Rural City of Wangaratta

Flood and Storm Emergency Plan

A Sub-Plan of the Municipal Emergency Management Plan

For the Rural City of Wangaratta
And
VICSES Wangaratta Unit

Version V2.1
Reviewed December 2025

VICTORIA State Government

RURAL CITY OF WANGARATTA

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Acknowledgment of Traditional Owners

The Rural City of Wangaratta Municipal Emergency Management Planning Committee respectfully acknowledges the Traditional Owners of the land and waters of the Rural City of Wangaratta. We pay our respects to Elders past, present and emerging, and are committed to working with Aboriginal and Torres Strait Islander communities to achieve a shared vision of safer and more resilient communities.

Authority

The plan has been prepared in accordance with and complies with the requirements of the EM Act 2013 including having regard to the guidelines issued under section 77, *Guidelines for Preparing State, Regional and Municipal Emergency Management Plans* and was endorsed by the Hume Regional Emergency Management Planning Committee as a sub-plan to the State Emergency Management Plan and approved by the Emergency Management Commissioner.

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If you would like to receive this publication in an accessible format please email *emergencyplanning@emv.vic.gov.au.* This document is also available in PDF format at emv.vic.gov.au.

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Distribution of MFSEP

Once endorsed and signed the, MFSEP should be distributed to all MFSEP committee members, MEMPC Chair, council, MEMO, Deputy MEMO, Representatives from; BoM, CMA, DEECA, Parks Victoria, Ambulance Victoria, Department of Transport and Planning (VicRoads), DFFH, relevant utilities, MERC, RERC, Police station, VICSES Units, VICSES Regional office, FRV district office, FRV stations, CFA brigades, CFA regional office.

Document Transmittal Form / Amendment Certificate

This Municipal Flood and Storm Emergency Plan (MFSEP) will be amended, maintained and distributed as required or every 3 years facilitated by VICSES in consultation with the Municipal Emergency Management Planning Committee (MEMPC)

Suggestions for amendments to this Plan should be forwarded to VICSES Regional Office via:

North East Region
Victoria State Emergency Service
64 Sydney Road, Benalla,
Victoria 3672
Phone: (03) 9256 9650
Fax: (03) 9256 9671
Email: northeast@ses.vic.gov.au

Amendments listed below have been included in this Plan and updated as a new version.

Amendment Number	Date of Amendment	Amendment Entered By	Summary of Amendment
V1.1	Oct 2018	Charlie Sexton	Update the 2014 MFEP and Incorporate storm hazard into the plan. Update with the 2018 Wangaratta Urban Flood Study data and update into the new VICSES template.
V1.2	Oct 2020	Toby Richards	Update of actions in the intel flood cards and ensure data from flood study is correct
V1.3	Jan 2022	Charlie Sexton	Update intel card actions and input Flood Study data Update changes to the EMLA Act 2018 and references to the new SEMP Approval by the RCOW MEMPC
V1.4	Dec 2024	Scott Richter	Update to new template. Ensure consistency with Wangaratta MEMP Updated flood intelligence cards. Updated community consultation. Add township summaries. Add River Guage information. Updated Wangaratta levee intel. Additional 1% Flood Inundation maps Draft for MEMPC review and feedback
V2.0	Feb 2025	Scott Richter	Final Version for MEMPC endorsement
V2.01	Dec 2025	Scott Richter	REMPC endorsement and Plan date change

This Plan will be published on the VICSES website at www.ses.vic.gov.au/get-ready/your-local-flood-information located with the associated local flood guides.

List of Abbreviations & Acronyms

The following abbreviations and acronyms are used in the Plan:

The following abbreviations and acronyms are used in the Plan			
AAR	After Action Review	IIA	Initial Impact Assessment
AEP	Annual Exceedance Probability	IMS	Incident Management System
AHD	Australian Height Datum (the height of a location above mean sea level in metres)	IMT	Incident Management Team
AIDR	Australian Institute of Disaster Resilience	JSOP	Joint Standard Operations Procedure (as issued by the Emergency Management Commissioner)
AIIMS	Australasian Inter-service Incident Management System	LSIO	Land Subject to Inundation Overlay
AoCC	Area of Operations Control Centre / Command Centre	MEMO	Municipal Emergency Management Officer
ARI	Average Recurrence Interval	MEMP	Municipal Emergency Management Plan
ARMCANZ	Agricultural & Resource Management Council of Australia & New Zealand	MEMPC	Municipal Emergency Management Planning Committee
AV	Ambulance Victoria	MERC	Municipal Emergency Response Coordinator
BoM	Bureau of Meteorology	MERO	Municipal Emergency Resource Officer
CEO	Chief Executive Officer	MFSEP	Municipal Flood & Storm Emergency Plan
CERA	Community Emergency Risk Assessment	MFEPC	Municipal Flood Emergency Planning Committee
CFA	Country Fire Authority	MRM	Municipal Recovery Manager
CMA	Catchment Management Authority	PMF	Probable Maximum Flood
DEECA	Department of Energy, Environment and Climate Action	RAC	Regional Agency Commander
DFFH	Department of Families, Fairness and Housing	RCC	Regional Control Centre
DH	Department of Health	RDO	Regional Duty Officer

DJSIR	Department of Jobs, Skills, Industry and Regions	RERC	Regional Emergency Response Coordinator
DTP	Department of Transport and Planning	RERCC	Regional Emergency Response Coordination Centre
EMLO	Emergency Management Liaison Officer	REMP	Regional Emergency Management Plan
EMT	Emergency Management Team	SAC	State Agency Commander
EMV	Emergency Management Victoria	SBO	Special Building Overlay
ERC	Emergency Relief Centre	SCC	State Control Centre
ERV	Emergency Recovery Victoria	SDO	State Duty Officer
FO	Floodway Overlay	SEMP	State Emergency Management Plan
FRV	Fire Rescue Victoria	SEWS	Standard Emergency Warning Signal
IC	Incident Controller	SOP	Standard Operating Procedure
ICC	Incident Control Centre	VicPol	Victoria Police
IEMT	Incident Emergency Management Team	VICSES	Victoria State Emergency Service

Part 1. INTRODUCTION

1.1 Approval and Endorsement

The Rural City of Wangaratta MEMPC is the owner of this Municipal Flood and Storm Emergency Plan (MFSEP), pursuant to Part 6A of the Emergency Management Act 2013 (as amended). If the certificate of assurance is signed and dated, then the Hume REMPC has approved this plan.

In accordance with its roles and responsibilities set out in the State Emergency Management Plan (SEMP), the Victoria State Emergency Service (VICSES) has prepared this plan in collaboration with the Rural City of Wangaratta MFPC.

This MFSEP is a sub plan to the Rural City of Wangaratta Municipal Emergency Management Plan. (MEMP). It is consistent with the SEMP and the Victorian Floodplain Management Strategy (2016).

The plan is also consistent with and subordinate to:

- SEMP Flood Sub-Plan, SEMP Storm sub-plan
- The Hume Region Emergency Management Plan
- The North East (Hume) Region Emergency Response Plan - Flood Sub Plan
- The North East (Hume) Region Emergency Response Plan - Storm Sub Plan

The MEMPC prepared this plan in alignment with the Guidelines for Preparing State, Regional and Municipal Emergency Management Plans, including formal consultation and statement of assurance.

It also takes into account the outcomes of the Community Emergency Risk Assessment (CERA) process undertaken by the Municipal Emergency Management Planning Committee (MEMPC).

This MFSEP is a result of the cooperative efforts of the MFPC and its member agencies.

This Plan requires the approval of the Hume Regional Emergency Management Planning Committee.

This Plan is endorsed by the Rural City of Wangaratta MEMPC as a sub-plan to the MEMP.

The MEMPC has consulted with the following people and organisations about the arrangements contained within this plan:

Rural City of Wangaratta	Department of Families, Fairness and Housing
CFA District 23, CFA Whorouly Brigade, CFA Cheshunt Brigade	VICSES Wangaratta Unit
DEECA (Department of Energy, Environment and Climate Action)	North East Catchment Management Authority
Victoria Police (Municipal Emergency Response Coordinator)	Ambulance Victoria
North East Water	

1.2 Certificate of Assurance

Plan Preparer: The Victoria State Emergency Service prepared this sub-plan on behalf of the Municipal Emergency Management Planning Committee

I certify that the attached sub-plan complies with the requirements of the *Emergency Management Act 2013,* including having regard to any relevant guidelines issued under section 77 of that Act, to the extent outlined in the attached checklist.

The MEMPC last conducted a review of the plan on 24 February 2024.

On behalf of the Municipal Emergency Management Planning Committee: **Steven Tucker** **Chair, Municipal Emergency Management Planning Committee** **28/05/2025**	**On behalf of the Victoria State Emergency Service (VICSES)** **Cameron Rothnie** **Assistant Chief Officer - Unit Support, Emergency Management, Community Engagement, VICSES Eastern Region** **15/02/2025**

1.3 Purpose and scope of this flood/storm emergency plan

The purpose of this MFSEP is to detail the arrangements for managing a flood emergency before, during and after it occurs or potentially occurs within the Rural City of Wangaratta municipality.

As such, the scope of the Plan is to:

- identify the local flood and storm risk.
- support the implementation of mitigation and planning measures to minimise the causes and impacts of flooding.
- detail emergency management arrangements.
- identify linkages with local, regional and state emergency planning arrangements with a specific emphasis on those relevant to flood.

1.4 How to read this plan

This is a sub-plan and therefore should be read in conjunction with the:

- SEMP, SEMP flood Sub-plan and SEMP Storm Sub-plan

- The Hume Region Emergency Management Plan
- Rural City of Wangaratta MEMP

1.4.1 Linkages and hyperlinks

This plan refers to a range of existing resources relating to floods/storms, including documents and websites. This plan does not seek to duplicate the information contained in these resources and instead provides links to where the reader can obtain further information.

For more operational or sensitive information, a log-in may be required, such as for documents saved on the Emergency Management Common Operating Picture (EM-COP), including Joint Standard Operating Procedures (JSOPs).

Documents or resources that are referred to frequently throughout this plan (such as the SEMP) may not hyperlinked in each instance.

All hyperlinks were accurate at time of publication and currency of the linked content remains the responsibility of the host agency.

1.5 Requirements of EMP guidelines

Emergency Management Victoria has published guidelines for preparing emergency management plans including municipal plans. In accordance with section 3.1 (Requirements) this plan has been:

- prepared collaboratively, efficiently and effectively (section 60AA(1))
- is consistent with other existing in force EMPs and where possible not duplicate or conflict with those plans (section 60AC)1
- has adopted an integrated, coordinated and comprehensive approach to emergency management (sections 60AD, 60ADA and 60ADB)
- • contain arrangements for mitigation, response, and recovery plus roles and responsibilities (section 60AE)
- Has been assured, approved and published every three years, or more frequently if required (sections 60AG, 60AH, and 60AI).

1.6 Municipal Flood Planning Committee (MFPC)

Membership of the Rural City of Wangaratta Flood Planning Committee (MFPC) comprises of the following representatives from the following agencies and organisations:

- Chairperson - VICSES Operations Officer Emergency Management
- VICSES (Unit Controller from VICSES Wangaratta Unit)
- Victoria Police (Municipal Emergency Response Coordinator)
- North East Catchment Management Authority
- Department of Families, Fairness and Housing
- Department of Energy, Environment and Climate Action as required
- Water Authorities as required
- Bureau of Meteorology as required

- Local community representatives

1.7 Responsibility for planning, review & maintenance of this plan

To remain effective and to place the community at centre of its planning, the MEMPC must ensure it maintains the MFSEP.

VICSES through the MFPC has responsibility for facilitating the preparation, review, maintenance and distribution of this plan.

The MFPC will meet at least once per year.

The MEMPC will ensure that the MFPC review the plan following:

- a new flood study
- a significant change in flood mitigation measures
- after the occurrence of a significant flood event within the municipality
- three years elapsing after the last review.

1.8 Community consultation in developing or review of the plan

The MEMPC via the MFPC has undertaken community consultation on this plan via the following mechanisms:

- Direct engagement with specific communities and groups including:

Community / Group	Nature of Consultation
Whorouly	- Consultation with local residents - Consultation with local CFA volunteers and community members who have been involved in flood response in the past.
King Valley	- Consultation with local residents - Consultation with local CFA volunteers and community members who have been involved in flood response in the past. - Caravan Park owners / managers
Wangaratta	- Consultation with local residents - Caravan Park owners / managers

Part 2. BEFORE: PREVENTION / PREPAREDNESS ARRANGEMENTS

2.1 Community Awareness for all Types of Flooding and Storms

Upon formal adoption by the MEMPC the community will have access to the details of this MFSEP via:

- The Victora State Emergency Service (VICSES) website
- any Be Flood Ready or Storms - Plan and stay safe engagement initiatives and websites

VICSES with the support of The Rural City of Wangaratta and North East Catchment Management Authority will coordinate targeted community flood engagement programs within the council area.

2.2 Structural flood mitigation measures

Structural flood mitigation measures are any physical construction to reduce or avoid possible impacts of flood hazards, or the application of engineering techniques or technology to achieve flood hazard resistance and resilience in structures or systems[1]. The following is a summary of structural flood mitigation measures that exist within the Council area:

NOTE: The Victorian Levee Guidelines have a requirement of 600mm freeboard from the 1% AEP. RCOW has received funding to undertake remediation works to bring the Wilson Road and Parfitt Road.

At the time of updating this MFSEP, remediation works were being undertaken on the levee systems protecting Wangaratta, with the intent that any deficiencies in freeboard will be remedied. Updates have been made to the levee intel in the below table, and the known deficiencies have been highlighted below for reference. If further works are completed on the levees during the life of this Flood Plan, an administrative update will be made to the plan and communication to relevant stakeholders.

[1] United Nations Office of Disaster Risk Reduction

Flood Mitigation Type	Description	Owner *	Maintenance Responsibility	Protection Level
PUBLIC LEVEES				
Wilson Road Levee	2.17km Earth Levee	DEECA	RCoW	The entirety of the Wilson Rd levee provides protection to the 1% AEP event with 600mm freeboard. Works were undertaken in 2024 to update the levee to ensure it meets standards, spanning from Chandler Street to Wilson Road, including Oxley Flats Road, Weir St, Heach St, Boyd St, Dunphy St, and Thomas St.
Parfitt Road Levee	3.46km Combination of Earthen, Road and Concrete Wall	DEECA	RCoW	The Parfitt road levee consists of two separate sections. The Parfitt 1 (west) levee provides 1% AEP event flood protection with 600mm freeboard. The Parfitt 2 (east) levee also provides 1% AEP event flood protection with 600mm freeboard. Works were undertaken in 2024/2025 to update the levee to ensure it meets standards, spanning from Parfitt Road, Potter St, Great Alpine Road, Kett St, Morgan Road, Wylie Road, and Parfitt Road North.
Sunset Drive Levee	Combined Earthen and Concrete Wall	DEECA	RCoW	The entirety of the Sunset Drive levee provides protection to the 1% AEP event however, no sections achieve 600mm freeboard. Freeboard ranges from 250mm to 450mm. There is a gate valve installed on the stormwater outlet of the Levee, the gate valve can be actuated to stop flow and allow a pump to discharge the area, such that rising levels in the creek don't backflow and inundate adjacent homes.
Merriwa Park Levee	Earth Levee	DEECA	RCoW	The Merriwa Park levee is 300mm to 450mm below the 1% AEP Event flood level, hence to achieve 600mm freedboard it requires 900mm to 1050mm height increase.

Flood Mitigation Type	Description	Owner *	Maintenance Responsibility	Protection Level
Diversion Channel	Diversion Channel 2.8km from the One Mile Creek to the Ovens Rivers alongside the south-eastern side of the Hume Freeway		RCoW	
Markwood Levee	Older earthen levee over various sections along Ovens River from Henley Ridge to Pioneer Bridge. Tea Garden Creek off take in here somewhere.		Query - NECMA	Concern about impact of diverting river flow near Pioneer Bridge.
Fishers Levee	Old unmaintained levee on Ovens River at end of Fisher Lane, East Wangaratta.			
KNOWN PRIVATE LEVEES FOR PROPERTY PROTECTION				
113 Wilson Road	Concrete/earthen wall with drop-in boards at driveways	Property Owner	Property owner	Sandbags, drop boards and plastic sheeting is place at the property.
"Glenloth" – 171 Oxley Flats Road	Concrete barrier with earthen ramp as driveway	Property owner	Property owner	Owner has 25 years on the property with good situational awareness. 12.8m (on the Ovens River gauge at Wangaratta) is the approximate limit of their levee. 1993 flood did not enter the residence.
170 Wilson Road, Wangaratta	Portable inflatable levee provided by Flood mitigation scheme. Levee stored at property in trailer	Property owner	Property owner	Four (4) bladders form the basis of the levee system. Requires 4 people to move the units around. Requires pump to transfer water from billabong (at rear of house) to inflate the bladders. Bulk water supply can also be brought in to inflate bladders.
22 Taylors Lane, Wangaratta	Drop in boards at edge of house. Done under Flood Mitigation Scheme.	Property owner	Property owner	Informed by the owner that the residence does not flood
132 Stamps Lane, North Wangaratta	Concrete block wall. Drop in gates. Done under Flood Mitigation scheme.	Property owner	Property owner	6 inch freeboard around private levee during 1993 flood event.

Flood Mitigation Type	Description	Owner *	Maintenance Responsibility	Protection Level
Ambrosio house – 65 Burrows Street, North Wangaratta	Brick wall at front, earthen levee at sides and rear of residence. Drop-in gates for driveway	Property Owner	Property Owner	First flood event (assuming 1993?) water rose 18 inches from (bottom) of this levee. No breaches detected through timber boards and sandbags that were utilised.
57 Bowser Road, North Wangaratta	Earthen wall, access over wall. Done under Flood Mitigation Scheme.	Property Owner	Property Owner	No evidence of water ever been through this house. *Pers comm* New Owner.
Alan Gibb House – 1100 Carboor Everton Road, Bobinawarrah.	Privately constructed earthen levee to protect house which was inundated in 1993 from Hurdle Creek.	Property Owner	Property Owner	
Private levees for grazing protection				
Frank Griffiths – Griffiths Lane, Laceby	Privately constructed earthen levee in excess of 20 years old. Diverts 15 Mile Creek water. May affect adjoining property	Property Owner	Property Owner	
Geoff Cheshire – O'Keefe Road, Boorhaman	Privately constructed earthen levee on Ovens River.	Property Owner	Property Owner	
Wangaratta Township Retardation Basins				
Various Township Retarding Basins	Retention / Bioretention basins deigned for the collection of surface waters	RCOW	RCOW	Basins deigned for the collection of surface waters off specific residential and industrial estates are located at: Thurles Avenue, Cormorant Way, Bowerbird Way, Liddell Drive, Macquarie Court, Weir Street, Fairway Drive, Wonga Park Drive, Morgan Road, Woodland Grove, Silver Wattle Drive, Pauline Terrace, Salisbury Street, Willow Drive, Trotman Drive / Maple Circuit, and, Murrell Street
Wangaratta Township Flood Pumps				
Various Township Flood pumps	Flood pumps that service flood and/or retention/retardation basin requirements across Wangaratta	RCOW	RCOW	There are 22 pumps across Wangaratta township. These are set to Automatic, with the level at which they commence dictated by the area / location they need to pump. All pumps are tested on a weekly basis.

2.3 Non-structural flood mitigation measures

Non-structural flood mitigation measures[1] are measures not involving physical construction which use knowledge, practice or agreement to reduce disaster risks and impacts, in particular through policies and laws, public awareness raising, training and education. The following are a summary of non-structural flood mitigation measures in the municipality.

2.3.1 Planning controls

The Rural City of Wangaratta has a Planning Scheme in place to evaluate planning applications for all types of development in the municipality. This is undertaken by the council's Statutory Planning Team.

The Planning Ordinance in place ensures that any development on areas prone to flooding are adequately assessed by the Planning Team:

- To identify waterways, major floodpaths, drainage depressions and high hazard areas which have the greatest risk and frequency of being affected by flooding.
- To ensure that any development maintains the free passage and temporary storage of floodwater, minimises flood damage and is compatible with flood hazard, local drainage conditions and the minimisation of soil erosion, sedimentation and silting.
- To reflect any declarations under Division 4 of Part 10 of the Water Act, 1989 if a declaration has been made.
- To protect water quality and waterways as natural resources by managing urban stormwater, protecting water supply catchment areas, and managing saline discharges to minimise the risks to the environmental quality of water and groundwater.
- To ensure that development maintains or improves river and wetland health, waterway protection and flood plain health.

Rural City of Wangaratta has available mapping systems to provide overlays for Floodways and Land Subject to Inundation to efficiently assess areas at risk.

2.3.2 Exercising the plan

The MEMPC is responsible for arranging for the exercising of this plan, which should occur annually. Ideally, the MEMPC will schedule the exercise shortly prior to the highest risk period for flooding.

2.3.3 Flood intelligence

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

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

DEECA maintains the FloodZoom flood intelligence platform. Inquiries regarding FloodZoom access should be directed to accounts@floodzoom.vic.gov.au.

2.3.4 Flood and Storm warning

The SEMP Flood Sub Plan (www.ses.vic.gov.au/em-sector/vicses-emergency-plans) and on the Bureau of Meteorology (BoM) website www.bom.gov.au, detail the arrangements for BoM issued Flood Watch and Flood Warning products.

Details on Warnings issued by VICSES through VicEmergency and VICSES channels are outlined in **Appendix E**.

2.3.5 Local knowledge

Local knowledge is a critical element of planning. The community and other organisations can provide valuable local information about hazards, incidents and how they may evolve. This information is commonly referred to as local knowledge. This plan aims to ensure that planners and responders capture appropriate local knowledge before, during and after incidents.[2]

People with experience of historic flood or storm events that have affected the municipality are a source of information.

Field Observers provide local knowledge to VICSES and the Incident Control Centre regarding local insights and the potential impacts and consequences of an incident and may assist with the dissemination of information to community members.

As an incident escalates from local control to a larger incident management structure, it is essential that local knowledge capability is retained within the overall structure. This should include how local subject matter experts are embedded in to divisional and sector command structures.

