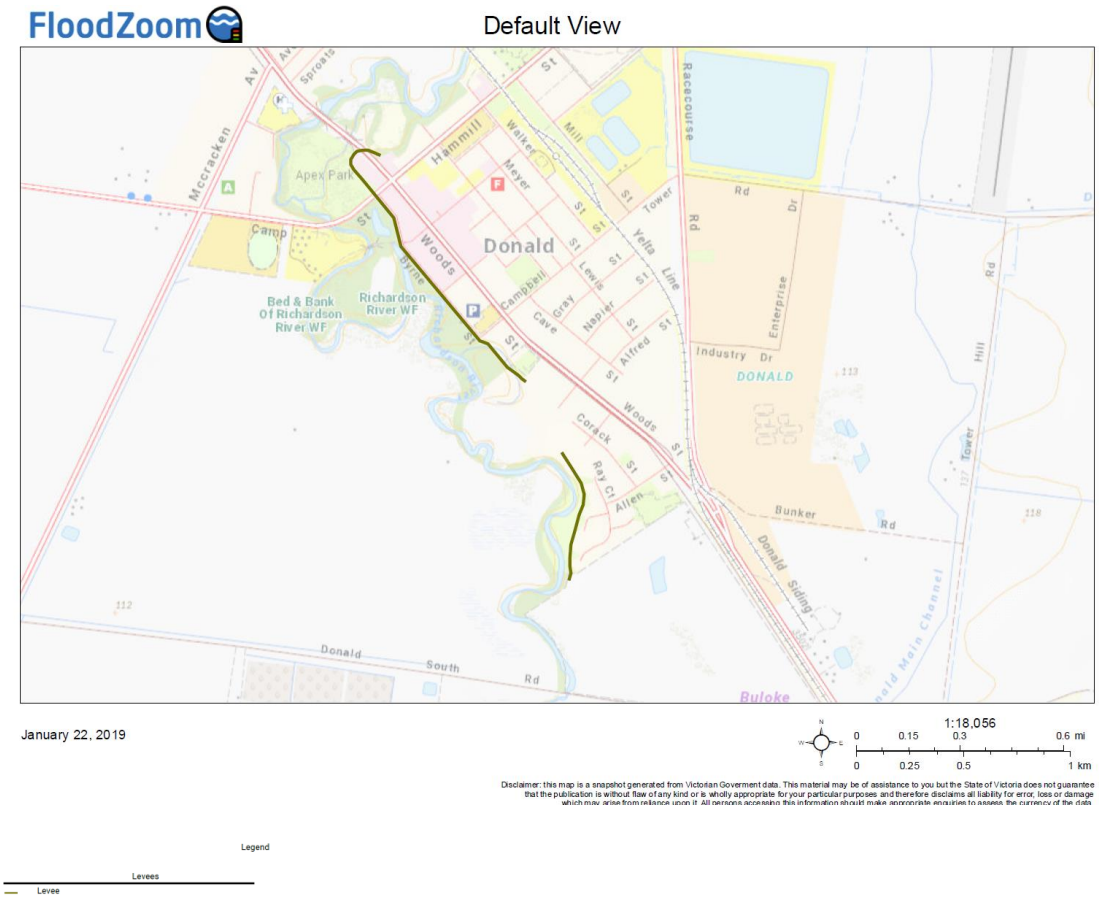
Bendigo and surrounds:



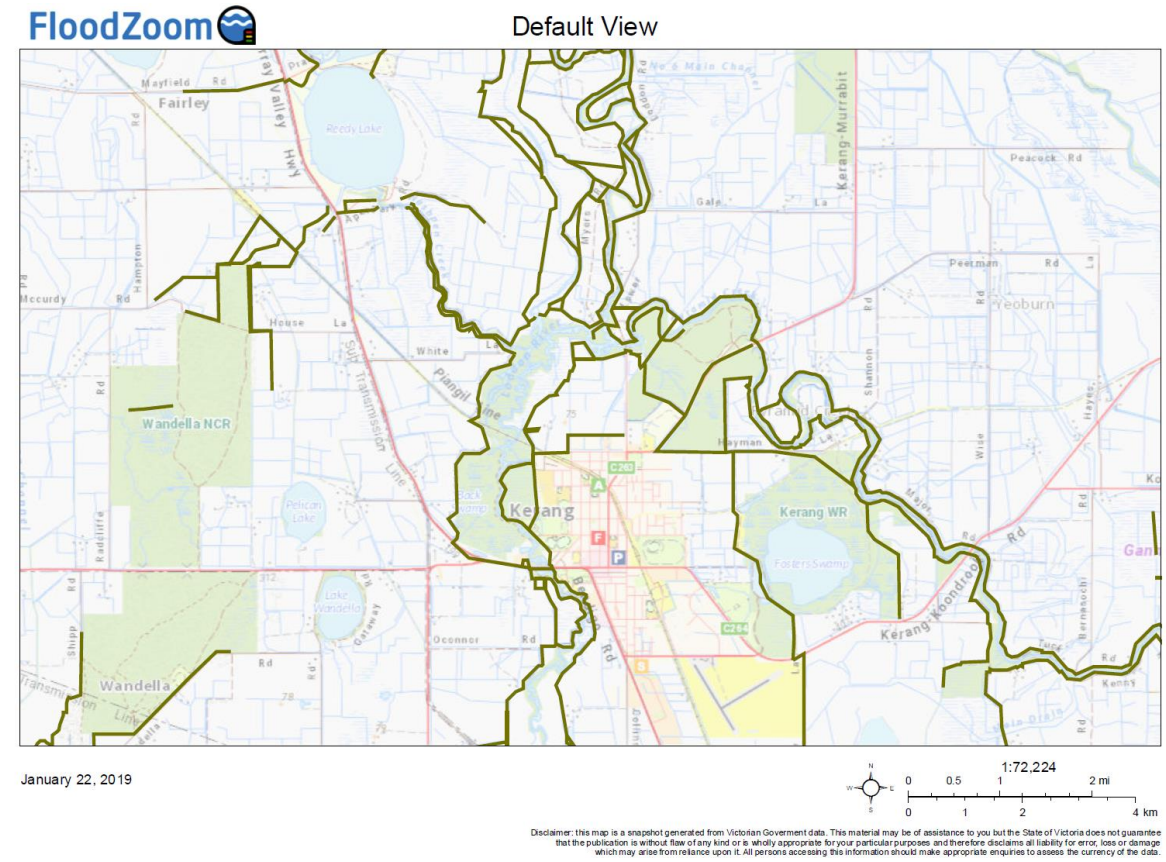
Quambatook and surrounds:



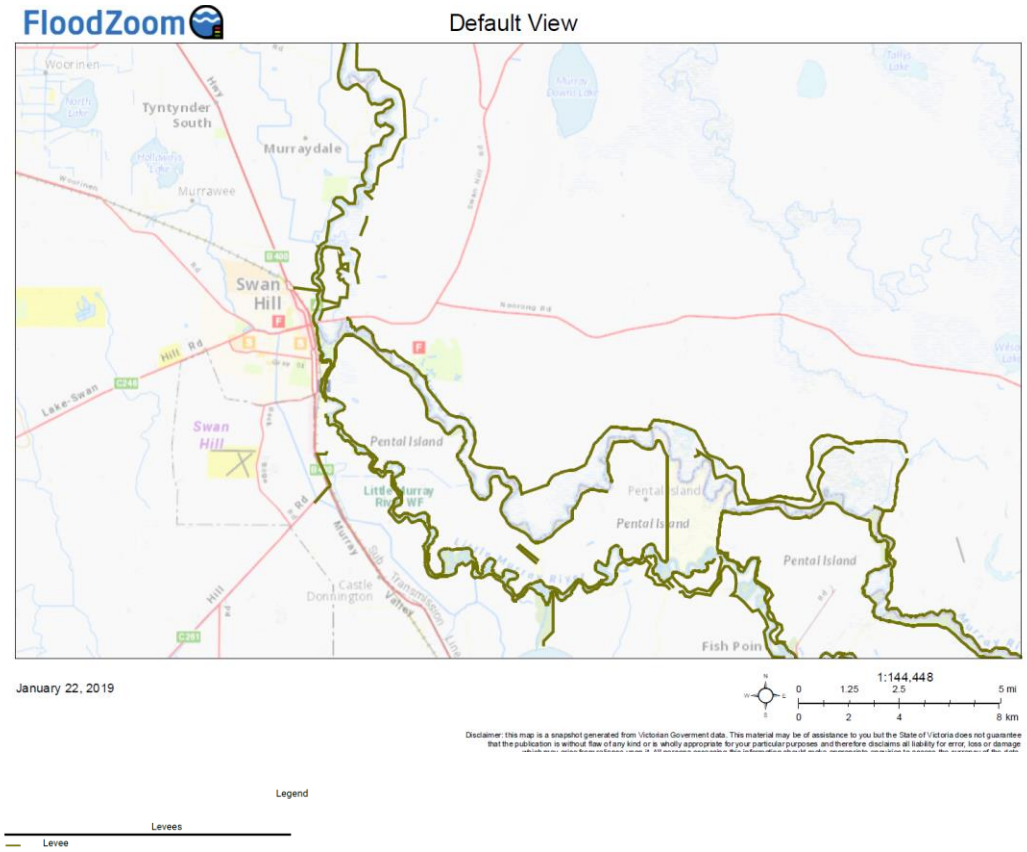
Donald:



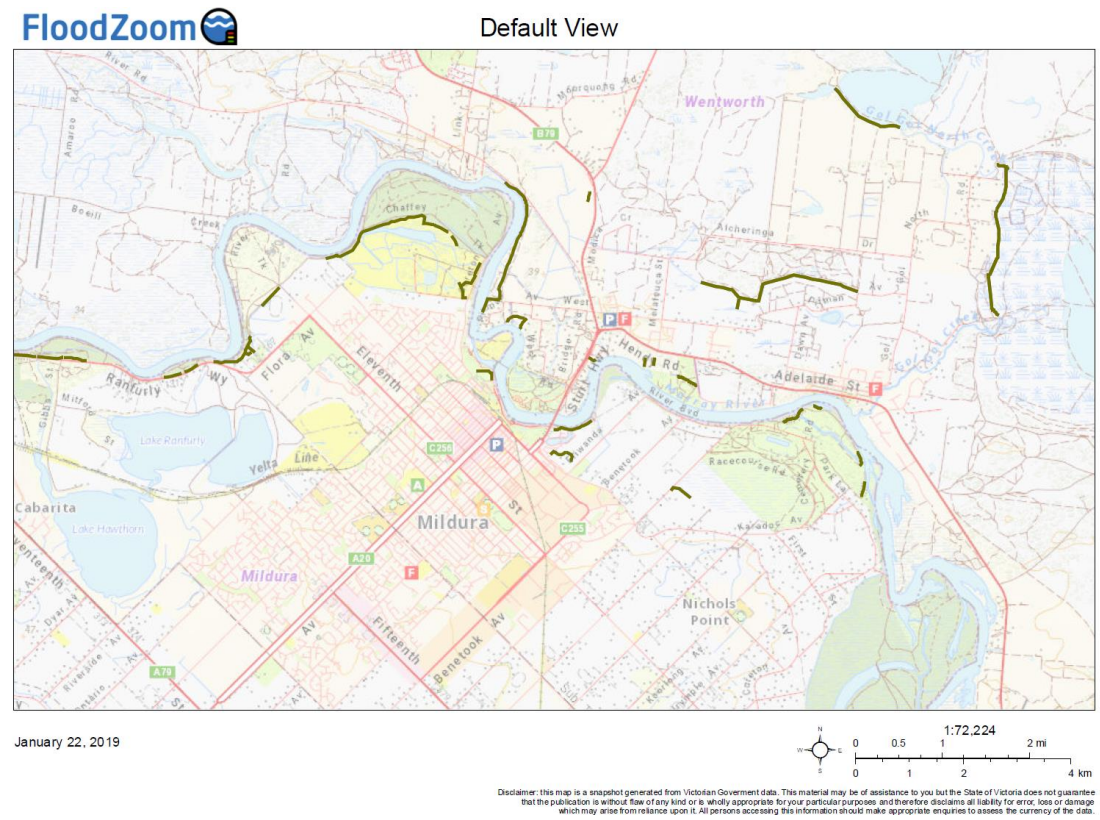
Kerang and surrounds:



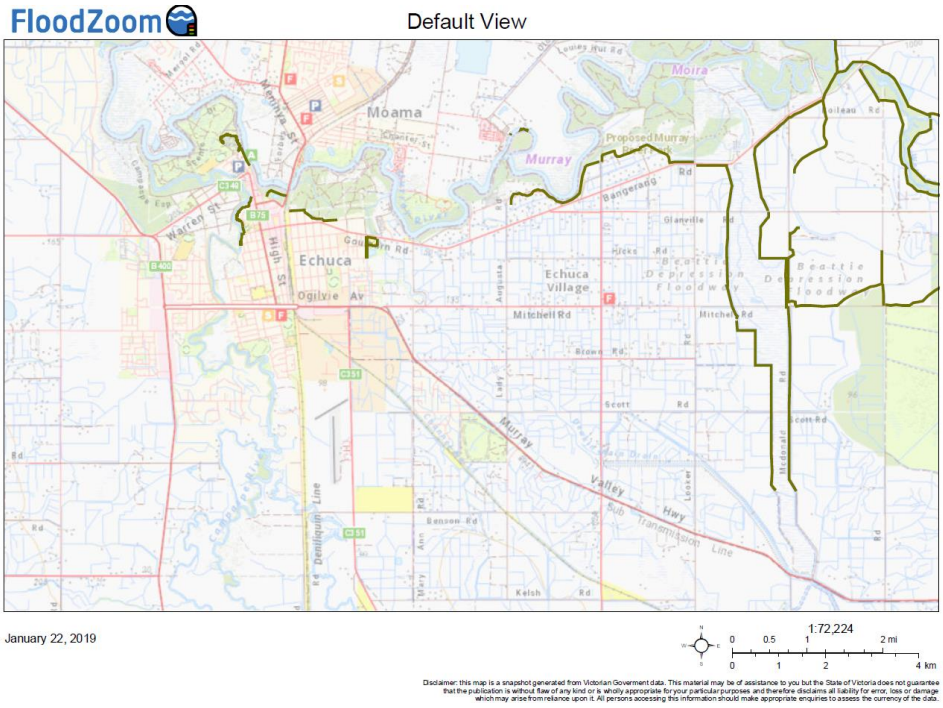
Swan Hill and surrounds:



Mildura and surrounds:



Echuca and surrounds:



Attachment 5 – Example of regional flood scenarios

Regional flood scenarios have been developed to support periodic training requirements (outlined in section 1.8), and provide an opportunity to document anecdotal and/or known flood impacts based on historic events, and to provide an indication of the resource requirements and associated gaps for operational response.

The below scenarios are based on likely events of varying intensity:

Scenario 1 – Heavy rainfall leading to minor to moderate riverine flooding

A major rainfall event impacts central and southern parts of the North West (Loddon Mallee) Region as a low pressure system over SA deepens and moves over the Bass Strait, with an associated trough extending north into NSW.

Catchments have become saturated, and most waterways within the region are experiencing moderate to major flooding. This event could initially have flash flood and flooding impacts around the townships of Carisbrook, Castlemaine and Dunolly, among others.