[2] VICSES Policy 10.02 Local Knowledge V4.0

Part 3. DURING: RESPONSE / RELIEF ARRANGEMENTS

3.1 Introduction

3.1.1 Activation of Response

VICSES may be notified of flood and storm incidents through several sources, but the most common source is calls received via 132 500 or if the emergency is life threatening, Triple Zero (000). Other sources are via other emergency management agencies and local government. In most cases, these events are of a small scale (a level 1 incident[3]), which local VICSES units manage without significant outside support.

In the case of more significant level 2 (regional level) or level 3 (an incident that has high complexity and may have statewide implications) Flood and storm response arrangements may be activated by the Regional Duty Officer (RDO) VICSES Hume Region or Regional Agency Commander (RAC).

The VICSES Incident Controller (IC)/RDO/RAC will activate agencies as required as documented in the SEMP Flood sub-plan or SEMP Storm sub-plan.

3.1.2 Responsibilities

There are a number of agencies with specific roles that will act in support of VICSES and provide support to the community in the event of a serious flood or storm within the Rural City of Wangaratta. These agencies will be engaged through the IEMT.

The general roles and responsibilities of supporting agencies are as agreed within the: MEMP, SEMP role statement and SEMP Flood sub-plan - and Regional Flood Emergency Plan.

Appendix H lists the roles and capabilities of other agencies when assisting VICSES to respond to storm events.

3.1.3 Municipal Emergency Coordination Centre or equivalent

If established, liaison with the emergency coordination centre will be through the established Division/Sector Command and through Municipal involvement in the IEMT, in particular the Municipal Emergency Response Coordinator (MERC). The VICSES RDO or ICC will liaise with the centre directly if they have not established division or sector command arrangements.

The function, location, establishment and operation of an emergency coordination centre if relevant will be as detailed in the MEMP.

3.1.4 Escalation

Many flood or storm incidents are of local concern and an appropriate response can usually be coordinated using local resources. However, when these resources are exhausted, the State's

[3] For a detailed definition of the levels of incidents, refer to Table 3 Levels of Incidents within the State Emergency Management Plan.

arrangements provide for further resources to be made available, firstly from neighbouring municipalities (on a regional basis) and then on a state-wide basis.

Resourcing and event escalation arrangements are described in the SEMP.

3.2 State emergency management priorities

The State Emergency Management Priorities shall form the basis of incident action planning processes.

3.3 Command control coordination consequences communication and community

Arrangements in this MFSEP must be consistent with the 6 C's detailed in SEMP, the State and Regional Flood Emergency Sub-Plans and the MEMP. For further information, refer to the Emergency management phases in the SEMP and a one page summary on the 6 C's.

Specific details of arrangements for this plan are to be provided in Appendix C.

3.3.1 Control

Sections 5(1)(b) and 5(1)(c) of the *Victoria State Emergency Service Act 2005* detail the authority for VICSES to plan for and respond to storms and floods.

The Role Statement within the SEMP identifies VICSES in its response functions as the Control Agency for flood and storm. It identifies DEECA as the Control Agency responsible for dam safety as well as reticulated water and wastewater (sewerage) service.

All flood and storm response activities within the Rural City of Wangaratta including those arising from a dam failure or retarding basin / levee bank failure incident will therefore be under the control of the appointed Incident Controller, or delegated representative.

3.3.2 Incident Controller (IC)

On the advice of the Bureau of Meteorology (BoM) or other reliable source, that a flood or storm event will occur or is occurring, VICSES as the control agency will appoint an Incident Controller (IC). The IC is typically from VICSES but may be from another agency when resources are constrained. The IC will lead and manage incident-tier response control including:

- controlling the operational elements of the response
- providing operational leadership during the incident at a static location or a dynamic incident, including the tactical resolution.

The IC responsibilities are as defined in the SEMP. While providing support to the IC, support agencies retain command of their own people.

3.3.3 Incident Control Centre (ICC)

As required, the IC will establish an Incident Control Centre (ICC). The ICC is where they manage the incident response command and control functions from. The IC will make the decision to

activate the ICC and when it should commence operations. The ICC may be activated in advance based on the severity of warnings and in accordance with VICSES readiness arrangements:

VICSES readiness and activation levels - flood

VICSES readiness and activation levels – severe weather

Pre-determined ICC locations are available in the MEMP.

Incident Level	Location	ICC Location	Facility owner	Key contact
3	VICSES Hume Regional Office	64 Sydney Road, Benalla	VICSES	Benalla SES ICC (03) 9256 7799 or RAC
3	CFA District 23 Headquarters	1 Ely Street, Wangaratta	CFA	Wangaratta ICC (03) 5720 2300 or CFA duty officer

3.3.4 Divisions and Sectors

To ensure that effective Command and Control arrangements are in place, the IC may establish Divisions and sectors depending upon the complexity of the event and resource capacities.

The location of Divisions and Sectors are chosen based on their suitability for maintaining operations during a flood and may differ from those used in other types of emergencies. The IC may establish Divisions and Sectors at the following locations to assist with the management of flooding within the Municipality:

Division	Sector
Wangaratta DCP – SES Wangaratta LHQ, 36 Handley Street, Wangaratta VIC 3676 03 5722 1900	Wangaratta DCP – SES Wangaratta LHQ, 36 Handley Street, Wangaratta VIC 3676 03 5722 1900

3.3.5 Maintenance of local knowledge and subject matter expertise in Divisions and Sectors

The plan recognises that personnel operating division and sector command points will often be from an agency that is not VICSES (the control agency) and may lack local knowledge associated with the nature of storms or flooding, and what resources are best deployed to certain types of requests for assistance.

To account for this, VICSES personnel should always be included within Division and Sectors to provide local knowledge.

3.3.6 Incident Management Team (IMT)

The Incident Controller will form an Incident Management Team (IMT) to support the IC in managing the incident-tier operational response to the emergency. This includes the functional areas of planning, intelligence, public information, operations, investigation, logistics and finance functions. Where possible, the IMT will be joint-agency, pre-planned and include personnel with relevant local knowledge.

For more detail, refer to the SEMP on IMTs and Incident Management Systems (IMSs).

3.3.7 Incident Emergency Management Team (IEMT)

The IC will establish a multi-agency Incident Emergency Management Team (IEMT) to support the IC in managing the effects and consequences of the flood or storm emergency.

The IEMT consists of key personnel (with appropriate authority) from stakeholder agencies and relevant organisations who need to be informed of strategic issues related to incident control. They can provide the IC with high level strategic guidance and policy advice for consideration in developing incident management strategies.

Organisations, including Rural City of Wangaratta, required within the IEMT will provide an Emergency Management Liaison Officer (EMLO) to the ICC if and as required as well as other staff and / or resources identified as being necessary, within the capacity of the organisation.

For more detail refer to the SEMP for guidance on IEMTs.

3.3.8 On Receipt of a Flood Watch / Severe Weather Warning

SES SOP008 Severe Weather Notification and Activation Process and SES SOP009 Flood Notification and Activation Process outline in detail the actions that VICSES will undertake upon receipt of a Severe Weather Warning or Flood Watch/Flood Warning.

The following are links to the current VICSES readiness:

VICSES readiness and activation levels - flood

VICSES readiness and activation levels – severe weather

Additionally, the VICSES Regional Duty Officer (until an incident controller is appointed) or IC will undertake actions as defined within the flood intelligence cards (**Appendix C**). General considerations by the IC/VICSES RDO will be as follows:

- Review flood intelligence to assess likely flood consequences.
- Monitor weather and flood information using the range of intelligence tools including– www.bom.gov.au and Melbourne Water Rainfall and river levels.
- Assess Command and Control requirements.
- Review local resources and consider needs for further resources regarding personnel, property protection, flood rescue and air support. Keeping in mind geographic extent of warning area and the potential for resource constraints if there may be wide-ranging effects across the region or state.

- Notify and brief appropriate officers. This includes Regional Control Centre (RCC) (if established), State Control Centre (SCC) (if established), Council, other emergency services through the EMT.
- Assess ICC readiness (including staffing of IMT and IEMT) and open if required.
- Ensure flood warnings and community information is prepared and issued to the community where required.
- Flood (Riverine and flash) Warnings are managed by the RDO/RAC.
- Severe Weather/ Thunderstorm warnings are managed by SDO/SAC.
- Develop media and public information management strategy.
- Monitor watercourses and undertake reconnaissance of low-lying areas (consider field observers).
- Ensure flood mitigation works are being checked by owners.
- Develop and issue incident action plan, if required.
- Develop and issue situation report, if required.

3.3.9 On Receipt of the First and Subsequent Flood Warnings

VICSES RDO (until an incident controller is appointed) or IC will undertake actions as defined within the flood intelligence cards **(Appendix C).** The IC/VICSES RDO will have general regard for the following considerations:

- Develop an appreciation of current flood levels and predicted levels. Are floodwaters rising, steady, peaking or falling?
- Review flood intelligence to assess likely flood consequences.

Consider What areas may be at risk of:

- inundation
- isolation
- indirect affects as a consequence of
    - power
    - gas
    - water
    - telephone
    - internet
    - sewerage
    - health
    - transport
    - emergency service infrastructure interruption.

Consider the characteristics of the populations at risk

Determine what the ‘at-risk’ community need to know and do, as the flood develops.

Warn the 'at-risk' community including ensuring that an appropriate warning and community information strategy is implemented including details of:

- the current flood situation
- flood predictions
- what the consequences of predicted levels may be
- public safety advice
- who to contact for further information
- who to contact for emergency assistance

Liaise with relevant asset owners as appropriate (such as water, power utilities, telecommunications)

Implement response strategies as required based upon flood consequence assessment.

Continue to monitor the flood situation – www.bom.gov.au/vic/flood/.

Continue to conduct reconnaissance of low-lying areas.

Liaise with relevant flood mitigation infrastructure managers.

3.4 Community information and warnings including media comms

Guidelines for the distribution of community/public information and warnings are contained in the VICSES Hume flood and storm emergency sub-plans and state flood and storm emergency sub-plans.

Refer to **appendix J** for more details on public information and warnings for the municipality.

The IC, through the Public Information Unit established at the ICC, will manage media communication. If the ICC is not established, the VICSES RDO will manage all media communication. The Rural City of Wangaratta will work with the IC/VICSES RDO to assist with the dissemination of public messaging and/or warnings to ensure that consistent and timely messaging occurs.

3.5 Initial Impact assessment

In accordance with the SEMP and SEMP flood sub-plan (3.6.11 Initial impact assessment), the IC should initiate an initial impact assessment during the first 48 hours of an emergency. It should capture the nature and scale of the flood impact on people, community infrastructure, and the economic, natural, and built environments, in order that emergency relief and early recovery activities can commence. This information may then be used to provide the basis for further needs assessment and recovery planning by Emergency Recovery Victoria (ERV) and recovery agencies.

3.6 Preliminary deployments to flooding

When flooding is expected to be severe enough to cut access to towns, suburbs and/or communities the IC will consult with relevant agencies to ensure that resources are in place if required to provide emergency response. These resources may include but not limited to emergency service personnel, food items and non-food items such as medical supplies, shelter, assembly areas, relief centres.

3.7 Response to flash flooding

Flash flooding can be defined as flooding that occurs within six hours or less of the flood-producing rainfall within the affected catchment. This may result in isolation of individuals and communities as time to warn and respond to flash flooding is limited[4]. The safest place to be in a flash flood is well away from the affected area. Accordingly, pre-event planning for flash floods should commence with an assumption that evacuation is the most effective strategy, provided evacuation can be safely implemented.

Emergency management response to flash flooding should be consistent the SEMP Storm Sub-Plan.

When conducting pre-event planning for flash floods the following steps should be followed, and in the order as given:

- Determine if there are barriers to evacuation by considering warning time, safe routes and resources available.
- If evacuation is possible, then evacuation should be the adopted strategy and it must be supported by a public information capability and a rescue contingency plan.
- Where it is likely people will become trapped by floodwaters due to limited evacuation time or options the IC needs to ensure they provide safety advice to people at risk. This advice should advise people not to attempt to flee by entering floodwater. If people become trapped, it may be safer to seek the highest point within the building and to telephone 000 if they require rescue.
- where this plan has identified buildings that are known to be structurally unsuitable, the plan needs to provide for an earlier evacuation trigger (return to step 1 of this cycle).
- If an earlier evacuation is not possible then the IC must make specific preparations to rescue occupants trapped in structurally unsuitable buildings either pre-emptively or as occupants call for help.
- Contact the Rural City of Wangaratta MERC and MEMO at the earliest opportunity to allow for relief preparation to commence.

Due to the rapid development of flash flooding it will often be difficult to establish relief centres ahead of actually triggering the evacuation. While this is normal practice it should not be used as a reason for not adopting evacuation.

Refer to **Appendix C** for response arrangements for flash flood events.

3.8 Evacuation for all flooding

Where practical, evacuation is the primary strategy for ensuring the safety of at-risk communities. The purpose of evacuation is for people to relocate temporarily from areas at risk of the consequences of flooding, to places of safety. It is essential to assess risks involved in undertaking an evacuation, as evacuation may not always be the most appropriate action. This will ensure that

[4] AFAC Emergency Planning and Response to Protect Life in Flash Flood Events – Guideline v2.0

people are not exposed to more hazardous environments because of their evacuation, for example, travelling through deep, fast-flowing floodwater[5].

Under the SEMP, Victoria Police (VicPol) has the responsibility for evacuation (Evacuation Manager) – in consultation with the control agency and other expert advice. EMV has developed a standardised procedure for evacuation under JSOP J03.12.

The IC decides whether to warn people to evacuate within a specified timeframe or whether it is necessary to advise them to evacuate immediately. The IC must make this decision having regard for the requirements of the JSOP.

Once the IC makes a decision to recommend evacuation, VicPol's Evacuation Manager is responsible for the management of the evacuation process where possible. VICSES and other agencies will assist where practical. VICSES is responsible for the development and communication of evacuation warnings.

VicPol and/or Australian Red Cross may take on the responsibility of registering people affected by a flood emergency including those who have been evacuated.

Refer to **Appendix D** of this Plan and the MEMP for additional local evacuation considerations for the municipality.

Except in limited circumstances, evacuation is not compulsory in Victoria[6]. Recent historic floods that were managed under current legislation and emergency management arrangements, demonstrated that some people will choose not to evacuate. Therefore, this plan must consider arrangements for managing these people in the event they require assistance or rescue.

Considerations include:

- Registering persons who intend not to evacuate.
- Providing additional information that may assist them in making a decision to evacuate.
- Identifying vulnerable people who may be willing to evacuate if assisted.
- IMT's should engage with community leaders, indigenous leaders, disability support organisations and multicultural organisations to support appropriate and effective engagement with these vulnerable groups in the community.

3.9 Flood rescue

Under the SEMP Response table 9 the control agency for rescue from land and water is VicPol, which operates the Rescue Coordination Centre. VICSES is a support agency for search and rescue on land and water evacuations and incidents involving mass casualties.

[5] AUSTRALIAN DISASTER RESILIENCE HANDBOOK COLLECTION Flood Emergency Planning for Disaster Resilience - **First edition 2020**

[6] Powers to compel evacuation rely on the Minister making a declaration of a State of Disaster under section 23(2)(e) of the Emergency Management Act 1986. However, section 23(7) prevents these powers be used to compel a person to evacuate if they have a pecuniary interest in the land or building or goods or valuables on the land or in the building.

VICSES may conduct flood rescues. Appropriately trained and equipped VICSES units or other agencies that have appropriate training, equipment and support may carry out rescues.

Rescue operations may be undertaken where voluntary evacuation is not possible, has failed or is considered too dangerous for an at-risk person or community. An assessment of available flood rescue resources (if not already done prior to the event) should be undertaken prior to the commencement of Rescue operations.

Rescue is considered a high-risk strategy to both rescuers and persons requiring rescue and should not be regarded as a preferred emergency management strategy. Rescuers should always undertake a dynamic risk assessment before attempting to undertake a flood rescue.

Victoria Police Rescue Coordination Centre should be notified of any rescues that occur: (03) 9399 7500. On occasion, VicPol may opt to respond a field capability of its rescue coordination centre to a location near the emergency. It may also work with the Triple Zero Victoria to deploy its dispatch capability to the same location to enhance rescue coordination and dispatch. Details in this plan may assist VicPol and Triple Zero Victoria in undertaking this function in the field or from the primary rescue coordination centre.

The following resources are available within Rural City of Wangaratta to assist with rescue operations:

Resource type	Unit / resource name	Location
Boat	Wangaratta Rescue Boat 574 Achilles SG-140	Wangaratta SES Unit, 36 Handley Street, Wangaratta

Additional resources from nearby regions or cross-boarder in NSW can be sourced via the Hume RDO.

Known high-risk areas/communities (such as low-lying islands) where rescues might be required include:

- **Painters Island Caravan Park, Pinkerton Cres, Wangaratta. (03) 5721 3380**
  - Painters Island caravan park has an Emergency Plan with trigger points for closure and evacuation during floods. Initial Triggers for moving to higher ground occurs at the Minor Flood Level, 11.9m with a secondary trigger to close the park at 12.2m.
- Whorouly Community
- King Valley

3.10 Aircraft management

Aircraft can be used for a variety of purposes during flood operations including evacuation, resupply, reconnaissance, intelligence gathering and emergency travel.

The IC controls the conduct of Air support operations.

The IC may request aircraft support through the State Air Desk located at the SCC. The Air Desk Supervisor will establish priorities.

Suitable airbase facilities are located at:

Airbase name	Type of facility (such as fixed wing/rotary wing capability)	Location
Wangaratta Aerodrome	Fixed wing and rotary capacity. **Runways** 18/36 • 1640m sealed runway • Code 3C classification, • 30m width. • Runway strip width 150m 09/27 • 530m grass runway • Code 1B classification • 18m width • Runway strip width 60m	Brian Higgins Drive, Laceby (7km south of Wangaratta)
NOTE: Access to the aerodrome may be impacted with flooding along 15 Mile Creek from 3.8m. Refer to the Flood Intelligence Card for 15 Mile Creek. An airport is also located at Albury in NSW		

3.11 Resupply

Communities, neighbourhoods or households can become isolated during floods and in some cases, storms. This can be as a consequence of road closures or damage to roads, bridges and causeways. Under such circumstances, the need may arise to resupply isolated communities/properties with essential items.

When predictions/intelligence indicates that communities, neighbourhoods and/or households may become isolated, VICSES will advise businesses and/or households that they should stock up on essential items.

After the impact, VICSES can support isolated communities through assisting with the transport of essential items to isolated communities and assisting with logistics functions.

Resupply operations are to be included as part of the emergency relief arrangements with VICSES working with the relief agencies to service communities that are isolated.

3.12 Essential community infrastructure and property protection

Essential community infrastructure and property such as residences, businesses, roads and utilities, may be affected in the event of a flood.

The Rural City of Wangaratta maintains a small stock of sandbags typically for critical infrastructure protection of Council assets, and back-up supplies are available through the VICSES Regional Headquarters and the local VICSES Wangaratta Unit. The IC will determine the priorities related the use of sandbags, which will be consistent with the strategic priorities.

The VICSES Operations Management Manual sets out the principles for sandbag use and allocation to the community. These principles do not apply to the use of sandbags by VICSES to construct and/or alter a levee. Refer to Sandbag filling and collection point guide and SOP036 Construction, Removal or Altering of Levee and Removal of Debris for further detail.

If VICSES sandbags are becoming limited in supply, then priority will be given to protection of essential community infrastructure. Other high priorities may include for example the protection of historical buildings.

Property may be protected by:

- Sandbagging to minimise entry of water into buildings.
- Encouraging businesses and households to lift or move contents.
- Construction of temporary levees in consultation with the CMA, LGA and VicPol and within appropriate approval frameworks.

The IC will ensure that owners of essential community infrastructure are kept advised of the flood situation. Essential community infrastructure providers must keep the IC informed of their status and ongoing ability to provide services.

Contact your local VICSES representative for the most current sandbag guidelines or download it from IMT Toolbox in EMCOP-Operations.

Refer to **Appendix C** for further specific details of essential infrastructure requiring protection and location of sandbag collection point(s).

3.13 Disruption to services

Disruption to services other than essential community infrastructure and property can occur in flood events. Refer to **Appendix C** for specific details of likely disruption to services and proposed arrangements to respond to service disruptions in the Rural City of Wangaratta.

3.14 Road closures

Rural City of Wangaratta and Department of Transport and Planning (DTP/VicRoads) will carry out their formal functions of road closures including observation and placement of warning signs, road-blocks to its designated local and regional roads, bridges, walking/bike/shared trails. Rural City of Wangaratta staff should also liaise with and advise DTP/VicRoads as to the need or advisability of erecting warning signs and/or of closing roads and bridges under its jurisdiction. DTP/VicRoads are responsible for designated main roads and highways and councils are responsible for the designated local and regional road network.

DTP/VicRoads and Rural City of Wangaratta will provide community information direct to the public regarding road closures. Information will be updated on the VIC Traffic website: https://traffic.vicroads.vic.gov.au/

Refer to **Appendix C** for specific details of potential road closures.

3.15 Dam spilling/ failure

The Department of Energy, Environment and Climate Action (DEECA) is the control agency for dam safety incidents. This includes breach, failure or potential breach/failure of a dam. However, VICSES is the control agency for any resultant flooding.

DEECA has developed dam safety emergency plans for municipalities where it is applicable.

Major dams with potential to cause structural and community damage within the municipality are described in **Appendix A**.

3.16 Wastewater related public health issues and critical sewerage assets

Inundation of critical sewerage assets including septic tanks and sewerage pump stations may result in water quality problems within the municipality. Where this is likely to occur or has occurred, the responsible agency for the critical sewerage asset should undertake the following:

- Advise VICSES of the security of critical sewerage assets to assist preparedness and response activities in the event of flood.
- Maintain or improve the security of critical sewerage assets.
- Check and correct where possible the operation of critical sewerage assets in times of flood.
- Advise the ICC in the event of inundation of critical sewerage assets.

It is the responsibility of the Rural City of Wangaratta to inspect and report to the MEMO and the ICC on any water quality issues relating to flooding.

3.17 Access to technical specialists

VICSES manages contracts with private technical specialists who can provide technical assistance in the event of flood operations or geotechnical expertise. Refer to VICSES SOP061 for the procedure to engage these specialists.