Scenario 2 – Major riverine flooding

Significant widespread rainfall combined with an already wet catchment from previous events has affected all of the Loddon Mallee key river systems, including the Loddon, Avoca and Campaspe rivers, with the region receiving almost three times its usual rainfall.

Extreme rainfall is generated by the passing of complex and persistent low pressure systems. This includes a broad slow moving trough centred over western Victoria and a ridge of high pressure to the south of Tasmania. The two systems create exceptionally humid conditions and an unstable easterly flow across Victoria. Major level flooding is experienced across the North West (Loddon Mallee) Region, with many gauges reaching the highest flood levels on record, and stormwater flooding also causing significant damage in numerous towns.

Significant impacts can be expected in numerous townships, including Rochester, Echuca, Carisbrook, Dunolly, Newbridge, Newstead, Bridgewater, Newstead, Durham Ox, Charlton, Donald and Kerang, among others along the waterways.

Attachment 6 – Municipal Flood Emergency Plans and Local Flood Guides

LFGs are available at:

- www.ses.vic.gov.au/get-ready/your-local-flood-information.
- https://www.floodzoom.vic.gov.au (for registered users only).

Local Government Area with MFEPs	Local Flood Guides
Macedon Ranges	Nil
Mount Alexander	Castlemaine Campbells Creek Chewton Newstead
Central Goldfields	Carisbrook
Bendigo	Bendigo White Hills Long Gully Epsom Ascot Huntly Golden Square Kangaroo Flat
Loddon	Nil
Campaspe	Echuca Rochester
Buloke	Charlton Donald
Gannawarra	Kerang Murrabit Benjeroop Quambatook
Swan Hill	Robinvale
Mildura	Nil

Attachment 7 – Regional resources

The list below contains details of major regional resources that may be used during a flood operation, and is supplementary to unit response resources.

- 1 x Field operations vehicle
- 4 x IAC/EMLO IT Kits
- 1 x Logistics truck with staging area management equipment
- 13 x Lighting towers
- 1 x Sandbag filling trailer
- Land Based Swift Water Rescue Team/s
- 13 x Rescue Boats situated at the following locations:
    - Mildura
    - Robinvale
    - Swan Hill
    - Kerang
    - Echuca
    - Rushworth
    - Kyabram
    - Rochester
    - Marong

DELWP and CFA maintain specialist resources that are able to be utilised by VICSES during a flood operation, including:

- IMT personnel
- Chainsaw crews
- Health monitoring units
- Initial Impact Assessment Teams

The region also holds strategic reserves of sandbags at the following locations (approx. to 1000):

Location	Number x 1,000 (approximate)
Swan Hill office store	10
Bendigo office store	15
Mildura	5
Swan Hill	5
Kerang	5
Rochester	3
Bendigo	5
Ouyen	6

In general, other units hold sandbag quantities >1000.

Attachment 8 – Flood readiness and activation trigger considerations (V3.0 – Sept 2017)

For the most up to date readiness and activation trigger considerations document always check the latest version on the VICSES Hub at: https://hub.ses.vic.gov.au/library/operational-doctrine.

FLOOD READINESS AND ACTIVATION TRIGGER CONSIDERATIONS - V3.0 - SEPTEMBER 2017

Readiness Level	RL 1- LOW TO MODERATE	RL 2 - HIGH	RL 3(A) - VERY HIGH	RL 3(B) - VERY HIGH	RL 4 - SEVERE	RL 5 - EXTREME
FDI	0 - 11	12 - 24	25 - 34*	35 - 49*	50 - 74	75 - 99
Fire Behaviour	Fires can be easily controlled	Fires can be controlled, expect short distance spotting	Fires can be difficult to control, crown fires may develop in forest.	Fires can be difficult to control, crown fires may develop in forest.	Fires may be uncontrollable and move quickly. Spot fires may occur up to 4km ahead of the fire.	Fires will be uncontrollable, unpredictable and fast moving. Spot fires up to 6km ahead of the fire.
	Minor		Moderate		High End Moderate to Major	
Flood Prediction	Flood Watch issued and /or Minor Flood warning issued	Minor Flood Warning issued	Low to mid range Moderate Flood warning issued with low consequences for built environment based on risk	Moderate to high end MODERATE Flood Warning with moderate consequences for built environment based on risk Multiple other Rivers in MINOR	MAJOR Flood Warning predicted and/or >2 high end MODERATE Flood warnings with risks and consequences for built environment & economic	Two or more MAJOR Flood warning(s) or One with significant consequences / widespread evacuations for built environment, exceeding 1 in 100 year riverine event. Multiple MODERATE Flood Warnings. Large Dam failure considered very likely.
Flood Behaviour	Anticipated continued light rain. Catchments able to absorb predicted rain for consecutive days but may lead to flooding. Nil impacts or consequences predicted unless identified.	Anticipated continued rain. Catchments able to absorb predicted rain for consecutive days with minor flooding occurring. 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	Anticipated continued rain. Catchments likely to be saturated and unable to absorb continued rain. Areas of inundation are more substantial in size but consequence low . Main traffic routes may be affected. Unlikely for buildings to be affected above the floor level. Evacuation of flood affected areas may start to be considered. In rural areas removal of stock is required.	Anticipated continued rain. Catchments are saturated and unable to absorb continued rain. Areas of inundation are more substantial. Main traffic routes may be affected. Some buildings may be affected above the floor level. Evacuation of flood affected areas may be planned for. In rural areas removal of stock is required. Impact assessment may be required.	Anticipated continued high rain. Catchments are saturated and unable to absorb continued rain and runoff. 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 likely. Utility services likely to be impacted.	Anticipated significant extreme weather event that will lead to rapidly rising river conditions. Catchments are saturated and unable to absorb current or additional runoff. 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 are likely. Utility services will be impacted.
	VICSES - Business As Usual Operations			JSOP 2.03 LINE OF CONTROL		
Readiness Level (State)	Preparedness WHITE	Preparedness WHITE	Preparedness WHITE	SCC Level BLUE or When ICC activated	SCC Level ORANGE Multiple ICCs activated or multi region	SCC Level RED Multiple ICCs activated or multi region
	SDO and SAC (monitor)	SDO and SAC (monitor)	SDO and SAC (monitor)	SDO and SAC In Place	SDO and SAC In Place Consider Day/Night	SDO and SAC In Place Day and Night
Readiness levels (Regional)	Preparedness WHITE	Preparedness WHITE	Regional Command (on CALL/STBY)	RURAL: Regional Cmd In Place, RC notified METRO - RCC OPEN: Base RCT in place	RCC OPEN: RCT in place, some agencies available on immediate recall	RCC OPEN: Full RCT/most REMT In Place
	RAC (Monitoring)	RAC (Monitoring)	RAC (Monitoring)	RAC and RDO at the RCC	RAC and RDO at the RCC	RAC and RDO at the RCC
	RDO (monitor and issuing public information)	RDO (monitor and issuing warnings)	RDO (issuing warnings - oversighting basic response (eg: evac caravan park)	FULL RCT on Standby REMT briefed by RAC	REMT briefed by RAC and on standby to come in (as required)	FULL RCT and REMT In Place
Readiness levels (Incident)			Base IMT (Rostered STBY)	Base IMT (In Place - Primary ICC)	RURAL - BASE IMT (In Place), CORE (On Call / Stand-by) METRO - CORE IMT (In Place) Observed activity - CORE IMT (In Place)	RURAL - CORE IMT (In Place), FULL (On Call / Stand-by) METRO - FULL IMT (In Place) Observed activity - FULL IMT (In Place)
People	Some minor inconvenience around local roads.		Increased number of roads being impacted traffic management plan should be considered.		Significant number of roads impacted traffic management plan is required some major roads closed with isolation or evacuation possible.	
Power	Possible power disruptions		Likely short term power disruptions		Power disruptions likely with some substations impacted and potential long term outages.	