3.18 Relief

Relief is the provision of assistance to meet the essential needs of individuals, families and communities during and in the immediate aftermath of an emergency.

As per the role statement for municipal councils within the SEMP, municipal councils are responsible for municipal relief coordination.

3.19 Activation of emergency relief

The IC is responsible for activating relief arrangements through the Municipal Recovery Manager (MRM). The decision to recommend the opening of an emergency relief centre sits with the IC.

The range and type of emergency relief services to be provided in response to a flood event will be dependent upon the size, impact, and scale of the flood or storm.

Refer to the SEMP Roles and Responsibilities - Relief for more detail of services that may be provided and the responsible coordinating agencies.

Suitable relief facilities identified for use during floods are detailed in **Appendix C** and/or the MEMP.

Details of the relief arrangements are available in the MEMP.

3.20 Animal welfare

Matters relating to the welfare of livestock and companion animals (including feeding and rescue) are to be referred to Department of Energy, Environment and Climate Action (DEECA) - Agriculture Victoria.

Requests for emergency supply and/or delivery of fodder to stranded livestock or for livestock rescue are passed to DEECA - Agriculture Victoria.

Matters relating to the welfare of wildlife are also to be referred to DEECA who has developed the Victorian Emergency Animal Welfare Plan.

Refer to **Appendix C** for animal shelter compound locations.

Part 4. AFTER: EMERGENCY RELIEF AND RECOVERY ARRANGEMENTS

4.1 General

As per the role statement for municipal councils within the SEMP, municipal councils are responsible for coordinating local level recovery activities. They are also the lead agency to coordinate post emergency needs assessment to determine long term recovery needs (Post Emergency Needs Assessment).

Arrangements for recovery from a flood and/or storm event within the Rural City of Wangaratta is detailed in the MEMP Part 6.

4.2 Transition from response to recovery

The SEMP sets out the transition to recovery arrangements. During the response phase, the IC will ensure they develop a plan for transition from response to recovery. The IC at the municipal tier should take a lead role in facilitating transition to recovery, working with the MRM, as it marks the end of the response phase which the Controller leads and manages.

4.3 After action review – Lessons management

Lessons management is the critical process of learning from how we worked before and during an event, to improve the system for next time.

Depending on the size and scale of the flood event, VICSES will normally coordinate a debrief or after action review of flood operations as soon as practical following an event. Under the VicPol SEMP role statement, it is the responsibility of the Municipal Emergency Response Coordinator (MERC) to ensure that this occurs.

When the flood is being managed as a level 3 event, it may be that Emergency Management Victoria in consultation with VICSES assumes responsibility for debriefing.

All agencies involved in the flood incident should be represented at the debrief or after action review.

APPENDIX A - FLOOD THREATS FOR RURAL CITY OF WANGARATTA

This Appendix is to provide a broad overview of flood risk within the Municipality. Detailed Flood Risk Information for Individual Communities is be detailed in Appendix C. This section contains information on Flood Class Levels, river gauge information and community-based flood emergency plans and intelligence cards for streams and communities within the Rural City of Wangaratta.

- C1 – River Systems Overview (Ovens, King Rivers & 15 Mile Creek)
- C2 – Flood Intelligence Card – Ovens River at Rocky Point - Use for Whorouly
- C3 – Flood Intelligence Card – King River at Cheshunt, Docker Rd & Hurdle Creek
- C4 – Flood intelligence Card – Ovens River at Wangaratta
- C5 – Flood intelligence Card – Fifteen Mile Creek (Including One & Three Mile Creeks

Summary of Communities

The below table provides a summary of all the communities / townships in Rural City of Wangaratta municipality along with a brief description and level of flood risk (based on the *Regional Risk Assessment* within the *North East Regional Floodplain Management Strategy 2018 – 2028*.

Community / Township	Description	Flood Risk
King River Catchment		
Cheshunt	Cheshunt is located adjacent the King River approximately 18 km downstream from Lake William Hovell. Cheshunt is the most upstream township on the King River. The majority of the township is located to the east of the King River floodplain, but breakout flows from Stony Creek (an anabranch of the King River) and adjacent tributary can result in shallow flooding. There are a number of rural dwellings in the King River floodplain both upstream and downstream of Cheshunt which are potentially subject to isolation due to flooding of the King Valley Road both upstream and downstream of Whitfield. September 1998 is the largest King River flood on record at Cheshunt.	Medium
Whitfield	Whitfield is located in the Upper King River valley approximately 4 km downstream of Cheshunt. The township is located on the western side of the King River floodplain, and flood impact on the township area is limited, however, the Gentle Annie Caravan Park on the King River approximately 1 km downstream of Whitfield is flood prone. Whitfield is isolated by flooding over the Wangaratta-Whitfield Road at Edi (and further downstream) but likely remains accessible via the Mansfield-Whitfield Road. Rural floodplain properties are prone to flooding. September 1998 is the largest King River flood on record in this area.	Low

Moyhu	Moyhu is located in the mid-King River valley 27 km downstream of Whitfield. The township is located to the west of the King River floodplain but is exposed to flooding from Boggy Creek (a King River tributary). The largest flood on record for Boggy Creek occurred in September 1998. The largest flood on the King River upstream of Moyhu occurred in September 1998 while downstream of Moyhu the largest flood was October 1993 as a result of record flooding in the King River tributaries (Boggy, Black Range, Meadow and Hurdle Creeks).	Medium
Oxley	Oxley is located adjacent the King River approximately 23 km downstream of Moyhu. The floodplain margin is well defined around the Snow Road with no impacts on the township area, but between Macartney Street and Gehrigs Lane, shallow flooding can occur from the King River and a local watercourse. Oxley is also bordered to the north by Horseshoe Creek, but there is no significant impact on existing development. Shallow flooding as a result of breakouts from Factory Creek can impact the area around the Oxley-Greta West Road and Wangaratta-Whitfield Road. The largest flooding in this area occurred in October 1993.	Medim
Milawa	Milawa is located in proximity to the Ovens River floodplain downstream of Markwood but is not exposed to Ovens River flooding. The generally flat terrain and shallow watercourses (King River tributaries – Horseshoe Creek, Woolshed Creek) result in broad areas of rural flooding, rural isolation and localised drainage issues within Milawa. The most recent flooding in this area occurred in August 2016.	Low
Fifteen Mile Creek, Reedy Creek, Diddah Diddah Creek		
Greta	The three small settlements of Greta, Greta South and Greta West are located in the upper reaches of the Fifteen Mile Creek system. The largest flood on record (October 1993) is not known to have resulted in flooding of properties in the area. Below Greta West, the floodplain width increases significantly resulting in broad rural inundation and flooding of numerous roads.	Low
Eldorado	Eldorado is located adjacent Reedy Creek. There is no available flood study to define the flood risk, however, there have been no known flood impacts in town in past events. Powerhouse Lane and Carraragarmungee Estate Road west of town are subject to flooding, but the Wangaratta-Eldorado Road is flood free.	Low
Springhurst	Limited known exposure to flood impact from Diddah Diddah Creek but some history of local flash flooding. Surrounding areas (Springhurst and Boorhaman Plains) have poor drainage and experience dispersed rural inundation as a result of local rainfall (i.e. March 2012).	Low

Ovens River Catchment		
Whorouly	Whorouly is located within the floodplain of the Ovens River approx. 15 km downstream of Myrtleford. The township area is subject to flooding from the combined effects of the Ovens River to the north and Whorouly Creek to the south. The main housing development is on relatively higher ground, but much of this land is subject to inundation in the 1% AEP event (or less). The town is subject to isolation during flood events. Surrounding rural properties (including dwellings) are subject to significant flooding. The October 1993 flood is the largest on record in this area.	High
Markwood	The Markwood district (no urban area), centred to the south of the Ovens River floodplain around the Markwood-Everton Road and Carboor-Everton Road, comprises rural dwellings and agricultural land. The area is subject to flooding from the Ovens River and the Tea Garden Creek system. A measure of flood protection is provided by the Markwood levee (upstream of the Markwood-Everton Road) which is designed to provide flood protection up to approximately 5% AEP, but in larger events, flooding does occur in this area. The October 1993 flood is the largest on record in this area.	Medium
Everton	Everton is located to the east of the Ovens River floodplain and is not impacted by flooding from the Ovens River. Local flood impacts arise from Horseshoe Creek. The Great Alpine Road is subject to flooding west of Everton (Mackay Lane).	Low
Tarrawingee	Tarrawingee is located to the north of the Ovens River floodplain and is not impacted by flooding from the Ovens River. Local flood impacts from Hodgson Creek are understood to have resulted in flooding over the Great Alpine Road in a local flood event in 2005. The Great Alpine Road is frequently closed west of Tarrawingee (at Yellow Creek), but access between Wangaratta and Tarrawingee remains via Detour Road.	Low
Wangaratta	Wangaratta is located at the confluence of the Ovens River, the King River, the Fifteen Mile Creek system (One Mile Creek and Three Mile Creek) and Reedy Creek. Flooding from the Ovens River and King River occurs across a wide flood plain to the North East of Wangaratta. In October 1993 (the largest flood on record) approximately 200 properties were adversely flood affected within the Wangaratta Township and surrounding rural environment. Access into Wangaratta can be cut on the north-bound and south-bound entrances from the Hume Freeway, however, access from the Hume Freeway via Greta Road is not normally impacted. The most significant flooding has occurred in 1974, 1993, 1998, 2010 and 2012 with lesser events in 1956, 1978 and 1981. The most flood prone residential areas within Wangaratta are encircled by ring levees constructed as part the 1981 flood mitigation scheme, subsequently modified after the 1993 floods.	High

	The One Mile Creek diversion channel diverts flows to the King River upstream of Wangaratta, reducing urban impacts on One Mile Creek and Three Mile Creek. The flood impacts in Wangaratta have been investigated in a recent flood study. Localised stormwater flooding does occur on a frequent basis and does appear to be an increasing phenomenon.	
Peechelba	Peechelba is located to the west of the Ovens River floodplain approximately 35 km downstream of Wangaratta. The township area is elevated with all dwellings being located a minimum of 2 m above the flood level in the largest flood on record (October 1993). The adjacent reaches of the Ovens River between Killawarra and Bundalong predominantly lie within the Warby-Ovens National Park and dwellings on adjacent properties are on elevated land.	Low

General

Riverine flooding

Within the municipality, large severe floods generally occur as a result of a moist warm airflow from northern Australia bringing moderate to heavy rainfall over a period of 12 hours or more following a prolonged period of general rainfall. The period of general rainfall "wets up" the catchments and (partially) fills both the on-stream dams and the natural floodplain storage. These combine to increase the runoff generated during the subsequent period of heavy rainfall.

Large but less severe floods result from sequences of cold fronts during winter and spring that progressively wet up the catchments and fill the on-stream dams and the natural floodplain storage. Prolonged moderate to heavy rain leads to major flooding.

Flooding in the Fifteen Mile, One Mile and/or Three Mile Creeks can happen separately to flood in the Ovens and/or King Rivers. This means different parts of Wangaratta can be at risk depending on where floodwater is coming from.

The Wangaratta rural and urban environments are a complex flood plain with the Ovens, King and 15 Mile Creek systems flowing through the Municipality joining in the Wangaratta urban area and continuing on as the Ovens River to join the Murray River at Bundalong.

OVENS RIVER, KING RIVER & FIFTEEN MILE CREEK

The Ovens River is one of the few remaining Victorian rivers that is not regulated by a dam. This means unregulated, uncontrolled flows from the upper catchments to the Murray River. The main storages in the basin are Lake Buffalo on the Buffalo River and Lake William Hovell on the King River.

The Ovens River Basin covers an area of 7,985 km^2 (Source. G-MW). The area extends from the Great Dividing Range in the south to the Murray River in the north and is bordered by the Broken River Basin in the west and the Kiewa River Basin in the east. The topography of the Basin is diverse ranging from rugged alpine peaks and plateaux around the Great Dividing Range, broad alluvial valleys around Myrtleford-Whorouly, to wide riverine plains near the Murray River.

The Ovens River flows in a north-westerly direction from the high country near Mt Feathertop and Mt Hotham. The Ovens River and its upstream tributaries - the Buckland, Catherine, Dandongadale, Buffalo and Rose rivers - have their headwaters in the Great Dividing Range, in the section extending between Mt Cobbler and Mt Hotham. In the south-west corner of the Basin, the Ovens River passes through the townships of Harrietville, Bright, Porepunkah and Myrtleford to Wangaratta, then north-west to the Murray River near Bundalong.

The largest tributary, the King River, is situated south-west of the Ovens River and has its headwaters on the Great Divide near Mt Howitt. The Ovens and the King Rivers meet on the riverine plain at Wangaratta just east of the Bridge near APEX Park.

In the central portion of the Basin, wide valleys have developed along the Ovens and King Rivers, downstream of Wangaratta. The Ovens River takes in the water of Reedy Creek and Fifteen Mile Creeks (which includes One and Three Mile Creeks, that pass through the Urban centre of Wangaratta) and meanders northward across the riverine flood plain to flow into Lake Mulwala on the Murray River

Flash flooding and overland flows

Short Duration, high intensity rainfall (usually associated with thunderstorms) can also cause localised flooding within the municipality, along overland flow paths when the local urban drainage system surcharges. Such events, which are mainly confined to the summer months, do not generally create widespread flooding since they only last for a short time and affect limited areas. Flooding from these storms occurs with little warning and localised damage can be severe.

High intensity rainfall such as associated with thunderstorms giving average rainfall rates of more than 20mm/hour for an hour or more is likely to lead to flash flooding and / or overland flows, across the urbanised parts of the municipality.

Blocked or capacity impaired stormwater drains can also lead to overland flows and associated flooding: the drain surcharges and excess water flows above ground.

The upper catchment of the King River and 15 Mile Creek is prone to flash flooding events with rapid stream rises closing roads, damaging/washing away bridges and isolating communities.

Description of major waterways and drains

OVENS RIVER

The Ovens River catchment is steep topography down to Rocky Point at Whorouly East. The two main tributaries are the Buckland River and the Buffalo River. Both tributaries have steep topography to their confluence with the Ovens. This all occurs in the Alpine Shire and explains the often rapid and severe flooding that occurs in that municipality in a major event, compared to the slower but more widespread flooding that affects the gradually flatter and wider floodplain between Rocky Point and Wangaratta. The steep topography in the Alpine Shire causes a rapid stream flow that challenges the ability to provide early flood warnings for that municipality based on stream flows.

From Rocky Point to Wangaratta the Ovens floodplain follows a historically defined course several kilometres wide taking in the Whorouly, Markwood, Tarrawingee and Oxley Flats areas. This is contained initially within high country at Henley Ridge and the Everton/Murmungee divide and

further west between high ground around Milawa and high ground north of the Great Alpine Road. The Tea Garden Creek defines the southern boundary of much of this flood plain from Everton to Oxley Flats and smaller catchments such as Horseshoe Creek cut through the high ground south and west of Milawa. Hodgsons Creek rises in the gold bearing country south west of Beechworth and runs westerly through Black Springs and Everton Upper to Tarrawingee where it joins the Ovens River. Reedy Creek rises in the high country around Woorragee and runs westerly through Woolshed and Eldorado and crosses the Hume Freeway north of Wangaratta from where it defines the northern edge of the Ovens River floodplain down to Boorhaman.

The combination of King River and Ovens River waters during flood times has a profound effect on properties east and north of Wangaratta on the floodplain near the confluence of the two rivers (east of the Bridge near APEX Park). This resulted in the construction of two major flood levees, the Parfitt Road Levee and the Wilson Road Levee in the early 1980's as part of the Wangaratta Flood Mitigation Scheme. The Wilson Road Levee was overtopped during the record October 1993 flood and has since been raised to provide increased protection (1% AEP) for the properties within. The Parfitt Road Levee also received substantial modification along the concrete wall section behind the Wangaratta Caravan and Tourist Park, along with raising protection (levees) for several isolated dwellings outside the two levees.

KING RIVER

The King River rises near Mt Howitt on the Great Divide and flows north through the dam at Lake William Hovell and the townships of Cheshunt, Whitfield, Moyhu and Oxley to form a confluence with the Ovens River at Wangaratta. The Upper King River catchment is steep topography down to Moyhu and has a very rapid stream flow that reduces the ability to provide an early flood warning for those areas based on stream flows alone.

Historically, severe flooding has occurred in 1851, 1870, 1917, 1974, 1981, 1993, 1998, 2010 and 2016. The 1917 event became a tragedy when six people lost their lives on 8th June after a dray overturned near the junction with the Ovens River in Wangaratta. The October 1993 flood caused record flows and severe damage along the mid and lower catchments of the King River and its main tributaries including the Black Range, Meadow, Hurdle and Boggy Creeks.

In September 1998, intense rainfall was experienced in the upper catchments of the Ovens, King and Kiewa Rivers. The King River catchment responded with record flows being measured in the upper catchment. In Cheshunt, flood levels were 300 mm above the October 1993 levels, however north of Docker Road flood levels for this event were below the levels experienced in October 1993. It is believed the relatively dry catchment prior to the 1998 event contributed to this anomaly. Around Cheshunt, Whitfield and Moyhu extensive rural inundation and damage occurred. Residents of the Gentle Annie Caravan Park near Whitfield were relocated. Severe damage occurred through gravel deposits on adjoining floodplains, particularly in the upper reaches, that required removal to ensure minimal damage to the farmland abutting the river network. Major breakaways in the river channel required emergency works at several locations and where necessary, bridge repair works, and road reinstatement works were undertaken to ensure the road network continued to function.

The 1998 flood event has been recognised as having an equivalent average return interval (ARI) of approximately 35 years while the 1993 and 1974 events were equivalent to an ARI of 120 years and ARI of 70 years respectively (Source: NECMA). Since then floods have occurred in September and December of 2010 and as recently as March 2012. The major flood of early September 2010

again caused considerable rural damage with severe bank erosion and the need to undertake costly modifications to the approach abutments at the Gentle Annie bridge near Whitfield. A comprehensive flood mapping study of the King River tributaries was undertaken by the North East Catchment Management Authority and Rural City of Wangaratta with the final report released in December 2004 - (Reference: 25.7 King River Tributaries Flood Mapping Study.pdf)

FIFTEEN MILE CREEK (ONE MILE CREEK AND THREE MILE CREEK)

The Fifteen Mile Creek rises near Wattle Range Road a few kilometers east of Tolmie and flows north through Greta South to Wangaratta. The upper Fifteen Mile Creek catchment is steep topography down to Greta South and has a very rapid stream flow that once again reduces the ability to provide early flood warning based on stream flows in this area. Near Greta West the Fifteen Mile Creek divides into the One Mile Creek system and the Three Mile Creek system.

The One Mile Creek is further divided into two components, the main one being a theoretically throttled flow into the Wangaratta urban area with excess being conveyed by the diversion channel beside the Hume Freeway and into the King River. The Three Mile Creek is an uncontrolled stream that skirts the west side of Wangaratta where it rejoins with One Mile Creek near Yarrawonga Road, and then flows into the Ovens River several kilometers downstream of the city. Most of the urban area flooding that occurs in Wangaratta is along these two streams including the parks and walking tracks that flank both of these waterways.

The May 1974 flood caused above floor flooding of houses along the One Mile Creek between Cribbes Road and Yarrawonga Road, houses were flooded along Three Mile Creek. It should be noted that flooding of this magnitude is unlikely in the future due to structural mitigation works undertaken since this event. In the period between then and the October 1993 flood, substantial residential development had occurred along the Three Mile Creek and this, combined with completed construction of the Freeway Diversion Channel just prior to the 1993 event, resulted in a reduction of houses flooded along the One Mile Creek compared to the Three Mile Creek. The Diversion Channel was estimated to have diverted some 60% of the water that would normally have flowed down the One Mile Creek, into the King River. This resulted in lower levels in the One Mile Creek down to about Rowan Street where the backup effect of water in the Three Mile Creek started to increase flood levels. In 1993 houses were flooded above floor level on the One Mile Creek and houses similarly affected on the Three Mile Creek. Lowering of the sill into the Diversion channel has been undertaken to allow floodwater to divert much earlier in an event and now provides further protection for residential properties along the One Mile Creek. A comprehensive study of flooding in the Fifteen Mile Creek catchment was undertaken by the North East Catchment Management Authority with the final report released in July 2006 - (Reference: 14.51 Fifteen Mile Creek Floodplain Management Plan.pdf)

NON RIVERINE FLOODING (Overland)

Localised flooding does occur on a frequent basis, and appears to be an increasing phenomenon, such as experienced in the 2010 and 2018 flood event, north of Wangaratta in an area roughly bounded by Boralma, Bowser and Boorhaman. The catchment for this area is in the Springhurst hills east of the Hume Freeway and whilst there is no major stream in the area the innumerable smaller valleys and relatively cleared country generate considerable runoff. Once west of the Melbourne - Sydney Railway track the extremely flat riverine plains slow the progression of runoff causing a number of small drains and depressions to rapidly fill causing overland floodwater to encroach onto properties and houses that very rarely see flooding.

Heavy Rainfall of 268mm in approx. 6 hours was recorded in Eldorado which created a flash flood event and subsequent over land flood to the Hume Freeway North of Wangaratta. Several rescues from vehicles were conducted and some over floor flooding of approx. 40 properties and damage to 4 bridges occurred. Areas in Byawatha, Londrigan, Eldorado and Tarrawingee experienced significant overland flooding with agricultural losses to 440km of fences, 5000 tonnes of hay lost and 37,000ha of grazing land impacted. Hodgsons Creek at Tarrawingee flooded impacting access and egress and the closure of the Great Alpine Road at the Tarrawingee bridge. Estimated to be a 1/2000year rainfall event.

The 2010 and 2012 events saw similar localised flooding from the eastern face of the Warby Ranges, which impacted on the rapidly developing semi-rural properties as far south as Hamilton Park near Glenrowan, to the more intensely developed areas near Waldara. It is only since this development has occurred and storm-water runoff has been concentrated into defined drainage systems that the potential for flooding of adjacent properties has become apparent.

Although Flood Mitigation schemes have been developed, it is acknowledged works in place prior to 1993 were not entirely adequate. Further measures have been taken but cannot be assumed to be a complete answer.

Dam spilling or failure

Flooding resulting from spilling or failure of the following dams is likely to cause significant structural and community damage.