Health	Little impact expected some local issues might be encountered but managed locally within own facility Plan		Consideration for review and familiarisation with facility Plan - VICPOL and DHHS to review Vulnerable persons list		Highly likely some hospitals isolated and vulnerable people isolation and require evacuation.	
Education	Unlikely impact		Some impact expected traffic management plan for school buses should be considered.		Some school and preschools may be inundated and school bus routes closures	
Road Network	Unlikely to impact		Some minor roads may be impacted with possible disruption to critical needs supplies such as milk		Highly likely for roads to be cut and egress and access impacted. Major roads potentially cut in some locations traffic diversions in place. Potential rescue of trapped persons in vehicles. Expected impact on rail routes. Economic impact likely with loss of commercial transport routes.	
Public Transport	Limited impact on public transport routes		Impact to public transport routes may occur but likely to be minimal with diversions possible		Public transport impacts will occur with roads and rail lines cut and no alterative route available - significant disruption to people movement likely	
Relief and Recovery	Relief and recovery activity unlikely may be some local issues.		Increased potential for relief and recovery activity but likely to be managed locally by LGA with support of DHHS		Formal arrangements put in place for relief and recovery activity Regional Recovery Commander appointed. Health Commander in Place and demands on relief and recovery to be substantial and potentially long term.	
Water utilities	Little impact expected some local issues might be encountered but managed locally.		Increased potential but still managed locally. May be minor sewerage overflow issues in isolated areas		Highly likely that some infrastructure will be impacted water authorities should develop or initiate their plans to address issues. Significant potential for pollutants including sewerage in water	
Telecommunications	Nil impact		Minimal impact to individual premises only		Significant impact with loss of landlines and mobile powers which will affect peoples capacity to receive warnings and information.	
Public Events	Maybe cancelled due to weather conditions only		Some public events may need to be cancelled or rescheduled due to safety of patrons either whilst at event or travelling to or from.		Public events impacted likely cancellation of major events due to flooding impact on venue or ability to attend or leave event.	
Tourism	Unlikely that event will be impacted but consideration must be given to any event occurring to ensure it is safe to continue.		Potential impact on tourist locations if area not safe to visit or isolated due to road closures.		May impact on high value tourist locations and facilities with long term impacts in the social and economic environment of communities.	
Agriculture/Animal welfare	No impact likely with landowners managing any localised issues.		Potential impact with losses to live stock, fencing and crops including high intensive farming of produce		Substantial impact to live stock, fencing (widespread), farm machinery and crops, including high intensive produce farming short and long term impacts due to loss of soil and erosion. Highly likely need for stock movement support and fodder resupply for isolated stock	
Remote communities	Inconvenience only		Some minor isolation of individual properties or remote communities is likely		Community isolation likely with resupply requirements as well as evacuation considerations needed	
Environmental	Minimal impact - some minor watercourse erosion		Stream erosion and loss of vegetation around watercourses		Significant disturbance to soil and vegetation	
Cultural Heritage	Minimal impact likely		Some disturbance along watercourses may occur but likely to be minimal		Potential for significant disturbance especially of flood of significance in area and flood of record	
Public Infrastructure /Essential Community Infrastructure	limited impact		Some disruption to access-Parks and low lying community areas and infrastructure - Some minor damage of community infrastructure build on floodplains		Significant damage to road infrastructure and community facilities. Long term closure of key community facilities likely	
Critical infrastructure	Nil impact		May require some preparatory work and discussion with owner of infrastructure		Significant work likely to be required to protect critical infrastructure - Contingency plans put in place if lose of the infrastructure occurs	

Regional Agency Commander (VICSES) provides advice to the Regional Controller re: forecast and consideration for varying the actual number, distribution and level of IMT required.