DEECA is the control agency for dam safety incidents (such as breach, failure or potential breach/failure of a dam). VICSES is however the control agency for any resultant flooding.

Within the municipality there are the following dams:

Location	Owner	Dam Height	Dam Capacity	Comments
Lake Buffalo	Goulburn-Murray Water	33 metres (Embankment)	24,000ML	Lake Buffalo is located on the Buffalo River, 24 km south of Myrtleford in north-eastern Victoria. It lies at the foot of the western slope of Mount Buffalo National Park. Construction was completed in 1965 with a 600m long earth and rockfill embankment, with a gated primary spillway. The water stored in Lake Buffalo is used to supplement flows in the Ovens River for irrigation and urban water supply. The dam initially supplied a thriving tobacco industry in the valley, however this has now changed to numerous vineyards.
Lake William Hovell	Goulburn-Murray Water	35 metres (Embankment)	13,690ML	Lake William Hovell is located on the King River 18km south of Cheshunt in north-eastern Victoria. Construction of the reservoir was completed in 1973.

				Lake William Hovell supplies water for irrigated crops, vineyards and grazing properties along the King River from Cheshunt to Wangaratta. It also generates a small amount of hydroelectricity. The 'flip bucket' spillway is a special feature of the storage. When the storage has filled and during floods, overflow water is directed into the King River as a spectacular spray

The following supporting documentation is available through Goulburn Murray Water Dam Safety Manager:

- Lake Buffalo Dam Safety Emergency Plan Document DM3374318 – April 2012*
- Lake William Hovell Dam Safety Emergency Plan Document DM3304269 – May 2012*

Emergency contact details are available in the RCOW MEMP.

*these documents are only released by Goulburn Murray Water in hard copy and are tightly controlled. A hard copy of each plan is available at the VICSES Hume Regional Office in Benalla

Historic Floods

Year	Waterway or Drain	Description
1917	Ovens & King Rivers	Significant Ovens & King River flood with 6 lives lost
1974	One & 3 Mile Creek's (Wangaratta Urban waterway)	The May 1974 flood caused above floor flooding of houses along the One Mile Creek between Cribbes Road and Yarrawonga Road, houses were flooded along Three Mile Creek. The town levees and diversion channel were constructed after this flood.
1993	King & Ovens River, 15 Mile Creek and all other waterways	Wangaratta became an island as roads were closed in all directions. Extensive flooding across many areas of Wangaratta damaging houses, businesses, caravan parks, farms, roads, bridges, water and sewage systems, equipment, fences and livestock. Over 180 homes, businesses and public buildings were flooded or cut off by floodwater. The Wilson Road levee was overtopped and some houses within the levee were flooded. Record flows and severe damage along the mid and lower catchments of the King River. Gentle Annie Bridge washed away, significant erosion along the river. Roads, bridges, water treatment and sewage plants, crops, pumps and 800 kilometres of fencing were damaged or destroyed.

		Houses were flooded above floor level on the One Mile Creek and houses similarly affected on the Three Mile Creek. 53 homes flooded along One Mile Creek
1998	King River	In September, intense rainfall was experienced with record flows being measured in the upper catchment. In Cheshunt, flood levels were 300 mm above the October 1993 levels
Sept & Dec 2010	Ovens River	After over 300 mm of rain added to by a significant (2m depth) of snow melt, flooding during September 2010 in Apex Park was over the iconic 'Yogi Bear' where the Ovens River reached 12.77m. The 2010 flood caused significant riverbank erosion with several areas advised to evacuate The December even reached 12.76m at Wangaratta. On 15 Mile creek the Sept 2010 level peaked at 6.08m, above the major level. Dec 2010 peaked at 5.96m Just below the Major level.
March 2012	RCOW Municipality	Ovens River at Wangaratta Peak level 12.48m. Over 300 millimetres of rain caused flash flooding across the Warby Ranges, Peechelba, Springhurst and Boorhaman damaging many roads and bridges.
Oct 2016	Ovens, King & 15 Mile Creek	Ovens River peaked at 12.78m. 15 Mile Creek at Greta South - Flood Peaked at 3.98m
Dec 2018	Flash Flooding in North Wangaratta, Eldorado, Londrigan	Heavy Rainfall of 268mm in approx. 6 hours was recorded in Eldorado which created a flash flood event and subsequent over land flood to the Hume Freeway North of Wangaratta. Several rescues from vehicles were conducted and some over floor flooding of approx. 40 properties and damage to 4 bridges occurred. Areas in Byawatha, Londrigan, Eldorado and Tarrawingee experienced significant overland flooding with agricultural losses to 440km of fences, 5000 tonnes of hay lost and 37,000ha of grazing land impacted. Hodgsons Creek at Tarrawingee flooded impacting access and egress and the closure of the Great Alpine Road at the Tarrawingee bridge. Estimated to be a 1/2000year rainfall event.
Nov 2022	Flash Flooding Hodgsons Creek	Heavy rainfall estimated 40-50mm per hour caused flooding along Hodgsons creek. Water over the road at Tarrawingee on the Great Alpine Road; Beechworth-Wangaratta road inundated and water over one lane of the Hume Highway.
Oct 2022	Widespread riverine flooding across Victoria, including the Ovens River and tributaries	Throughout 2022, eastern Australia experienced repeated episodes of heavy rainfall and widespread flooding due to several climate drivers . La Niña was present during the summer of 2021–22, weakened in autumn, but reemerged in early spring and lasted until the end of 2022. A negative Indian Ocean Dipole developed in winter and persisted until spring. Additionally, a positive phase of the Southern Annular Mode dominated from mid-autumn onwards. As a result of these factors, water storages across the country were high for most of 2022.

		The Ovens River at Wangaratta peaked at 12.78m.
Oct 2023	Ovens River	Widespread rainfall resulted in flooding across the North east, including a peak on the Ovens River at Wangaratta of 12.61m

APPENDIX B - TYPICAL FLOOD PEAK TRAVEL TIMES

In using the information contained in this appendix, consideration needs to be given to the time of travel of the flood peak. A flood on a 'dry' waterway will generally travel more slowly than a flood on a 'wet' waterway (for example, the first flood after a dry period will travel more slowly than the second flood in a series of floods). Therefore, recent flood history, soil moisture and forecast weather conditions all need to be considered when using the following information to direct flood response activities.

Note that flooding will start some time ahead of the time indicated by the following travel times – these are the time between the flood peaks at respective sites.

Typical travel times have been collated from recorded historical events.

Typical travel times

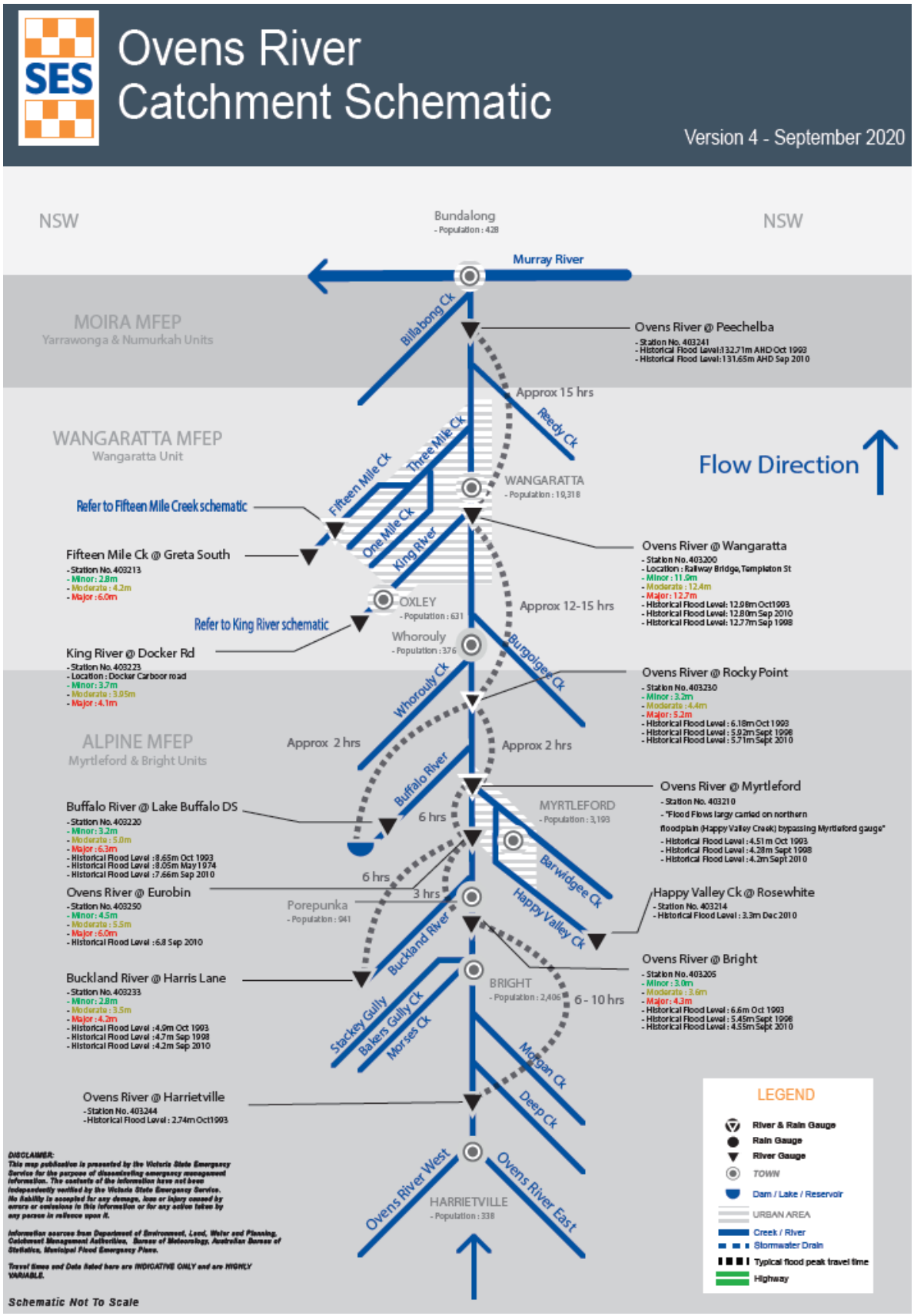
Location from	Location to	Typical travel time	Comments
Ovens River Catchment			
Alpine Shire Council			
Bright	Myrtleford	Around 8:15 hours	Major flooding(Ovens River Catchment Floods October 1993 vol 3)
Bright	Eurobin	7.5 – 12.5 Hours Oct 2000 (7.5 Hrs) Sept 2010 (12.5 Hrs)	Ovens River Intelligence Report 2012
Harris Lane (Buckland River)	Myrtleford	Around 8:15 hours	Major flooding (Ovens River Catchment Floods October 1993 vol 3)
Myrtleford	Rocky Point	Around 1:13 hours	Major flooding (Ovens River Catchment Floods October 1993 vol 3)
Lake Buffalo	Rocky Point	Around 6:30 hours	Major flooding (Ovens River Catchment Floods October 1993 vol 3)
Rural City of Wangaratta			
Rocky Point	Wangaratta	Around 12:45 hours	Major flooding (Ovens River Catchment Floods October 1993 vol 3)
Wangaratta	Peechelba E	Around 12:30 hours	Major flooding (Ovens River Catchment Floods October 1993 vol 3)

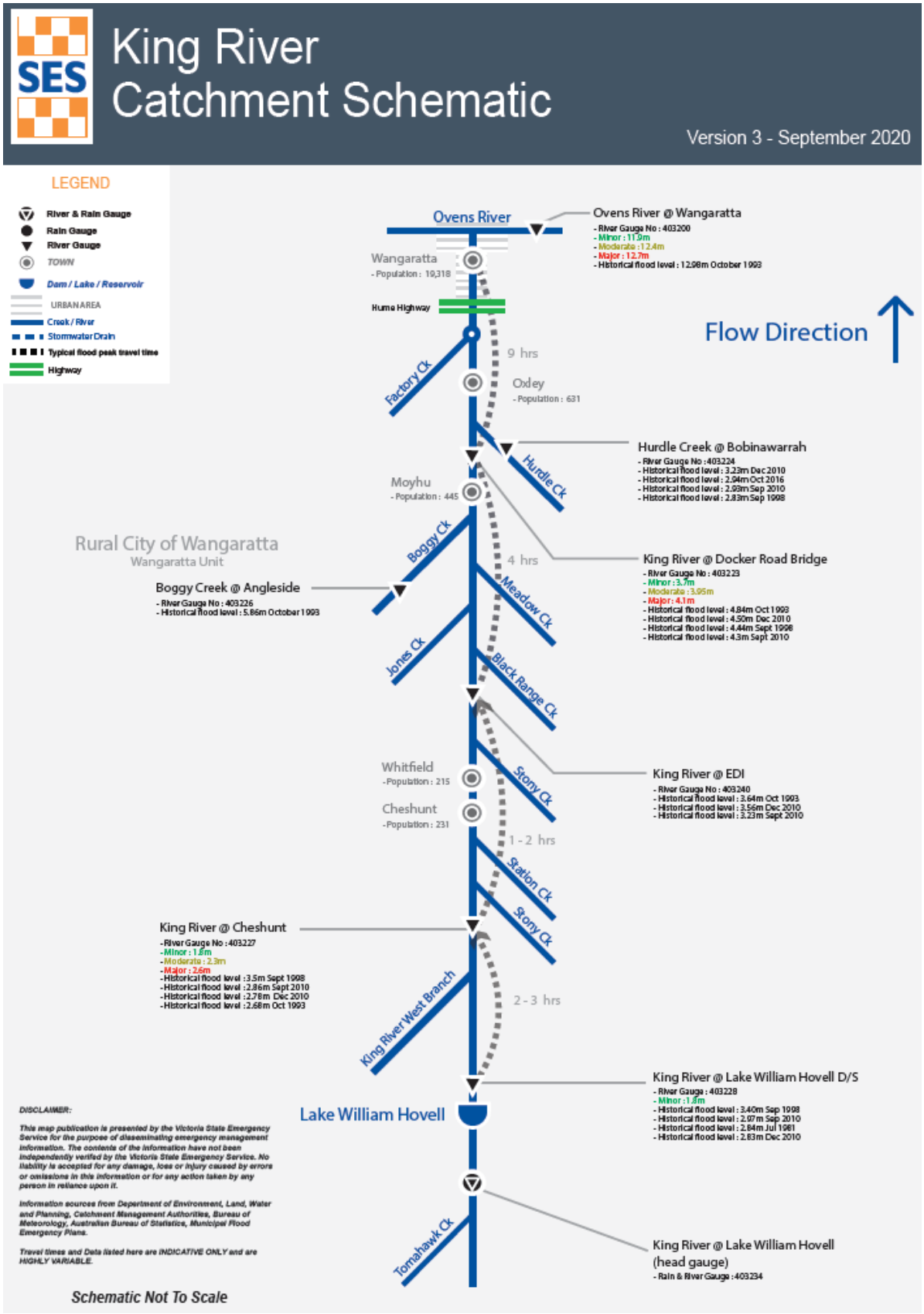
Moira Shire Council			
Peechelba E	Yarrawonga	Around 15:00 hours	Major flooding (Ovens River Catchment Floods October 1993 vol 3)
Wangaratta	Yarrawonga	Around 27:30 hours	Major flooding (Ovens River Catchment Floods October 1993 vol 3)
Bright	Yarrawonga	Around 50:00 hours	Major flooding (Ovens River Catchment Floods October 1993 vol 3)

Location from	Location to	Typical travel time	Comments
King River Catchment			
Lake William Hovell	Cheshunt	Around 1-3 hours	Major flooding Ovens River Intelligence Report 2012
Cheshunt	Edi	Dec 2010 (2 hours)	Major flooding Ovens River Intelligence Report 2012
Edi	Docker Rd Bridge	Around 4-7 hours Dec 2010 & Sept 1998 (7 hours)	Major flooding (Ovens River Catchment Floods October 1993 vol 3) Ovens River Intelligence Report 2012
Docker Rd Bridge	Wangaratta	Around 9 hours	Major flooding (Ovens River Catchment Floods October 1993 vol 3)

Location from	Location to	Typical travel time	Comments
15 Mile Creek Catchment (One and Three Mile Creeks at Wangaratta)			
Greta South	Glenrowan	4.5 – 11.5 Hours Feb 2005 (4.5 Hrs) Sept 2000 (5 Hrs) Dec 2010 (11.5 Hrs)	Ovens River Intelligence Report 2012
Greta South	Cribbes Rd	Around 20:15 hours	Major flooding (Ovens River Catchment Floods October 1993 vol 3) Note: the speed calculated for the 15 Mile Creek between Greta South and Cribbes Road is inconsistent with other speed in the catchment, and if correct would imply a very substantial storage effect in the flood plain downstream of Greta South

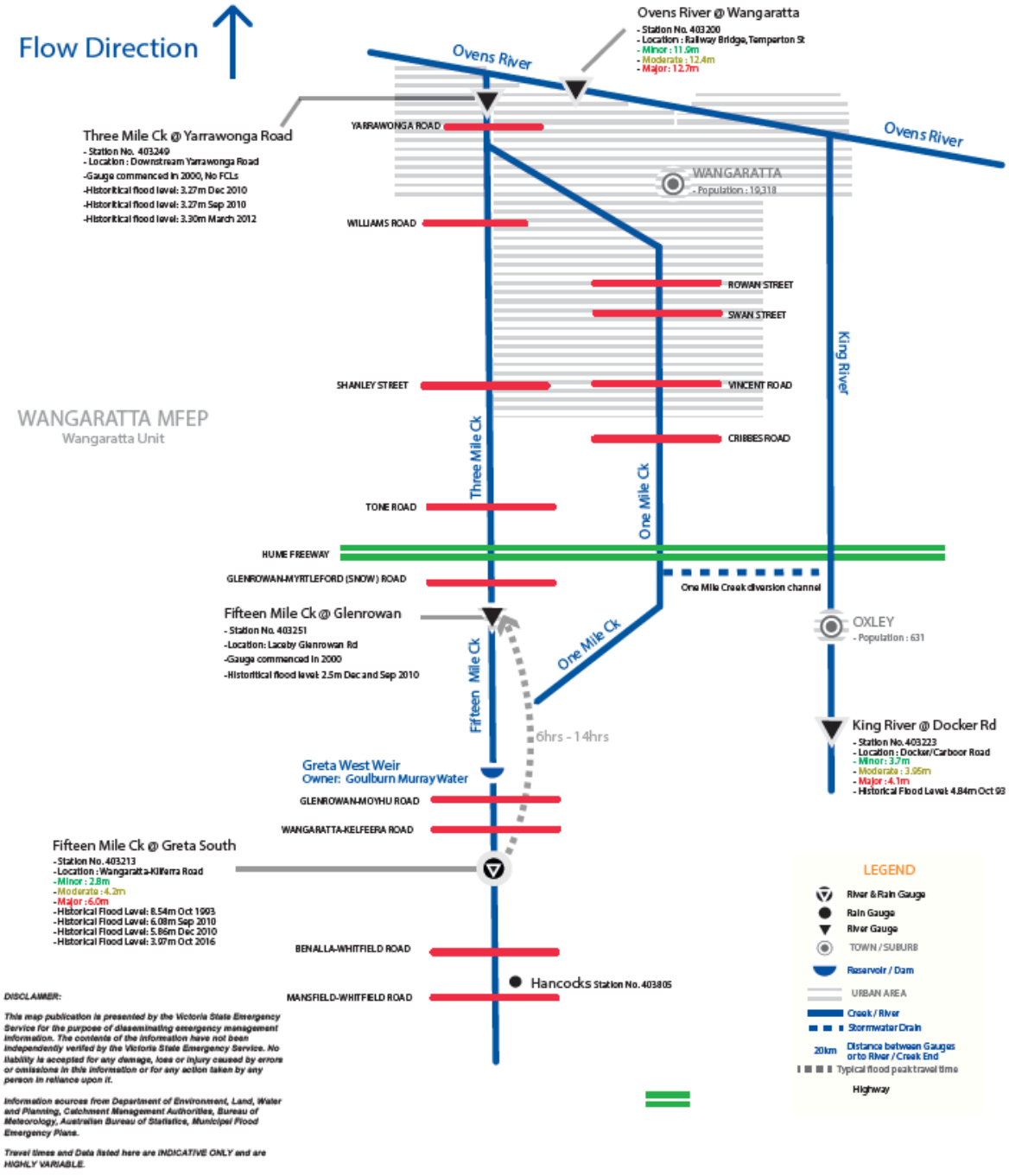
Appendix C1: River Systems Overview & Schematics (Ovens, King Rivers & 15 Mile Creek)




King River
Catchment Schematic
Version 3 - September 2020
LEGEND
River & Rain Gauge
Rain Gauge
River Gauge
TOWN
Dam / Lake / Reservoir
URBAN AREA
Creek / River
Stormwater Drain
Typical flood peak travel time
Highway
Ovens River
Ovens River @ Wangaratta
- River Gauge No : 403200
- Minor : 11.9m
- Moderate : 12.4m
- Major : 12.7m
- Historical flood level : 12.98m October 1993
Wangaratta
- Population : 19,318
Hume Highway
Flow Direction
9 hrs
Factory Ck
Oxley
- Population : 631
Hurdle Creek @ Bobinawarrah
- River Gauge No : 403224
- Historical flood level : 3.23m Dec 2010
- Historical flood level : 2.94m Oct 2016
- Historical flood level : 2.93m Sep 2010
- Historical flood level : 2.83m Sep 1998
Hurdle Ck
Moyhu
- Population : 445
Rural City of Wangaratta
Wangaratta Unit
Boggy Ck
4 hrs
Meadow Ck
King River @ Docker Road Bridge
- River Gauge No : 403223
- Minor : 3.7m
- Moderate : 3.95m
- Major : 4.1m
- Historical flood level : 4.84m Oct 1993
- Historical flood level : 4.50m Dec 2010
- Historical flood level : 4.44m Sept 1998
- Historical flood level : 4.3m Sept 2010
Boggy Creek @ Angleside
- River Gauge No : 403226
- Historical flood level : 5.86m October 1993
Jones Ck
Black Range Ck
Whitfield
- Population : 215
Stony Ck
King River @ EDI
- River Gauge No : 403240
- Historical flood level : 3.64m Oct 1993
- Historical flood level : 3.56m Dec 2010
- Historical flood level : 3.23m Sept 2010
Cheshunt
- Population : 231
1 - 2 hrs
Station Ck
Stony Ck
King River @ Cheshunt
- River Gauge No : 403227
- Minor : 1.8m
- Moderate : 2.3m
- Major : 2.6m
- Historical flood level : 3.5m Sept 1998
- Historical flood level : 2.86m Sept 2010
- Historical flood level : 2.78m Dec 2010
- Historical flood level : 2.68m Oct 1993
King River West Branch
2 - 3 hrs
King River @ Lake William Hovell D/S
- River Gauge : 403228
- Minor : 1.8m
- Historical flood level : 3.40m Sep 1998
- Historical flood level : 2.97m Sep 2010
- Historical flood level : 2.84m Jul 1981
- Historical flood level : 2.83m Dec 2010
Lake William Hovell
DISCLAIMER:
This map publication is presented by the Victoria State Emergency Service for the purpose of disseminating emergency management information. The contents of the information have not been independently verified by the Victoria State Emergency Service. No liability is accepted for any damage, loss or injury caused by errors or omissions in this information or for any action taken by any person in reliance upon it.
Information sources from Department of Environment, Land, Water and Planning, Catchment Management Authorities, Bureau of Meteorology, Australian Bureau of Statistics, Municipal Flood Emergency Plans.
Travel times and Data listed here are INDICATIVE ONLY and are HIGHLY VARIABLE.
Tomahawk Ck
King River @ Lake William Hovell (head gauge)
- Rain & River Gauge : 403234
Schematic Not To Scale

15 Mile Creek Catchment Schematic

Version 3 - September 2020



Schematic Not To Scale

APPENDIX C – WANGARATTA FLOOD EMERGENCY PLAN

Overview of Flooding Consequences

The urban area of Wangaratta lies at the confluence of the Ovens and King River's and the 15 Mile Creek Catchments (which Include the One and Three Mile Creeks).

Wangaratta's predominant flood risk comes from the One and Three Mile creek systems. Protection measures on this system are a levee at Sunset Drive.

Many of the properties in the Ovens and King Floodway confluence in Wangaratta are encircled by two levee systems being the Parfitt and Wilson Rd Levees. Some properties to the east of the Wilson Rd Levee along the Oxley Flats Road are protected by private levees. Properties to north of Wangaratta in the Stamps Lane and Burrows Lane area are also protected by private levees.

Painters Island Caravan Park is impacted from the Ovens River System from 11.9m and is situated between the Ovens River and the Parfitt Rd Levee System.

Wangaratta Caravan and Tourist Park on Parfitt Road is protected by the Parfitt Rd Levee System.

There are many properties at risk predominately on the One and Three Mile Creek systems during significant flooding

A flood damages assessment was undertaken for the Wangaratta Urban Waterways Flood study (2017) area under existing conditions. The flood damage assessment determined impacts across the range of design floods (20%, 10%, 5%, 2%, 1% and 0.5% AEP flood events). Floor level survey was obtained for 160 properties in the study area and combined with existing floor level datasets provided by the North East CMA. The combined floor level dataset was one of the principal inputs for the damage assessment.

The stage-damage curves developed by the New South Wales Office of Water have been recommended by Aither and were used for this study.

The model results for all mapped flood events were processed to calculate the number and location of properties affected. This included properties with buildings inundated above floor, properties with buildings inundated below floor and properties where the building was not impacted but the grounds of the property were inundated. In addition to the flood affected properties, lengths of flood affected roads for each event were also calculated. Damage to agricultural parcels was also included in the assessment.

The 1% AEP flood damage estimate for existing conditions was calculated to be just over $6 million. A total of 307 properties are predicted to be flooded affected in a 1% AEP flood event, with 55 of those properties flooded above floor level.

Parameter	Annual Exceedance Probability (%AEP)					
	0.5%	1%	2%	5%	10%	20%
Residential Buildings Flooded Above Floor	81	53	28	7	2	1
Commercial Buildings Flooded Above Floor	3	2	2	0	0	0
Properties Flooded Below Floor	308	252	234	188	166	126
Total Properties Flooded	**392**	**307**	**264**	**195**	**168**	**126**

Parameter	Flood Class Level			
	Minor	Moderate	Major	Total
Roads Impacted by water	9	25	51	85
Caravan Parks Impacted by floodwater	1	0	1	2
Car Parks impacted by flood water	4	0	0	4

Warnings and Gauges

The Bureau of Meteorology currently provides flood forecasts for The Ovens River, King River and 15 Mile Creek within the Rural City of Wangaratta.

Warnings are available for flooding expected along these water courses. Flood class levels for the gauges are detailed in table C1.2 and are used in the issuing of a flood warning for. These and other gauge details within the [insert catchment name] catchment are contained within table C1.3.

	River/creek flood class level		
Gauge	**Minor**	**Moderate**	**Major**
Ovens River at Rocky Point	3.2m	4.4m	5.2m
Ovens River at Wangaratta	11.9m	12.4m	12.7m
King River at Lake William Hovell	1.8m	No level	No level
15 Mile Creek at Greta South	2.8m	4.2m	6m
King River at Cheshnut	1.8m	2.3m	2.6m
King River at Docker Road	3.7m	3.95m	4.1m
Hurdle Creek at Bobinawarrah	No set Flood Class		

Table C1.2 – Gauges with established Flood Class Levels within the Ovens River Catchment.

At these sites within the Ovens River catchment, the Bureau of Meteorology (the BoM) will issue flood warnings if levels reach those classified above. Warnings will be placed on the Bureau's website (bom.gov.au/vic/warnings/index.shtml?ref=hdr) and the VicEmergency website emergency.vic.gov.au.

Gauge Locations:

Gauge	Station No.	Location	Stream Level & Flow Gauge	Rain Gauge	Map Reference
Ovens River at Rocky Point	403230	From Myrtleford head north-west along Ovens Highway, turn west at Glenrowan Myrtleford Road. Site access is to the south, 1.9km from intersection.	✓	✓	MapName: WAN/NE Zone:55 Easting: 470308.003 Northing: 5956814.000 LocalMap: 403230A

Ovens River at Wangaratta	403200	Site is in Wangaratta beside the Railway Bridge access via Temperton st	✓		MapName: WAN/NE Zone:55 Easting: 439069.002 Northing: 5976929.000 LocalMap: 403200C
King River at Lake William Hovell	403228	From Cheshunt take the Upper King River Road south. Pass Long Spur Track at 14.5 km from Cheshunt. Access track is to the east off Upper King River Road at 15.5km from Cheshunt. Turn off before Lake William Hovell access road	✓		MapName: WAN/NE Easting: 446105.996 Northing: 5915032.000 LocalMap: 403228B
15 Mile Creek at Greta South	403213	Site is on the Wangaratta-Kilfeera Road bridge at Greta South	✓	✓	MapName: WAN/NE Zone:55 Easting: 432405.997 Northing: 5947061.000 LocalMap: 403213A
King River at Cheshnut	403227	From Cheshunt head south down King River Road. Turn south-west onto Burrows Road approximately 3.5km from Cheshunt. The site is a further 1.9km.	✓	✓	MapName: WAN/NE Zone:55 Easting: 446337.998 Northing: 5923662.000 LocalMap: 403227A
King River at Docker Road	403223	Turn off Wangaratta Whitfield Road at Docker Carboor Road heading east. Site is at first bridge over King River.	✓		MapName: WAN/NE Zone:55 Easting: 445330.002 Northing: 5958595.000

					LocalMap: 403223A
Hurdle Creek at Bobinawarrah	403224	From Milawa travel west along Bright Rd to Allans Lane. Turn south, site located at bridge approximately 6km from intersection.	✓	✓	MapName: WAN/NE Zone:55 Easting: 450675.997 Northing: 5958968.000 LocalMap: 403224B

Table C1.3 – Gauges within the Oven River catchment within the Rural City of Wangaratta municipality.

These Gauges may provide some warning of expected flooding. The Bureau of Meteorology's website also links a number of these gauges at: http://www.bom.gov.au/cgi-bin/wrap_fwo.pl?IDV60201.html. It is advised that residents monitor the Bureau of Meteorology's website http://www.bom.gov.au/vic/warnings/index.shtml?ref=hdr and the VicEmergency website https:/emergency.vic.gov.au/ for any thunderstorm, flood or severe weather warnings present for their area.

Properties at Flood Risk

Properties listed in the table below are at risk from flooding along the Ovens River catchment within the Rural City of Wangaratta municipality. As more intelligence becomes available, this list may change.

This Property Flood Risk Table is presented by the Victoria State Emergency Service for the purpose of disseminating emergency management information. The contents of the information have not been independently verified by the Victoria State Emergency Service. No liability is accepted for any damage, loss or injury caused by errors or omissions in this information or for any action taken by any person in reliance upon it.

Properties at risk from Flooding within the Ovens River catchment								
Residential			Commercial	Industrial	Rural	Public Use		
Street No. at Risk in AEP Event					Address	Suburb	Along Water Watercourse	Flood Risk Type
20% AEP	10% AEP	5% AEP	2% AEP	1% AEP				
X					Dowling Lane	Wangaratta	Ovens River	Riverine
	X				9 Pinkerton Crescent	Wangaratta	Ovens River	Riverine
	X				430 King Valley Rd	Cheshunt	King River	Riverine
	X				Gentle Annie Caravan Park	Whitfield	King River	Riverine

Properties at risk from Flooding within the Ovens River catchment								
Residential		Commercial		Industrial	Rural		Public Use	
Street No. at Risk in AEP Event					Address	Suburb	Along Water Watercourse	Flood Risk Type
20% AEP	10% AEP	5% AEP	2% AEP	1% AEP				
		X			182 Markwood-Tarrawingee Road	Markwood	Ovens River	Riverine
		X			171 Oxley Flats Road	Wangaratta	Ovens / King Rivers	Riverine
		X			194 Great Alpine Road	Wangaratta	Ovens River	Riverine
		X			31-37 Weir Street	Wangaratta	King River	Riverine
		X			23 Peruzzo Street	Wangaratta	Ovens River	Riverine
		X			49 Stamps Lane	Wangaratta	Reedy Creek	Riverine
		X			20 Turner Street	Wangaratta	One Mile Creek	Riverine
		X			116 Phillipson Street	Wangaratta	One Mile Creek	Riverine
		X			118 Phillipson Street	Wangaratta	One Mile Creek	Riverine
		X			122 Phillipson Street	Wangaratta	One Mile Creek	Riverine
		X			124 Phillipson Street	Wangaratta	One Mile Creek	Riverine
		X			126 Phillipson Street	Wangaratta	One Mile Creek	Riverine
		X			128 Phillipson Street	Wangaratta	One Mile Creek	Riverine
		X			109 Edwards Street	Wangaratta	Three Mile Creek	Riverine
		X			100 Edwards Street	Wangaratta	Three Mile Creek	Riverine
			X		35 Crisp Street	Wangaratta	One Mile Creek	Riverine
			X		37 Crisp Street	Wangaratta	One Mile Creek	Riverine
			X		10 Graham Avenue	Wangaratta	One Mile Creek	Riverine
			X		14 Graham Avenue	Wangaratta	One Mile Creek	Riverine
			X		16 Graham Avenue	Wangaratta	One Mile Creek	Riverine
			X		18 Graham Avenue	Wangaratta	One Mile Creek	Riverine
			X		20 Graham Avenue	Wangaratta	One Mile Creek	Riverine

Properties at risk from Flooding within the Ovens River catchment								
Residential			Commercial		Industrial	Rural	Public Use	
Street No. at Risk in AEP Event					Address	Suburb	Along Water Watercourse	Flood Risk Type
20% AEP	10% AEP	5% AEP	2% AEP	1% AEP				
			X		15 Valdoris Avenue	Wangaratta	One Mile Creek	Riverine
			X		13 Bronmar Street	Wangaratta	One Mile Creek	Riverine
			X		14 Bronmar Street	Wangaratta	One Mile Creek	Riverine
			X		112 Arundels Lane	Wangaratta	15 Mile Creek	Riverine
			X		? Williams Rd	Wangaratta	Three Mile Creek	Riverine
			X		66 Ryley Street, Christopher Robin Kindergarten	Wangaratta	King River	Riverine
			X		66 Ryley Street, Wangaratta Lawn Tennis Club	Wangaratta	King River	Riverine
				X	707 Oxley Flats Road	Oxley Flats	Ovens River	Riverine
				X	87 Milawa-Tarawingee Road	Miliwa		Riverine
				X	49 Pinkerton Crescent	Wangaratta	Ovens River	Riverine
				X	22 Taylors Lane	Wangaratta		Riverine
				X	137 Taylors Lane	Wangaratta	King River	Riverine
				X	86 Stamps Lane	Wangaratta	Reedy Creek / Ovens River	Riverine
				X	119 Stamps Lane	Wangaratta	Reedy Creek / Ovens River	Riverine
				X	132 Stamps Lane	Wangaratta	Reedy Creek / Ovens River	Riverine
				X	1 Bowser Road	Wangaratta	Reedy Creek / Ovens River	Riverine
				X	128 Wilson Road	Wangaratta	King River	Riverine
				X	1 Willis Street	Wangaratta	Ovens River	Riverine
				X	3 Willis Street	Wangaratta	Ovens River	Riverine
				X	53 Pinkerton Crescent	Wangaratta	Ovens River	Riverine

Properties at risk from Flooding within the Ovens River catchment								
Residential			Commercial		Industrial	Rural	Public Use	
Street No. at Risk in AEP Event					Address	Suburb	Along Water Watercourse	Flood Risk Type
20% AEP	10% AEP	5% AEP	2% AEP	1% AEP				
				X	57 Bowser Road	Wangaratta	Reedy Creek / Ovens River	Riverine
				X	19 Thomas St	Wangaratta	Ovens River	Riverine
				X	Low lying paddocks at the Tafe Campus at Tone Road start to become inundated	Wangaratta	Three Mile Creek	Riverine
				X	Buildings and roadways at the Wangaratta Speedway become impacted	Wangaratta	Three Mile Creek	Riverine
				X	12 Graham Avenue	Wangaratta	One Mile Creek	Riverine
				X	2/152 Rowan Street	Wangaratta	One Mile Creek	Riverine
				X	1/152 Rowan Street	Wangaratta	One Mile Creek	Riverine
				X	152a Rowan Street	Wangaratta	One Mile Creek	Riverine
				X	15 Walter Street	Wangaratta	Three Mile Creek	Riverine
				X	22 Graham Avenue	Wangaratta	One Mile Creek	Riverine
				X	33 Crisp Street	Wangaratta	One Mile Creek	Riverine
				X	13 Walter Street	Wangaratta	Three Mile Creek	Riverine
				X	26 Graham Avenue	Wangaratta	One Mile Creek	Riverine
				X	Dwelling and Shedding adjacent to 101 Williams Road	Wangaratta	Three Mile Creek	Riverine
				X	17 Mahers Lane	Carboor	Hurdle Creek	Riverine
				X	32 Murphys Lane	Carboor	Hurdle Creek	Riverine
				X	35 Murphys Lane	Carboor	Hurdle Creek	Riverine
				X	46 Murphys Lane	Carboor	Hurdle Creek	Riverine
				X	2245 Carboor-Everton Road	Carboor	Hurdle Creek	Riverine
				X	2259 Carboor-Everton Road	Carboor	Hurdle Creek	Riverine

Properties at risk from Flooding within the Ovens River catchment								
Residential			Commercial		Industrial	Rural	Public Use	
Street No. at Risk in AEP Event					Address	Suburb	Along Water Watercourse	Flood Risk Type
20% AEP	10% AEP	5% AEP	2% AEP	1% AEP				
				X	117 Lake Buffalo-Carboor Road	Carboor	Hurdle Creek	Riverine
				X	1100 Carboor-Everton Road	Bobinawarrah	Hurdle Creek	Riverine
				X	1291 Carboor-Everton Road	Bobinawarrah	Hurdle Creek	Riverine
Totals								
1	3	15	14	36				

Table C1.4 – Properties at risk of flooding in the Ovens Catchment within the Rural City of Wangaratta

Flood mitigation

The below table summarises the structural flood mitigation measures in place:

NOTE: The Victorian Levee Guidelines have a requirement of 600mm freeboard from the 1% AEP. RCOW received funding to update the Wilson Road and Parfitt Road Levees to this protection level. Update in the table below regarding these works.

At the time of updating this MFSEP, remediation works were being undertaken on the levee systems protecting Wangaratta, with the intent that any deficiencies in freeboard will be remedied. The previous known deficiencies have been highlighted below for reference, however will be removed as part of an administrative amendment to this plan once the levee works have been completed and validated.

Mitigation	Description	Protection	Comments
Ovens & King River systems			
Wilson Road Levee System	2.17km Earth Levee	42 Residential Properties	The entire Wilson Road levee now provides protection up to the 1% Annual Exceedance Probability (AEP) level, achieving a 600mm freeboard. Construction along the Wilson Levee was finished in 2024, spanning from Chandler Street to Wilson Road, including Oxley Flats Road, Weir St, Heach St, Boyd St, Dunphy St, and Thomas St.
Parfitt Road Levee System	3.46km Combination of Earthen, Road and Concrete Wall	77 Residential Properties 28 Commercial Properties 1 Church 2 Hotels 1 Caravan Park	The Parfitt Road Levee is currently under construction and is scheduled for completion by the end of February. Once finished, the Parfitt levee will also protect up to the 1% AEP level with a 600mm freeboard. The construction covers Parfitt Road, Potter St, Great Alpine Road, Kett St, Morgan Road, Wylie Road, and Parfitt Road North. Additionally, some work has been completed along the Regal Ct Levee.
Merriwa Park Levee	Earth Levee	Christopher Robin Kindergarten Tennis Club	The Merriwa park levee was generally in poor condition. The upstream bank was over-steepened at batters of typically 2H:1V with localised areas of up to 1.5H:1V and had significant amounts of established trees growing into the bank. Evidence of slumping and creep was observed, and the path along the crest had cracks along the length which has been repaired. The cracking in inferred to be a result of stress relief. The trees in the embankment were warped. The slumping, cracking and warped trees are likely a result of localised small slope instabilities., rather than a global failure. The downstream embankment was grassed with gentle batters. In general, The Merriwa Park levee is 300mm to 450mm below the 1% AEP Event flood level, hence, to achieve 600mm freeboard it requires 900mm to 1050mm height increase. Tennis courts, playground and sound shell pavilion flood, clubhouse usually floods to well above clubhouse floor level. 1993 nearly to roof level.
Fishers Levee	Old unmaintained levee on Ovens River at end of Fisher Lane, East Wangaratta.	Fishers Levee	Old unmaintained levee on Ovens River at end of Fisher Lane, East Wangaratta.

170 Wilson Road, Wangaratta	Portable inflatable levee		Levee stored at property in trailer. Four (4) bladders form the basis of the levee system. Requires 4 people to move the units around. Requires pump to pump to transfer water from billabong (at rear of house) to inflate the bladders. Bulk water supply can also be brought in to inflate bladders.
"Glenloth" – Oxley Flats Road	Check Council files		Owner has 25 years on the property with good situational awareness. 12.8m (on the Ovens River gauge at Wangaratta) is the approximate limit of their levee. 1993 flood did not enter the residence.
22 Taylors Lane, Wangaratta	Check Council files.		Informed by the owner that the residence does not flood. Is able to isolate septic and other drainage lines.
132 Stamps Lane	Concrete block wall.		6 inch freeboard around private levee during 1993 flood event.
Ambrosio House 65 Burrows Street, North Wangaratta	Query earthen wall and drop in gates.		First flood event (assuming 1993?) water rose 18 inches from (bottom) of this levee. No breaches detected through timber boards and sandbags that were utilised.
57 Bowser Road, North Wangaratta	Earthen wall, access over wall.		No evidence of water ever been through this house
Geoff Cheshire - O'Keefe Road, Boorhaman	Privately constructed earthen levee on Ovens River.		
Markwood Levee	Older earthen levee		over various sections along Ovens River from Henley Ridge to Pioneer Bridge. Tea Garden Creek off. Query - NECMA **Concern about impact of diverting river flow near Pioneer Bridge**.
Various Township Retarding Basins	Retention / Bioretention basins	Deigned for the collection of surface waters	Basins deigned for the collection of surface waters off specific residential and industrial estates are located at: Thurles Avenue, Cormorant Way, Bowerbird Way, Liddell Drive, Macquarie Court, Weir Street, Fairway Drive, Wonga Park Drive, Morgan Road, Woodland Grove, Silver Wattle Drive, Pauline Terrace, Salisbury Street, Willow Drive, Trotman Drive / Maple Circuit, and Murrell Street
Various Township Flood pumps	Flood pumps	Pumps service flood and/or retention/ retardation basin requirements across Wangaratta	There are 22 pumps across Wangaratta township. These are set to Automatic, with the level at which they commence dictated by the area / location they need to pump. All pumps are tested on a weekly basis.
Sunset Drive Levee	Combined Earthen and Concrete Wall	8 Residential Properties (Sunset Dr, Walter St & Hilandra Ave)	The Sunset Drive Levee was in generally good condition. The earthen levee embankment was low in height with gentle batters, well vegetated with grass and no evidence of erosion was observed. Part of the levee was a concrete and brick retaining wall. Access to part of this wall was restricted by fences. The raising of the wall is considered a structural issue. It is also noted that the residences adjacent to the retaining wall had established trees growing very close to the toe. It is recommended that no trees or large vegetation should be permitted near the toe of the retaining wall, and that a setback distance is established. There is a gate valve installed on the stormwater outlet, which was installed to counter previous issues with a flap gate installed on the end of the pipe. This was placed such that if the flap gate is stuck open then the gate valve can be actuated to stop flow and allow a pump to discharge the area, such that rising levels in the creek don't backflow and inundate adjacent homes.
Frank Griffiths - Griffiths Lane, Laceby	Privately constructed earthen levee in excess of 20 years old.		Privately constructed earthen levee. Diverts 15 Mile Creek water. May affect adjoining property.
Hurdle Creek			
Alan Gibb House – 1100 Carboor Everton Road, Bobinawarrah.	Privately constructed earthen levee		

Appendix C2: Flood Intelligence Card – Ovens River at Rocky Point - Use for Whorouly (Includes intel for Whorouly Creek)

Gauge Location: Ovens River at Rocky Point

Gauge	River Height (m)	River Flow (ML/d)	Flood Class Level & Annual Exceedance Probability (%AEP)	Consequence/ Impact	Action Actions may include: Evacuation, closure of road, sandbagging, issue warning and who is responsible etc.	Reference
Ovens. R at Rocky Point (use for Whorouly area)	3.2		**Minor Flood Level**	1981 flood peak Rural flooding along the river commences, and continues to extend as river levels increase.	BOM will issue and VICSES to publish Minor flood warning to community RCOW/ RRV to monitor roads to determine road closures. This action should be ongoing with additional river rises. Primary actions are flood intelligence collection and monitoring, along with delivery of public information and warnings.	FIC Ovens catchment / BOM Dec 2012
	4.2m			October 2023 flood event. • Snow Road closed at Carboor-Everton Road and at the GAR • Whorouly Road north of 'the shop' to Snow Road. • Carboor-Everton Road Closed		
	4.4		**Moderate Flood Level**	Above Moderate flood level, properties north of Whorouly may begin to become isolated	BOM will issue and VICSES to publish Moderate flood warning to community.	FIC Ovens catchment / BOM Dec 2012
	4.77			• 2010 Dec flood peak • Flooding occurred in and around the Whorouly township. • Whorouly became isolated • Northern parts of Whorouly flooded / isolated. No intel on flood depths or in properties had above flood flooding	SES to prepare Whorouly community for potential isolation before this height. Ensure sandbag store is stocked at CFA Station at Whorouly and sand is delivered before road access is cut. Ensure active communication with local CFA, who have good knowledge of flooding within the community and will form most of the local response should Whorouly become isolated. Need to consider re-supply and emergency access options in the event of isolation.	

Gauge	River Height (m)	River Flow (ML/d)	Flood Class Level & Annual Exceedance Probability (%AEP)	Consequence/ Impact	Action Actions may include: Evacuation, closure of road, sandbagging, issue warning and who is responsible etc.	Reference
Ovens. R at Rocky Point (use for Whorouly area)	5.048			2016 Oct flood peak. In the 2016 flood event, there were a number of isolations in the Whorouly area. Township at risk of isolation. **Possible Road Closures:** • Whorouly Road to both Snow Road ends • Bussels Lane from Snow Road to Back Road • Back Road from Whorouly Road • Whorouly-Bowmans Road from Whorouly Road to South of Paddy Gully Road • Whorouly River Road from Whorouly Road to Snow Road.	RCOW/ RRV to monitor roads to determine road closures necessary. SES to monitor stated roads and properties for impacts – assess risk of isolations. Sandbag stores located at Wangaratta and Myrtleford SES Units	
	5.2		**Major Flood Level**		BOM will issue and VICSES to publish Major flood warning to community RCOW/RRV to monitor and inspect roads to determine road closures	FIC Ovens catchment / BOM Dec 2012
	5.72	99,290		• Sept 2010 Flood peak. - upstream at Myrtleford created pockets of isolation • No above floor flooding upstream in Myrtleford. • Water over Road at GAR at sewerage treatment plant but road remains open. (Sewerage farm is NOT affected by even extreme flood levels, rail trail acts as support levee unless Lake Buffalo breeches)	Continued monitoring of affected roads and assess need for evacuations and/or risk or isolations.	
	5.92	110,725		• 1998 Sept flood peak. • Great Alpine Road at sewerage farm near Myrtleford will be blocked. Alternative access via the Rail Trail for emergency Service vehicles only. • Large flows from the Buffalo River in addition to Ovens River can impact this area downstream of Rocky Point further	IMT to monitor Flows into the Ovens from the Buffalo and Buckland sub catchments to determine in downstream impacts and timing.	
	6.18	99,248		• October 1993 Flood Peak		Ovens River Intelligence Report 2012

Note: flood intelligence records are approximations. This is because no two floods at a location, even if they peak at the same height, will have identical impacts. Flood intelligence cards detail the relationship between flood magnitude and flood consequences. More details about flood intelligence and its use can be found in the Australian Institute of Disaster Resilience (AIDR) Handbook series on managing the Floodplain.

Appendix C3: Flood Intelligence Card – King River at Cheshunt, Docker Rd & Hurdle Creek

Gauge Location: King River – various gauges

Gauge	River Height (m)	River Flow (ML/d)	Flood Class Level & Annual Exceedance Probability (%AEP)	Consequence/ Impact	Action Actions may include: Evacuation, closure of road, sandbagging, issue warning and who is responsible etc.	Reference
King River at Lake William Hovell **(800 metres downstream of Lake William Hovel)**			**Minor Flood Level**		BOM will issue and VICSES to publish Minor flood warning to community RCOW/ RRV to monitor roads to determine road closures necessary The VICSES Region Duty Officer in conjunction with the RAC will maintain operational awareness and form an appropriate response to suit the level of the incident.	Refer Lake William Hovell Dam safety Plan. Ungated spillway.
	1.8	4000				
	2.42	12300	18%			
	2.48	15000		Oct 1993 flood level		
	2.69	18900	10%			
	2.91	25900		May 1974 flood level		
	3.04	30400	4%			
	3.32	41900	2%			
	3.38	46000		Sept 1998 flood level		
	3.65	56300	1%			

Gauge	River Height (m)	River Flow (ML/d)	Flood Class Level & Annual Exceedance Probability (%AEP)	Consequence/ Impact	Action Actions may include: Evacuation, closure of road, sandbagging, issue warning and who is responsible etc.	Reference
King River at Cheshunt **(4 km upstream Cheshunt)**	1.8		**Minor Flood Level** **50% AEP**		BOM will issue and VICSES to publish Minor flood warning to community RCOW/ RRV to monitor roads to determine road closures necessary	BOM Dec 2012
	1.8			• Dry Creek commences to flow over farmland from Queens Creek to King River. • At Gentle Annie Caravan Park, King river approaching top of bank. **Water over road** • Whitfield-Wangaratta Rd. at Edi commences flooding. This is the primary road into the King Valley.	Contact Gentle Annie Caravan Park and ensure they are monitoring situation and prepared to enact their Flood Emergency Plan. DEECA owned park with managers Petra and John. They have managed the park through floods in 2022 / 2023 and have good plan in place. A 'heads up' phone call should suffice. They can also provide some valuable intel back to the ICC / RDO. PH: 0401 450 234 VICSES to add to Minor Flood warning impacts at this level. RCOW/ RRV to monitor and inspect roads to determine road closures. Consider placing sand and empty sandbags at strategic locations in King Valley, especially if there is risk of road closure. Locations to consider include • Moyhu CFA: Sand and sandbags • Whitfield CFA: Sand and sandbags • Cheshunt CFA: Sand and sandbags • VICSES maintains a register of sandbag stores pre-deployed to these locations.	FIC King Catchment
	2.0			• At Cheshunt, King River at top of bank. • King Valley roadside flooding commences at Cheshunt. • Low lying farmland (Cheshunt-Edi) commences flooding. • Local roadside flooding along King Valley Rd.	VICSES to add to Minor Flood warning impacts at this level RCOW/ RRV to monitor and inspect roads to determine road closures	FIC King Catchment

Gauge	River Height (m)	River Flow (ML/d)	Flood Class Level & Annual Exceedance Probability (%AEP)	Consequence/ Impact	Action Actions may include: Evacuation, closure of road, sandbagging, issue warning and who is responsible etc.	Reference
King River at Cheshunt **(4 km upstream Cheshunt)**	2.3		**Moderate Flood Level** **20% AEP**		BOM will issue and VICSES to publish Moderate flood warning to community VICSES to Consider the use of Snap, Send, Solve Flood observers for Intelligence gathering	
				• Large areas of farmland flooding along the King River. • Inundation *may* occur along Lake Buffalo-Whitfield Road (Black Range Creek), particularly around low points to bridge access. This may result in rural farm property isolations. • Land inundated at confluence of Black Range Creek & King River	VICSES to add to Moderate Flood warning impacts at this level Local SES units to engage landholders of potential isolation. RRV/ RCOW to place road closure signs along Lake Buffalo-Whitfield Road. Alpine Shire to close road from the other end? Recon at Edi Cutting camp ground to ensure campers aware of flood situation. Consideration for evacuation of the campground.	FIC King Catchment
	2.6		**Major Flood Level** **10% AEP**	• Floods historically in the King Valley can vary, with the King River being the main stream, yet there are multiple other smaller tributaries. • When there is widespread heavy or prolonged rainfall, there may be areas of localised flooding and road closures, in addition to flooding along the King River itself. Examples include the Boggy Creek at Mohyu. • Community isolations can occur at Mohyu, Whitfield and Cheshunt, however generally access is restored within 12 hours (based on historical events). • Following widespread flooding in the King Valley, historically there have been issues with road and bridge damage and disruption to essential utilities including power and phone.	BOM will issue and VICSES to publish Major flood warning to community. VICPOL Evacuation Manager required and to consider Evacuations from this level OR preparation for community isolation. Visitors to the King Valley Region are the priority for evacuation. Public information should include clear directions for relief and evacuation to be easily understood by visitors. Historically, local residents are reluctant to evacuate during floods and will instead shelter in place. The CFA and Cheshunt General Store are good sources of flood intel in the King Valley and can be contacted to find out what is occurring locally, should access to the Valley be cut off.	

Gauge	River Height (m)	River Flow (ML/d)	Flood Class Level & Annual Exceedance Probability (%AEP)	Consequence/ Impact	Action Actions may include: Evacuation, closure of road, sandbagging, issue warning and who is responsible etc.	Reference
King River at Cheshunt **(4 km upstream Cheshunt)**	2.6	23,600		• Large areas of farmland flooding along the King River. • King River causeway at Cheshunt commences flooding. • Edi Cutting camping ground inundated. • Fosangs Lane residential land flooding. • King River over bank at Gentle Annie Caravan Park. • At Cheshunt Causeway, abutting farmland commences flooding either side. **Water over road** • Upper King River Road between Cheshunt & Lake William Hovell inundated (south of Hamiltons Bridge). • King Valley Road closed between Whitfield and Cheshunt. • Edi-Cheshunt Road inundated. • Hardys Lane, Cheshunt	VICSES to add to Major Flood warning impacts at this level. Gentle Annie Caravan Park to commence evacuation. Evac needs to occur back towards Mansfield as the Wangaratta-Whitfield road will be closed at this height. IMT to consider Evacuations and relief centre of affected Cheshunt properties. Parks Vic to close Edi Cutting campground. VICSES Unit to doorknock King Valley Residents due to be impacted. RRV/ RCOW to place road closure signs along Upper King River Road, King Valley Road, Edi-Cheshunt Road	King Rural Floodplain Study
	2.7			June 2023 Peak Height (2.79m) October 2022 Peak Height (2.78m) October 1993 flood peak (2.73m) **Property Inundation** • 2 Properties at 430 King Valley Rd in Cheshunt commence flooding. • 1 property on Mahlooks Lane may be impacted / isolated. **Water over road** • Wangaratta-Whitfield Road closed at several locations e.g. at Edi Cutting.	VICSES with partner agencies to determine if response to 430 King Valley Rd. Cheshunt required. Property protection may be effective at this level. Considerations for the Evacuation of listed properties. RRV/ RCOW to place road closure signs along Wangaratta –Whitfield Road and at Edi Cutting VICSES to doorknock/ provide information to the King Valley Residents due to be impacted.	King Rural Floodplain Study
	2.9			May 1974 Peak height (2.89) • Jessie's Creek commences flooding near Mountain Hotel, Whitfield. **Water over road** • Upper King Road closed between Lake William Hovell and Cheshunt (South of Hamilton's bridge) • Gentle Annie Lane inundated. • Mahlooks Lane inundated. • King Valley Road requires closing at Cheshunt Causeway between Whitfield and Cheshunt. • Edi-Cheshunt Road inundated	RCOW/RRV(as appropriate) to provide road closure signage at these location	

Gauge	River Height (m)	River Flow (ML/d)	Flood Class Level & Annual Exceedance Probability (%AEP)	Consequence/ Impact	Action Actions may include: Evacuation, closure of road, sandbagging, issue warning and who is responsible etc.	Reference
	2.93	34,100		• July 1981 peak height		
King River at Cheshunt **(4 km upstream Cheshunt)**	3.32	41,900 – 50,000	2%			Ovens River Intelligence Report 2012
	3.54	63,000		• Sept 1998 Flood Peak • Large areas of farmland throughout the King Valley inundated. • Community isolations were reported to have occurred in this flood event (reported by locals) at Mohyu, Whitfield and Cheshunt along with numerous rural properties in the King Valley. • Numerous rural roads will have water over road	There is likely to be no access to the King Valley in a flood of this magnitude. VICSES will need to plan for community isolations, flood rescue and medical access.	Ovens River Intelligence Report 2012
	3.55	67,000	**1%**	• In a 1% flood it may be possible to see 50+ properties impacted by inundation to varying levels along the King Valley. The exact number and locations have not been validated by a flood study • Many properties that may be impacted will be in rural / farming areas and may be difficult to access.		King Rural Floodplain Study

Gauge	River Height (m)	River Flow (ML/d)	Flood Class Level & Annual Exceedance Probability (%AEP)	Consequence/ Impact	Action Actions may include: Evacuation, closure of road, sandbagging, issue warning and who is responsible etc.	Reference
King River at Docker Road (at the Bridge)	3.7	5,200	**Minor Flood Level** **~63% AEP**	• No Impacts at this level	BOM will issue and VICSES to publish Minor flood warning to community	Ovens River Intelligence Report 2012
	3.95	10,800	**Moderate Flood Level** **~40% AEP**	• Low lying agricultural areas impacted **Water over road** • Docker-Carbour Road is Closed Between Wangaratta-Whitfield Road & Oxley-Meadow Creek Road in 2022 flood event	BOM will issue and VICSES to publish Moderate flood warning to community RCOW to place road closure signs at Docker Road	Ovens River Intelligence Report 2012
	4.1	53,000	**Major Flood Level** **~10% AEP**	• Agricultural land flooding	BOM will issue and VICSES to publish Major flood warning to community VICSES to consider the use of Snap, Send, Solve Flood observers for Intelligence gathering and Flood Gauge Reading patrols	Ovens River Intelligence Report 2012
	4.3			• September 2010 Peak Flood height		
	4.44	74,000		• September 1998 flood peak	VICSES to add to Major Flood warning impacts at this level IMT to consider if property isolations begin and to gather intel/local knowledge	Ovens River Intelligence Report 2012
	4.5			• December 2010 Peak Flood height		
	4.65	98,700	2%			Ovens River Intelligence Report 2012
	4.84	112,000		• October 1993 flood peak		Ovens River Intelligence Report 2012
	4.86	123,000	**1%**			Ovens River Intelligence Report 2012

Note: flood intelligence records are approximations. This is because no two floods at a location, even if they peak at the same height, will have identical impacts. Flood intelligence cards detail the relationship between flood magnitude and flood consequences. More details about flood intelligence and its use can be found in the Australian Institute of Disaster Resilience (AIDR) Handbook series on managing the Floodplain.

Gauge Location: Hurdle Creek at Bobinawarrah (use also for Carboor)

Gauge	River Height (m)	River Flow (ML/d)	Flood Class Level & Annual Exceedance Probability (%AEP)	Consequence/ Impact	Action Actions may include: Evacuation, closure of road, sandbagging, issue warning and who is responsible etc.	Reference
Hurdle Creek at Bobinawarrah	2.94			• October 2016 flood peak		
	2.98			• October 2022 flood peak • Carboor Upper Road damaged and closed during the 2022 flood event.		
	3.23	7,737		• December 2010 flood peak. • Approx. 800mm rainfall from August to December recorded at the Carboor Upper rain gauge. • Nil significant impacts, other than rural / farmland flooding. • Some roads may be impacted at this height.	VICSES to consider placement of sandbags and sand at CFA Station in Carboor prior to road access being cut off. VICSES to consider publishing ungauged Minor flood warning to community.	Ovens River Intelligence Report 2012

	3.54	12,800	1%	• Oct 1993 Flood Level, 6 properties flooded above floor level.
				• Carboor-Everton Rd Hurdle Creek, Black Range Creek area impacted in 1993, between Mahers Lane and Murphys Lane. Residents names were:
				  • Jennings
				  • Ludeman
				  • Mitchell
				  • Hedderman
				• 2 X properties on Carboor-Everton Rd most vulnerable: Gibb Family (at Bridge and Box)
				
				Based on impacts from the 1993 flood event, the following *may* occur:
				
				Water over Roads:
				• Carboor-Everton Road
				• Mahers Road, including at the bridge from Carboor-Everton Road.
				• Murphys Lane, including at the bridge from Carboor-Everton Road.
				
				Properties at risk of isolation:
				• 17 Mahers Lane, Carboor
				• 32, 35 & 46 Murphys Lane, Carboor
				• 2245 & 2259 Carboor-Everton Road, Carboor
				• 1171 Lake Buffaloe-Carboor Road, Carboor
				• 1100 & 1291 Carboor-Everton Road, Bobinawarrah
					VICSES to consider publishing ungauged Major flood warning to community.
					
					VICPOL Evacuation Manager required and to consider Evacuations from this level.
					
					Considerations if a relief centre is required.
					
					VICSES to consider the use of Snap, Send, Solve Flood observers for Intelligence gathering.
					
					VICSES unit to engage residents in areas or properties listed about access issues and flooding predictions and speak to at risk residents.
						Whorouly-Wangaratta Flood Study 2003

Appendix C4: Flood Intelligence Card – Ovens River at Wangaratta

Gauge Location: Ovens River at Wangaratta

NOTE: Wangaratta Ovens River Flood Gauge 0 = 130.426 AHD

The flood intelligence cards in Appendix C4 - Ovens River at Wangaratta, are based largely on outputs from the Wangaratta Urban Waterways Flood Investigation (2017). This provides the most consistent and up to date flood mapping for the Wangaratta region and is well calibrated to large historic events. While the mapping is considered to be of a high standard, observations in recent flood events (2012 onwards) suggest that the flood impacts for the Wangaratta gauge between 12.5m and 12.8m are likely marginally overstated by the flood study mapping. The intelligence products could be considered a conservative upper limit representation of likely impact at the stated gauge level. Recent Observations have been included in the below flood intelligence cards to accurately reflect impacts observed in live events. However, no two floods are the same.

Gauge	River Height (m)	River Flow (ML/d)	Flood Class Level & Annual Exceedance Probability (%AEP)	Consequence/ Impact	Action Actions may include: Evacuation, closure of road, sandbagging, issue warning and who is responsible etc.	Reference
Ovens River at Wangaratta Gauge (Railway Bridge Templeton St)	**10.0**		**Below Minor Flood Class Level**	• Flooding of low lying crossing on tracks within the Lower Ovens park commence.		
	11.1			• Low level track on Ovens River west bank between Parfitt Road and Stock Bridge closed (onset below this level)	Rural City of Wangaratta to enact - Flood Ready Operations Procedures document	RCOW
	11.4			• Access routes into Lower Ovens National Park cut by flows in Boundary Creek (Francis Ln, Frosts Crossing).		17/07/2014
	11.5			• Flooding of wetland area near corner of Phillipson St and Cambridge Drive		17/07/2014
	11.6			• (Reedy Creek 3.98m) Stamps Lane open to end but peripheral flooding in a number of areas to around 300mm below road. • Highest is lagoon adjacent driveway to 150 Stamps Ln with water over around 1/3 of road width. • Main lagoon flood runner near 132 Stamps Ln has strong flow from Reedy Creek side. • Stamps Lane near Bowser Road is around 300 mm above Reedy Creek level. • Wills Street, Burrows Street, Dale Street remain dry but minimal freeboard on Burrows Street near Dale Street intersection	RCOW to commence closure of bike paths along Ovens River	

Gauge	River Height (m)	River Flow (ML/d)	Flood Class Level & Annual Exceedance Probability (%AEP)	Consequence/ Impact	Action Actions may include: Evacuation, closure of road, sandbagging, issue warning and who is responsible etc	Reference
Ovens River at Wangaratta **(Railway Bridge Templeton St)**	**11.6**			• Ambrosio Road north of Burrows Street starts to flood • Commencement of flooding over loop track (nearest to water treatment plant) in Frank Garth reserve. • At this stage water ponds under second span of Parfitt Road Bridge upstream of Apex Park due to culvert connection but there are no through flows to Apex Park • Hoban Street under rail bridge around 300mm above water level – house downstream is well elevated and likely that residents will remain in situ. • Bike / walking paths on Ovens River west bank between Parfitt Road and showgrounds closed (likely closed at around 11m upstream of stock bridge). • East bank tracks from Parfitt Road to footbridge near railway line remains dry • Flooding into Sydney Beach carpark commences due to water backing up through stormwater drains - results in shallow flooding over access road near entrance. Walking track between carpark and footbridge flooded • Flooding over access road into Northern Beaches (east of end of College Street)– water backing up through stormwater drains. Shallow flooding of open parkland area east of houses on Ovens View Terrace. • Flooding over lower access tracks around Billabongs Camping Area (Oxley Flats Rd / Hume Fwy) • Camping area remains accessible but arrangements for evacuation should begin to be established • Great Alpine Road around Yellow Creek remains open • Water at toe of Wilson Road levee at western end of Thomas Street but dry around remainder • Shallow flooding over driveway to single dwelling (19 Thomas Street) outside of levee – house is well elevated and residents likely to remain in-situ (boat access)	VICSES to consider EMT meeting with RCOW and VICPOL, likely via phone / video meeting. Consider ground crews to visit camp sites to understand if there are campers on site and to provide advice if further flooding imminent. VICPOL to start reviewing Evacuation plans for camping areas and other areas along Rivers where people are known to camp/live. RCOW to commence closure of bike paths along Ovens River. SES to undertake flood reconnaissance along impacted areas.	14/07/2016

Gauge	River Height (m)	River Flow (ML/d)	Flood Class Level & Annual Exceedance Probability (%AEP)	Consequence/ Impact	Action Actions may include: Evacuation, closure of road, sandbagging, issue warning and who is responsible etc	Reference
Ovens River at Wangaratta (Railway Bridge Templeton St)	**11.6**			• Shallow flooding into park area around Templeton Street boat ramp - road remains above flood level but walking tracks closed • Water against Painters Island river levee / concrete path over most of its length but freeboard remains		
	11.65			• Shallow flooding (backwater flooding) into backyards around 36 and 38 Templeton St) and to rear fences of houses between 38 Templeton Street and railway bridge		21/07/2013 and 2016 14/07/2016
	11.7			• Lower bench of park area between Wilson Rd bridge and WTP deeply flooded (onset threshold not known)		02/03/2012
	11.8			• Likely closure of Great Alpine Road at Yellow Creek (Detour Road bypasses)	RRV to consider closure of GAR at Yellow Creek and enact detour RCOW to monitor and inspect roads to determine road closures	
	11.85			• Dowling Lane remains open and dry, no impact around dwelling • Paths from Sydney Beaches to footbridge closed	RCOW to close paths at Sydney Beaches	01/07/2014

Gauge	River Height (m)	River Flow (ML/d)	Flood Class Level & Annual Exceedance Probability (%AEP)	Consequence/ Impact	Action Actions may include: Evacuation, closure of road, sandbagging, issue warning and who is responsible etc	Reference
Ovens River at Wangaratta (Railway Bridge Templeton St)	**11.9**	25,300	**Minor Flood Level**		BOM will issue and VICSES to publish Minor flood warning to community with tailored information from this plan Rural City of Wangaratta to enact - Flood Ready Operations Procedures document - Minor Level	
	11.9			• Estimated threshold for overtopping of Hoban Street beneath rail line - cuts access to 1 house • Advise Painters Island Caravan Park of flood risk. Current managers at this caravan park have not experience significant flooding and have only recently (2024?) taken over managing the park. • Ovens River commences flooding over bank at Apex Park and Painters Island Caravan Park. • Water up to Yogi's Chin in APEX Park • 31 Hoban Street, Wangaratta access becomes restricted	VICSES to add to Minor Flood warning impacts at this level VICSES to advise Painters Island Caravan park to enact their Emergency Plan -**phase 1** and enact their emergency plan checklist. Painters Island caravan park to move residents in low lying areas to higher ground in park. RCOW to commence closure of Apex Park. RCOW to ensure Sydney Rd Carpark is closed with cars removed before 11.9m at the latest VicPol to advise owners of cars parked on Sydney Rd car park to move cars before 11.9m Minor flood level RCOW to commence closure of low lying car parks at: • Sydney Beach • Bickerton Street • Baker Street • Boat Ramp (off Templeton Street) • Northern Beaches RCOW to remove bins, close bike and shared paths listed in Flood operation procedure. 31 Hoban St to be visited and decision to relocate. No access from 12m	14/07/2016 FIC Ovens catchment Wangaratta Urban Waterways Flood Study v03 2017

Gauge	River Height (m)	River Flow (ML/d)	Flood Class Level & Annual Exceedance Probability (%AEP)	Consequence/ Impact	Action Actions may include: Evacuation, closure of road, sandbagging, issue warning and who is responsible etc	Reference
Ovens River at Wangaratta (Railway Bridge Templeton St)	**12.0**			• Consider Fishers Levee (1917 levee along Yellow Creek) likely to overtop • East Wangaratta, GAR closed / traffic detours via Detour Rd area) • Minor flows into Apex Park commence. Ovens River near bank full through length of Apex Park but only shallow breakout immediately downstream of bridge (flows return to river) • Further flooding from Ovens River over entrance road to Sydney Beaches carpark • Northern beaches access road deeply flooded at end of College Street (flooding commences around 11.6m) • Shallow flooding of park areas near Ovens View Tce • Water flows across Apex Park and enters lagoon behind Painters Island Caravan Park may commence at this level.	RRV to put Detour In place and Close GAR VICSES to consider the use of Snap, Send, Solve Flood observers RCOW to monitor and inspect roads to determine any further road closures	Validated July 2013 event. 19/07/2014 Wangaratta Urban Waterways Flood Study v03 2017
	12.1			• Shallow flooding around eastern side of Wilson Road levee downstream of Oxley Flats Road (not overtopping Oxley Flats Rd in this area) • Nominal level at which flooding over Stamps Lane near Bowser Road can be expected - timing depends on precedent floods filling Yellow Creek area. • Flooding commences at Reedy Creek Wangaratta North level 4.25m • Overtopping of Ovens River in Frank Garth Reserve upstream of floodway bridge commences. • Water commences to pass beneath floodway span of Parfitt Road Bridge upstream of Apex Park (having spilled over the Ovens River bank in Frank Garth reserve) • Bickerton Street carpark overtops after depressions in Apex Park fill resulting in progressive filling of lagoon around Painters Island Caravan Park	APEX Park Carpark should be closed / cars removed before 12.1m	05/09/2015 08/08/2013 Wangaratta Urban Waterways Flood Study v03 2017

Gauge	River Height (m)	River Flow (ML/d)	Flood Class Level & Annual Exceedance Probability (%AEP)	Consequence/ Impact	Action Actions may include: Evacuation, closure of road, sandbagging, issue warning and who is responsible etc	Reference
Ovens River at Wangaratta (Railway Bridge Templeton St)	**12.2**			• Broad flooding of Apex Park commences - extends around Pavilion and reaches Yogi and covers road. • Level in Apex Park depends on duration of flooding (more-so than increment in gauge level) • Further flooding of Painters Island Caravan Park can commence based of steady flow rates • Painters Island Caravan Park access Road may be subject to shallow flooding from around 12.2 • Wangaratta gauge site inaccessible **Water over road** • Peechelba Rd (east of Ovens River	VICSES to advise Painters Island Caravan park to enact their Emergency Plan -**phase 2** and continue with emergency plan checklist. Painters Island Caravan Park determine to close park and ask all patrons to relocate VICSES/RCOW/VICPOL to hold EMT regarding the closure of Painters Island Caravan park – This may result in assistance to move residents and may trigger relocation funding from DFFH RCOW to commence closure of Peechelba Road	
	12.3			• Deep flooding in Frank Garth reserve by 12.3 • Dale Street railway underpass flooded • Deep, rapid flows through Parfitt Rd floodway bridge • Overtopping of levee/bike path along Ovens River frontage of Painters Island - at the defined low point in the levee (dip can also operate to drain water from the park depending on level of filling from Apex Park) • Shallow overtopping of Pinkerton Crescent (<200mm) near 35 Pinkerton (at rear of Painters Island) - timing and level depends on duration at this level. • Overflows drain away toward Dale St and Wills St • Low ground in Painters Island will be flooded to level controlled by Pinkerton Crescent and dip in river levee. • Cabins and office etc remain accessible from Pinkerton Cres but road may be subject to shallow flooding from around 12.2	VICSES recon of impacted areas listed.	02/03/2012 22/02/2013 22/07/2013 Wangaratta Urban Waterways Flood Study v03 2017

Gauge	River Height (m)	River Flow (ML/d)	Flood Class Level & Annual Exceedance Probability (%AEP)	Consequence/ Impact	Action Actions may include: Evacuation, closure of road, sandbagging, issue warning and who is responsible etc	Reference
Ovens River at Wangaratta (Railway Bridge Templeton St)	**12.4**	40,500	**Moderate Flood Level**	• Water up to Yogi's Mouth in APEX Park • Need to determine if this gauge level is the time to alert Parfitt Rd. Levee and Wilson Rd. Levee residential properties, Farms, Wang. Rural residential. • Broad scale, deep flooding of Northern beaches area outside of levee - floods close to road closure gate at end of College St • No impact on private properties along Ovens View Tce • No overtopping of Oxley Flats Road between Wilson Road and Taylors Lane (but may occur early under large King flood 24/07/2016	VICSES to consider Base IMT rostered/standby or Base IMT in place depending on forecast BOM will issue and VICSES to publish Moderate flood warning to community VICSES to Consider the use of Snap, Send, Solve Flood observers for Intelligence gathering IMT To consider requesting Swift water rescue team to be on standby. Rural City of Wangaratta to enact - Flood Ready Operations Procedures document - Moderate Level VICSES units to engage landholders of potential isolation/evacuations if required. Wangaratta council hold a contact directory of residents who are outside the 'protected' levee system but reside in the flood zone, this list takes into account residents of Stamps Lane as well as Wilson Rd and Taylors Lane	BOM Dec 2012 FIC Ovens catchment 24/07/2016 Wangaratta Urban Waterways Flood Study v03 2017
	12.45			• Water around toe level of Wilson Road levee for most of perimeter (excluding west of Oxley Flats Rd). • Shallow flooding over Taylors Lane (may occur early under large King River flood • Flooding along eastern perimeter of Parfitt Road levee • Continuous overbank flooding through Apex Park • Deep and fast flows through entire Sydney Beach carpark • Deep flooding over culverts at lagoon at entrance to Painters Island	RCOW to conduct Inspections of the levee systems to occur in line with Asset Inspection requirements. Includes regular inspection (two times per day), recording and images of levee system. RCOW to inspect and determine Closure of Taylors Lane	24/07/2016 Wangaratta Urban Waterways Flood Study v03 2017

Gauge	River Height (m)	River Flow (ML/d)	Flood Class Level & Annual Exceedance Probability (%AEP)	Consequence/ Impact	Action Actions may include: Evacuation, closure of road, sandbagging, issue warning and who is responsible etc	Reference
Ovens River at Wangaratta (Railway Bridge Templeton St)	**12.45**			• Near overtopping high point in driveway / low level carpark at rear of 16 Templeton St • Flooding into park area on Riverview Crescent (may flood earlier from large King River flood) • Baker St carpark deep flooding. Flooding of back yard 34 Templeton St extends through gate in colorbond fence • Flooding into park area on Riverview Crescent (may flood earlier from large King River flood) • Templeton St boat ramp area flooded to around rear property boundaries • Flooding of park near Ovens View Tce / College Street extends to around 5m outside of fence lines • Approaching edge of road at corner of Philipson St / Cambridge Drive (Mullinmur Billabongs) but well below road level • Billabong area at western end of Cambridge Drive not connected to floodplain flows but will fill from local runoff **Water over road** • Wilson Road (outside of the levee protected area). • Markwood-Everton Road • Bickerton Street, including the car parking areas. • Milawa-Tarrawingee Road • College Street, preventing access to the Northern Beaches carpark • Markwood-Tarrawingee Road • Pinkerton Crescent • Baker Street car park • Dowling Lane • River Road • GAR, between the Rail Trail and Detour Road. • Oxley Flats Road • Stamps Lane / Dale Street / Ambrosio Road	VICSES to add to Moderate Flood warning impacts at this level IMT to advise Flood observers that gauge is now inaccessible RCOW/RRV to commence closure of roads identified	24/07/2016 Wangaratta Urban Waterways Flood Study v03 2017

Gauge	River Height (m)	River Flow (ML/d)	Flood Class Level & Annual Exceedance Probability (%AEP)	Consequence/ Impact	Action Actions may include: Evacuation, closure of road, sandbagging, issue warning and who is responsible etc	Reference
Ovens River at Wangaratta (Railway Bridge Templeton St)	**12.5** AHD 142.93	58,100	**20% AEP**	• Localised breakouts on the northern floodplain of the Ovens River upstream of the Hume Freeway inundating agricultural land • Downstream of the Hume Freeway there are widespread outbreaks from the Ovens River, King River Yellow Creek and Reedy Creek. • Some properties on Oxley Flats Rd, Wilson Rd, River Rd, Markwood-Tarrawingee Rd, Milawa-Tarrawingee Rd, have water over driveways • Floodwaters from the King River fill Kaluna Wetlands and the rest of Merriwa Park not protected by the levee. • Some outbuildings in the Ovens River Floodplains are impacted by water **Properties at Risk** • 1 residential property at: Dowling Lane, North Wangaratta **Water over road** • Ivones Lane • Reids Lane • Goodwins Lane • River Road • Oxley Plains Road • Williams Lane • College Street, preventing access to the Northern Beaches carpark • Tweed Street • Burrows Street	VICSES to add to Moderate Flood warning impacts at this level VICSES to determine if response to Dowling Lane required – visit property to assess potential impact. RCOW/RRV to commence closure of roads identified Sandbag store held at Wangaratta SES Unit.	Wangaratta Urban Waterways Flood Study v03 2017
	12.62	84,200	**10% AEP**	• AHD 143.05 • Increased extent of flooding around Markwood-Tarrawingee Road with additional driveways impacted by floodwaters <100 mm deep. **Properties at Risk (above floor):** • 9 Pinkerton Crescent **Water over road** • Willis Street • Minor inundation of Billabong Drive east of Kingfisher Drive	VICSES to determine if response to Pinkerton Crescent required – visit property to assess potential impact. RCOW/RRV to commence closure of roads identified	Wangaratta Urban Waterways Flood Study v03 2017

Gauge	River Height (m)	River Flow (ML/d)	Flood Class Level & Annual Exceedance Probability (%AEP)	Consequence/ Impact	Action Actions may include: Evacuation, closure of road, sandbagging, issue warning and who is responsible etc	Reference
Ovens River at Wangaratta (Railway Bridge Templeton St)	**12.7**	98,000	**Major Flood Level**	• Water up to Yogi's Nose in APEX Park • Widespread flooding around the airport and along the Ovens River flats north of Wangaratta to Peechelba • Merriwa Park levee under threat – consideration to sandbag or implementation of other protection measures • The Christopher Robin Kindergarten will be threatened. **Water over road** • Parfitt and Bowser Roads – north of levee system • Vernon Road • Lucas Street • Carboor- Everton Road (Markwood Everton Road to Snow Road) • Fraser Lane • Wylie Street • Melba Street • Sunset Drive • Trotman Drive • Walter Street • Willow Drive	VICSES to consider Base IMT in place or Core in place with observed activity BOM will issue and VICSES to publish Major flood warning to community VICSES to add to Major Flood warning impacts at this level. VICSES/RCOW to Inspect Merriwa Park Levee and Christopher Robin Kindergarten determine protection measures.- RCOW to Close Merriwa Park IMT will consider critical services infrastructure. RCOW/RRV to commence closure of roads identified. VicPol Evacuation Manager to consider Evacuations Plan Rural City of Wangaratta to enact - Flood Ready Operations Procedures document – Major Level	BOM Dec 2012 Wangaratta Urban Waterways Flood Study v03 2017

Gauge	River Height (m)	River Flow (ML/d)	Flood Class Level & Annual Exceedance Probability (%AEP)	Consequence/ Impact	Action Actions may include: Evacuation, closure of road, sandbagging, issue warning and who is responsible etc	Reference
Ovens River at Wangaratta (Railway Bridge Templeton St)	**12.71** AHD 143.14	111,000	**5% AEP**	• Floodwaters begin to impact low lying areas of Merriwa Park within the levee including Christopher Robin Kindergarten. **Properties at Risk (above floor): 5 additional residential properties (6 in total)** • 182 Markwood-Tarrawingee Road Markwood • 171 Oxley Flats Road Wangaratta • 194 Great Alpine Road • 31-37 Weir Street Wangaratta • 23 Peruzzo Street Wangaratta • 49 Stamps Lane, Wangaratta **Water over road** • Vernon Road - Preventing access to agricultural land • Markwood-Everton Road • Allans Lan	VICSES to determine if response to Properties identified– visit property to assess potential impact. VICSES to add to Major Flood warning impacts at this level RCOW/RRV to commence closure of roads identified.	Wangaratta Urban Waterways Flood Study v03 2017
	12.759			• Dec 2010 flood peak		
	12.772			• Sept 1998 Flood peak following 300mm of rain		
	12.78			• Oct 2016 Flood Peak		
	12.804			• Sept 2010 flood peak • Old Hume Hwy Floods		

Gauge	River Height (m)	River Flow (ML/d)	Flood Class Level & Annual Exceedance Probability (%AEP)	Consequence/ Impact	Action Actions may include: Evacuation, closure of road, sandbagging, issue warning and who is responsible etc	Reference
Ovens River at Wangaratta (Railway Bridge Templeton St)	**12.82**	144,000	**2% AEP**	• Merriwa Park Inundated • Increased access issues to driveways and home along Oxley Flats Rd • Access issues beginning to properties Bowser Rd • Some of North East Water's wastewater treatment ponds are breached by floodwaters. • The levee around Merriwa Park is up to 700 mm below the floodwater resulting in the park including tennis club buildings and Christopher Robin Kindergarten being inundated with depths over 2 m in low lying areas. **Properties at Risk: 9 additional residential properties (15 in total)** • 340 Markwood-Tarrawingee Road Markwood • 231 Ivones Lane Milawa • 150 & 240 Stamps Lane North Wangaratta • 14 Taylors Lane Wangaratta • 5 Milawa-Tarrawingee Road Milawa • 49 & 61 Great Alpine Road Wangaratta **Commercial/Municipal properties at risk:** • 66 Ryley Street Wangaratta (Wangaratta Lawn Tennis Club) • Christopher Robin Childcare, Merriwa Park, Wangaratta **Water over road** • Carboor-Everton Road, from the Markwood-Everton Road to the Snow Road. • Parfitt and Bowser Roads, north of the Parfitt Levee System	VICSES to determine if response to Properties identified. Recon of these properties. VICSES to add to Major Flood warning impacts at this level IMT to engage REMT (NE Water) about waste water treatment impacts RCOW/RRV to close Merriwa Park and Christopher Robin Kindergarten RCOW/RRV to commence closure of roads identified	Wangaratta Urban Waterways Flood Study v03 2017

Gauge	River Height (m)	River Flow (ML/d)	Flood Class Level & Annual Exceedance Probability (%AEP)	Consequence/ Impact	Action Actions may include: Evacuation, closure of road, sandbagging, issue warning and who is responsible etc	Reference
Ovens River at Wangaratta (Railway Bridge Templeton St)	**12.92**	180,000	**1%**	• AHD 143.35 • Residential and commercial property within the levee on Wylie St and Parfitt Road, north of Morgan Road become impacted by flood waters. • Areas that are not protected by levees between Reedy Creek and the Ovens River, downstream of Fishers Lane are inundated by generally more than 1 m of water. **Properties at Risk (above floor): additional 15 residential properties (30 in total)** • 707 Oxley Flats Road Oxley Flats • 87 Milawa-Tarawingee Road • 49 Pinkerton Crescent Wangaratta • 137 & 22 Taylors Lane Wangaratta • 1 Bowser Road Wangaratta • 86, 119, & 132 Stamps Lane North Wangaratta • 128 Wilson Road Wangaratta • 1 & 3 Willis Street Wangaratta • 53 Pinkerton Crescent Wangaratta • 57 Bowser Road North Wangaratta • 19 Thomas St Wangaratta	Refer to 1% flood inundation map in Appendix F VICSES to determine if response to Properties identified VICSES to add to Major Flood warning impacts at this level RCOW/RRV to commence closure of roads identified	Wangaratta Urban Waterways Flood Study v03 2017
	12.974		**1%**	• AHD RL 143.4 • Parfitt Rd levee design height. 600 mm above 1% **3 Mile Creek:** • Sunset Drive levee design height, • Wilson Rd levee design height. 600 mm above 1% • Oxley Flats Road		Declaration maps
	12.98	187,000		• Oct. 1993 flood peak and estimated 1917 flood peak • Complete breakout through Whorouly and along Lower River Rd. • **Whorouly township:** Above floor flooding to houses in Church St and 1 house in Lane beside Pub. • **Lower River Rd:** Several Houses adjacent to Snow Rd (ex Glenrowan to Myrtleford Rd) above floor flooding. • Relatively calm flows around town but High velocity flows near Newth's Bridge, above floor flooding likely in this local area. • GAR at sewerage farm will be flooded. • Alternative access via the Rail Trail for emergency Service vehicles only. • Effects of the Ovens and Buffalo River can impact this area. • Sonnemans, approx 25 properties above floor level. • SEE ALSO impacts on Hurdle Creek in King Catchment.	Water authorities to consider contamination of floodwaters and safety of drinking water IMT to consider most at risk locations to stage land-based swift water response rescue capability and flood boat response capability	FIC Ovens catchment

Gauge	River Height (m)	River Flow (ML/d)	Flood Class Level & Annual Exceedance Probability (%AEP)	Consequence/ Impact	Action Actions may include: Evacuation, closure of road, sandbagging, issue warning and who is responsible etc	Reference
Ovens River at Wangaratta (Railway Bridge Templeton St)	**13.03**	201,900	**0.5% AEP**	• AHD 143.46 • The Wilson Road Levee is overtopped impacting serval houses on Wilson Road and the side roads. • Wilson Road Levee is over topped at the northern end, impacting a number of properties and dwelling within the levee. • The majority of residential and commercial properties within the Parfitt Road levee are impacted by flood waters. **Water over road** • Parfitt Road • Wylie Street • Bickerton Street • Kett Street • Morgan Road • Regal Crescent • Potter Street • Wilson Road • Dunphy Street • Thomas Street • Boyd Street • Heach Street • Chandler Street	VICSES to add to Major Flood warning impacts at this level RCOW/RRV to commence closure of roads identified	Wangaratta Urban Waterways Flood Study v03 2017
	13.6 est			• Local Knowledge Raised cabins at Painters Island inundate. • Reidy Creek floodplain. Stamps Lane overtopping at Reidy Creek Gauge 4.25 m		FIC Ovens catchment

Appendix C5: Flood Intelligence Card – Fifteen Mile Creek (Including One & Three Mile Creeks)

Gauge Location: Fifteen Mile Creek at Greta South

Gauge	River Height (m)	River Flow (ML/d)	Flood Class Level & Annual Exceedance Probability (%AEP)	Consequence/ Impact	Action Actions may include: Evacuation, closure of road, sandbagging, issue warning and who is responsible etc	Reference
Fifteen Mile Creek at Greta South	**2.8**		**Minor Flood Level**		BOM will issue and VICSES to publish Minor flood warning to community with tailored information from this plan The North East Duty Officer in conjunction with the Regional Agency Commander will maintain operational awareness and form an appropriate response to suit the level of the incident	
	3.2			• GoTAFE paddocks (Tone Rd), CFA and SES Training Grounds (Shelley St) and low-lying farms near freeway are inundated. • Rattray Avenue footbridge closed on One Mile Creek • Swan and Bronmar Streets	RCOW/RRV to commence closure of roads identified.	
	3.8	6,200	20% AEP (5 year ARI)	• No above floor flooding to residential or commercial/municipal properties • Generally shallow inundation of agriculture land between the Hume Freeway and Arundels Lane from 15 Mile Creek breakouts and culverts under the freeway. • Flow in 1 and 3 Mile Creeks generally confined to channel or minor breakouts into the waterway corridor not impacting property **Water over road** • Snow Road, between the Hume Freeway and Laceby-Targoora Road • Greta Road near corner of Brian Higgins Drive impacting access to the airport from both north and south • Arundels Lane • Tone Road, at 3 Mile Creek • Clarkes Lane	VICSES to add to Minor Flood warning impacts at this level RCOW/RRV to commence closure of roads identified RCOW consider impacts of access and Egress to/from the aerodrome	Wangaratta Urban Waterways Flood Study 2017

Gauge	River Height (m)	River Flow (ML/d)	Flood Class Level & Annual Exceedance Probability (%AEP)	Consequence/ Impact	Action Actions may include: Evacuation, closure of road, sandbagging, issue warning and who is responsible etc	Reference
Fifteen Mile Creek at Greta South	**3.98**			• Oct 2016 flood peak		
	4.2		**Moderate Flood Level**		BOM will issue and VICSES to publish Moderate flood warning to community VICSES to Consider the use of Snap, Send, Solve Flood observers for Intelligence gathering	
	4.83	9,700	10% AEP (10year ARI)	• No above floor flooding to residential or commercial / municipal properties • Access to airport impacted but runway and buildings not impacted. • Low lying property at 1 Glenrowan Road, Wangaratta isolated from breakouts from 15 Mile Creek with depths of 200-300 mm across the driveway. • Flow in 1 Mile Creek still mainly confined to waterway corridor. • Some impact to rear of properties along Graham Avenue but homes not affected. • Minor inundation at rear of several properties along Mannion Court and Martin Place. • Flow in 3 Mile Creek also generally confined to waterway corridor. Some impact to rear of properties along Franklin Street but homes not affected. • Breakouts from 3 Mile Creek leading to generally shallow inundation to the exterior of several properties on Laura Court and Scott Street. **Water over road** • Gravel Pit Rd • Glenrowan Road	RCOW/RRV to commence closure of roads identified. SES to recon listed properties and ensure residents are aware of possible impacts. Consideration given to access to airport and contingency options Door knock of residents noted to be impacted along 3 Mile Creek. Assess if property protection is required. Sandbag store at Wangaratta SES Unit	Wangaratta Urban Waterways Flood Study 2017
	5.0			• Flooding begins along One Mile Creek near Cribbes Road and begins to impact properties in Graham Avenue.		

Gauge	River Height (m)	River Flow (ML/d)	Flood Class Level & Annual Exceedance Probability (%AEP)	Consequence/ Impact	Action Actions may include: Evacuation, closure of road, sandbagging, issue warning and who is responsible etc	Reference
Fifteen Mile Creek at Greta South	5.96			• December 2010 flood level.		
	6.00		**Major Flood Level**		BOM will issue and VICSES to publish Major flood warning to community VicPol Evacuation Manager to consider Evacuations Plan	
	6.04	14,200	5% AEP (20 year ARI)	• No above floor flooding to residential or commercial / municipal properties • No additional key locations of interest inundated • Increased depths around the airport but runway and buildings not impacted. • Three Mile Creek downstream of Shanley Street remains largely within the waterway corridor. • The One Mile Creek is largely confined to the creek corridor **Water begins to enter properties (below floor) at:** • 20 Turner Street, • 122-128, 118 and 116 Phillipson Street, • 109 and 100 Edward Street **(below floor).**	VICSES to add to Major Flood warning impacts at this level. VICSES to door knock listed locations at risk and assess impact. Assess if property protection is required.	Wangaratta Urban Waterways Flood Study 2017
	6.8			• September 2010 flood level.		
	7.0			**Properties at Risk (above floor):** • Properties in Rowan Street	VICSES to recon listed locations at risk and assess impact. Assess if property protection is required.	

Gauge	River Height (m)	River Flow (ML/d)	Flood Class Level & Annual Exceedance Probability (%AEP)	Consequence/ Impact	Action Actions may include: Evacuation, closure of road, sandbagging, issue warning and who is responsible etc	Reference
Fifteen Mile Creek at Greta South	**8.1**	22,100	2% AEP (50 year ARI)	• Widespread inundation across the 15 Mile Creek floodplain between the Snow Road and Hume Freeway. • Flood waters start to impact on the CFA training centre and the and saleyard wastewater treatment ponds. • Flow in 1 Mile Creek still mainly confined to waterway corridor with some exceptions. • Multiple properties that border the One and Three Mile Creeks throughout Wangaratta see water enter yards and properties. **Properties at Risk (above floor): additional 12 residential properties (12 in total)** • 35 & 37 Crisp Street Wangaratta • 10, 14, 16, 18, 20 Graham Avenue Wangaratta • 15 Valdoris Avenue Wangaratta • 13, 14 Bronmar Street Wangaratta • 112 Arundels Lane Wangaratta South • Williams Rd **Water over road** • Bronmar Street • Trottman Drive	VICSES to add to Major Flood warning impacts at this level IMT to engage CFA RAC regarding floodwater entering VEMTC Training Ground IC, RCOW and evacuation manger to consider evacuations and relief arrangement for impacted residents RCOW/RRV to commence closure of roads identified VICSES to recon listed locations at risk and assess impact. Assess if property protection is required / possible.	Wangaratta Urban Waterways Flood Study 2017
	8.54	24,500		• October 1993 Flood Peak • 53 Homes flooded along One Mile Creek		Ovens River Intelligence Report 2012
	x.xxm Beyond level of rating curve	29,700	1% AEP (100 year ARI)	• The exterior of 43 Cusack Street becomes impacted by flood water. • Low lying paddocks at the Tafe Campus at Tone Road start to become inundated. • Buildings and roadways at the Wangaratta Speedway become impacted by flood waters from the Three Mile Creek.	IC, RCOW and evacuation manger to consider evacuations and relief arrangement for impacted residents	Wangaratta Urban Waterways Flood Study 2017

Gauge	River Height (m)	River Flow (ML/d)	Flood Class Level & Annual Exceedance Probability (%AEP)	Consequence/ Impact	Action Actions may include: Evacuation, closure of road, sandbagging, issue warning and who is responsible etc	Reference
Fifteen Mile Creek at Greta South	**x.xxm Beyond level of rating curve**	29,700	1% AEP (100 year ARI)	• Further properties that border the One and Three Mile Creeks throughout Wangaratta see water enter yards and properties **Properties at Risk (above floor): additional 11 residential properties (23 in total)** • 12 Graham Avenue Wangaratta • 2/152 Rowan Street Wangaratta • 1/152 Rowan Street Wangaratta • 152a Rowan Street Wangaratta • 15 Walter Street Wangaratta • 22 Graham Avenue Wangaratta • 33 Crisp Street Wangaratta • 122-128 Phillipson Street Wangaratta • 13 Walter Street Wangaratta • 26 Graham Avenue Wangaratta • Dwelling and Shedding adjacent to 101 Williams Road **Water over road** • Melba Street • Sunset Drive • Trotman Drive • Walter Street • Willow Drive • Edwards Street • Rattray Avenue • Panes Lane	VICSES to add to Major Flood warning impacts at this level IMT to engage TAFE/ Dept of Education regarding water entering grounds RCOW/RRV to commence closure of roads identified. VICSES to recon listed locations at risk and assess impact. Assess if property protection is required / possible.	Wangaratta Urban Waterways Flood Study 2017
	x.xxm Beyond level of rating curve	39,000	0.5% AEP (200 year ARI)	• Further properties that border the 15, One and Three Mile Creeks floodplains see water further enter properties, and additional agricultural land in the 15 Mile Creek Floodplain inundated • Flood Waters Approach the Northern End of The Airport Runway. • The One Mile Creek Breaks Out of The Creek Reserve Along Rattray Avenue, and the Creek Reserve Between White Street and Vincent Road Impacting A Number of Properties, Including Dwellings on Valdoris Avenue.	VICSES to add to Major Flood warning impacts at this level IC, RCOW and evacuation manger to consider evacuations and relief arrangement for impacted residents. Property protection from this level unlikely to be effective, unless on the flood fringe.	Wangaratta Urban Waterways Flood Study 2017

Gauge	River Height (m)	River Flow (ML/d)	Flood Class Level & Annual Exceedance Probability (%AEP)	Consequence/ Impact	Action Actions may include: Evacuation, closure of road, sandbagging, issue warning and who is responsible etc	Reference
Fifteen Mile Creek at Greta South	**x.xxm Beyond level of rating curve**	39,000	0.5% AEP (200 year ARI)	• Significant Impact to The Saleyards Wastewater Treatment Ponds. • Floodwaters Approaching and Impacting on Stables at The Turf Club. • The Crochet Club and Church on Ryan Avenue Are Inundated by Floodwaters. • Breakout Across Park Adjacent to Police Station.	VICSES to consider door knock of impacted properties and streets. RCOW to engage Turf Cub, Crotchet Club, saleyards and Church on Ryan St regarding enacting emergency plans Determine impact on water treatment ponds at the saleyards on waterways and other business in the area and environment RCOW/RRV to commence closure of roads identified	
	x.xxm Beyond level of rating curve	39,000	0.5% AEP (200 year ARI)	**Additional impacts to dwellings (not above floor) in:** • Cusack St • 27-33 Perry Street. • Swan Street • Rowan Street. • Phillipson Street • Hulme Drive, • Moran Court • Dalton Court, • O'Callaghan Drive, • Warratah Court, • Mannion Court • Edward Street • 79 Shanley Street • 1 & 2 Hayes Court • 1 Scott Street. • 2-6 Sunset Drive • 22 Willow Drive • 42-48 & 59-61 Franklin Street • 42-46 Trotman Drive	IC, RCOW and evacuation manger to consider evacuations and relief arrangement for impacted residents VICSES to consider door knock of impacted properties and streets. VICSES NEDO/IWO to add to Major Flood warning impacts at this level	Wangaratta Urban Waterways Flood Study 2017

Gauge	River Height (m)	River Flow (ML/d)	Flood Class Level & Annual Exceedance Probability (%AEP)	Consequence/ Impact	Action Actions may include: Evacuation, closure of road, sandbagging, issue warning and who is responsible etc	Reference
Fifteen Mile Creek at Greta South	**x.xxm Beyond level of rating curve**	39,000	0.5% AEP (200 year ARI)	**Properties at Risk (above floor): additional 18 residential properties (41 in total)** • 2 Hayes Court Wangaratta • 22 Hulme Drive Wangaratta • 8 Sadler Street Wangaratta • 1/85 Swan Street Wangaratta • 27 Perry Street Wangaratta • 12 Bronmar Street Wangaratta • 19 Martin Place Wangaratta • 46 Franklin Street Wangaratta • 4 Sunset Drive Wangaratta • 44 Franklin Street Wangaratta • 16 Olive Street Wangaratta • 11 Bronmar Street Wangaratta • 2 Sunset Drive Wangaratta • 24 Graham Avenue Wangaratta • 31 Perry Street Wangaratta • 156 Rowan Street Wangaratta • 154 Rowan Street Wangaratta • 64 Swan Street Wangaratta • Various Properties on Valdoris Avenue. **Water over road** • White Street • Franklin Street • Esmond Street	RCOW/RRV to commence closure of roads identified. IC, RCOW and evacuation manger to consider evacuations and relief arrangement for impacted residents VICSES to consider door knock of impacted properties and streets.	Wangaratta Urban Waterways Flood Study 2017

Note: flood intelligence records are approximations. This is because no two floods at a location, even if they peak at the same height, will have identical impacts. Flood intelligence cards detail the relationship between flood magnitude and flood consequences. More details about flood intelligence and its use can be found in the Australian Institute of Disaster Resilience (AIDR) Handbook series on managing the Floodplain.

APPENDIX D - FLOOD EVACUATION ARRANGEMENTS

Phase 1 - Decision to Evacuate

Under the SEMP, Victoria Police (VicPol) has the responsibility for evacuation (Evacuation Manager) – in consultation with the control agency and other expert advice. EMV has developed a standardised procedure for evacuation under JSOP J03.12.

The IC decides whether to warn people to evacuate within a specified timeframe or whether it is necessary to advise them to evacuate immediately. The IC must make this decision having regard for the requirements of the JSOP.

Once the IC makes a decision to recommend evacuation, VicPol's Evacuation Manager is responsible for the management of the evacuation process where possible. VICSES and other agencies will assist where practical. VICSES is responsible for the development and communication of evacuation warnings.

VicPol and/or Australian Red Cross may take on the responsibility of registering people affected by a flood emergency including those who have been evacuated.

The Incident Controller may make the decision to evacuate an at-risk community under the following circumstances:

- properties are likely to become inundated
- properties are likely to become isolated and occupants are not suitable for isolated conditions
- public health is at threat because of flooding and the IC considers that evacuation is the most effective risk treatment. The AV Health Commander is responsible for supporting the evacuation of vulnerable people. Refer to the State Health Emergency Response Plan (SHERP) for details)
- essential services have been damaged and are not available to a community, therefore the IC considers evacuation is the most effective risk treatment.

The following should be considered when planning for evacuation:

- anticipated flood consequences and their timing and reliability of predictions
- size and location of the community to be evacuated
- likely duration of evacuation
- forecast weather
- flood models
- predicted timing of flood consequences
- time required and available to conduct the evacuation
- evacuation priorities and evacuation planning arrangements
- access and egress routes available and their potential flood liability
- current and likely future status of essential infrastructure
- is cross border assistance required or evacuation to another municipality relief centre?

- resources required and available to conduct the evacuation
- shelter including emergency relief centres, assembly areas
- vulnerable people and facilities
- transportation
- registration
- people of cultural or linguistically diverse background and transient populations
- safety of emergency service personnel
- different stages of an evacuation process.

The decision to evacuate is to be made by the IC in consultation with the MERC, MEMO, DFFH, Health Commander and other key agencies and expert advice (CMA's and Flood Intelligence specialists).

When planning evacuation, the IC will consider triggers for evacuation. For example, specific flood heights are predicted.

The table below details triggers for evacuation, if these heights are predicted or are likely to occur evacuation should be considered.

The below is a guide only based on historical floods and intelligence. Every flood is different and intelligence should be validated on the ground to assist with planning for evacuations.

Location OVENS RIVER	Evacuation Trigger	Action
WANGARATTA Ovens River – Wangaratta Gauge	11.9m	Painters Island Caravan Park, Wangaratta to enact Emergency Management Plan – Phase 1 (Move low lying camping area to higher ground. VICSES RDO/RAC to hold an EMT between SES, VICPOL and RCOW to determine actions
	12.2m	Painters Island Caravan Park, Wangaratta to enact Emergency Management Plan – Phase 2 (Close Park – Relocate all visitors/residents to alternate location VICSES RDO/RAC to hold an EMT between SES, VICPOL and RCOW to determine actions
	12.5m	One property in Dowling Lane North Wangaratta may need evacuation IMT to determine if response to Dowling Lane Required – make contact or Visit address
	12.62m	9 Pinkerton Crescent Wangaratta may need evacuation

		IMT to determine if response to Dowling Lane Required – make contact or Visit address
	12.82m	Evacuation of Parfitt Road Levee required due to levee over topping and possible failure Open Relief centre
	12.97m	Evacuation of Wilson Road Levee required due to levee over topping and possible failure Open Relief centre
KING RIVER		
KING VALLEY King River at Cheshunt	2.6m	King River overtopping bank into Gentle Annie Caravan Park, Whitfield. EDI Cutting Camp Area inundated. VICSES/VICPOL to visit and evacuate campers. RCOW/PV to close Edi Cutting IMT to make contact or Visit addresses, consider Relief centre
	2.7m	Properties in Cheshunt township become inundated (refer to intel card) IMT to make contact or Visit addresses and open relief centre
15 MILE CREEK		
WANGARATTA 15 Mile Creek – Greta South Gauge	6.04m	Some homes in the following streets inundated and require evacuation: Turner St, Phillipson St & Edward St (Refer Appendix C) IMT to make contact or Visit addresses, consider Relief centre
	8.1m	Some homes in the following streets inundated and require evacuation: Crisp St, Graham Ave, Valdronis Ave, Bronmer St, Arundals Lne (Refer Appendix C) IMT to make contact or Visit addresses, consider Relief centre
	8.54 & Above	Some homes in the following streets inundated and require evacuation: Rowan St, Walter St, Graham Ave, Crisp St, Phillipson St, Williams St (Refer Appendix C) IMT to make contact or Visit addresses, consider Relief centre

Phase 2 – Warning

Warnings may include a warning to 'prepare to evacuate' and a warning to 'evacuate now'. Once the IC has made the decision to evacuate, the at-risk community will be warned to evacuate. Evacuation warnings should be disseminated via methods listed in Part 3 and Appendix J of this plan.

Phase 3 – Withdrawal

VicPol is the responsible agency for evacuation. In accordance with the JSOP, The VicPol Evacuation Manager will consult with the IC and IEMT on the most appropriate relief options. When preparing the schedule 2 Evacuation Recommendation as per the JSOP, it is important to ensure that the recommended routes and specified relief centres are accessible to the relevant community. This is to ensure a community does not receive advice about a relief centre that may not be accessible to them due to road closures and flooding.

VICSES, CFA, AV and Local Government will provide resources where available to support VicPol/DTP-VicRoads with route control and may assist VicPol in arranging evacuation transportation.

VicPol will control security of evacuated areas.

Evacuees will be encouraged to move using their own transport where possible. Transport for those without vehicles or other means needs to be considered by the Police Evacuation Manager and options identified.

Landing zones for helicopters (if possible) are located at:

- Wangaratta Aerodrome

Vulnerable persons register and people with special needs

The Department of Families Fairness and Housing (DFFH) is responsible for the Vulnerable Persons Register (VPR). It operates across Victoria and provides 24x7 access to data by authorised emergency management agencies. The system can be accessed via most web enabled devices and includes locality aware functions for mobile devices.

DFFH has developed VPRs to store local information about consenting, identified vulnerable people[7], which will be directly entered by funded agencies and locally overseen by municipal councils[8]. The VPRs are cloud-based and directly accessible to authorised representatives from Victoria Police (without having to contact the council or funded agency) to aid emergency planning and response, including potential evacuation.

[7] Informed consent will be required before identified vulnerable people can be registered in a VPR. In keeping with the definition of a vulnerable person and the additional considerations the VPR should only list a small number of people, as per Diagram 1. More information about the identification and screening process for VPRs is available in Protocol 1: Emergency planning and screening.

8 64 councils covered by the Vulnerable People in Emergencies Policy, November 2012.

The information in the VPR can be filtered, mapped, and where necessary exported to reports for authorised purposes, according to the role and access rights of each organisation.

Phase 4 – Shelter

Relief Centres and/or assembly areas which cater for people's basic needs for floods may be established to meet the immediate needs of people affected by flooding. The flood relief centres are listed in the table below:

Sector	Shelter type Relief Centre	Comments
Wangaratta	Barr Reserve Community Centre Shilling Drive, Wangaratta	
Wangaratta	Wangaratta Livestock Exchange 99 Shanley Street, South Wangaratta	Primarily for Livestock and Horses
Wangaratta	Wangaratta Performing Arts and Convention Centre 33 – 37 Ford Street, Wangaratta	
Wangaratta	Wangaratta Showgrounds Entry via Evans Street or Golf Links Lane (depending on traffic management requirements)	Incorporates facilities managed by Wangaratta Lions Club, Wangaratta Kennel & Obedience Dog Club, and the Wangaratta Football & Netball Club
Whitfield	Whitfield Recreation Reserve Sports Pavilion Mansfield – Whitfield Road, Whitfield.	

VicPol in consultation with VICSES will liaise with Local Government and DFFH (where regional coordination is required) via the relevant control centre to plan for the opening and operation of relief centres. This can best be achieved though the Emergency Management Team (EMT)

Animal Shelter

Animal shelter compounds will be established for domestic pets and companion animals of evacuees. These facilities may be located at locations will be coordinated by the Rural City of Wangaratta.

Sector	Animal Shelter (include address)	Comments
Wangaratta	Wangaratta Livestock Exchange, Shanley Street, Wangaratta	Livestock
Wangaratta	Wangaratta RSPCA Shelter, 1 Connell Street, Wangaratta	Dogs, cats, small companion animals
Refer to the Rural City of Wangaratta Municipal Emergency Management Animal Welfare Plan for animal shelter details		

APPENDIX E – FLOOD AND STORM WARNING SYSTEMS

Flood and Storm Warning

Flood and storm warning products and Flood Class Levels can be found on the BoM and VicEmergency websites. Flood and storm warning products include Severe Thunderstorm Warnings, Severe Weather Warnings, Flood Watches and Flood Warnings. See next page for an example of a BoM Flood Warning on the VicEmergency page.

VICSES uses VicEmergency EMCOP Public Publishing and Emergency Alert Telephone warnings to distribute riverine and flash flood (and other hazards) warnings in Victoria.

The EMCOP platform enables simultaneous publishing to the VicEmergency app, website, hotline (1800 226 226) and Emergency Broadcasters. Communities can also access this information through EMV and VICSES social media channels (VicEmergency, Victoria State Emergency Service on Facebook and VICSES News on X and so forth) and emergency broadcasters, such as Sky News TV, ABC Local ABC radio 106.5FM (ABC Goulburn Murray) and various other local emergency broadcaster radio stations (current list available via the EMV website).

VICSES Regional staff (typically the RDO) or ICCs where established lead the issuing of warnings for riverine flood events when pre-determined triggers are met (issuing of a BOM Flood Watch or Warning), and share locally relevant and tailored information via VicEmergency (all hazards platform hosted by EMV) and standard VICSES communication channels (VICSES social media, traditional media, web and face to face). These activities are coordinated by the VICSES RDO and approved by the VICSES RAC, or the PIO and IC respectively (when an ICC is active).

If verified reports are received of flash flooding posing, or resulting in, a significant threat to life or property, VICSES Regions (or ICCs) will issue a flash flood warning product via EM-COP.

VICSES at the state tier (or SCC Public Information Section) issue all severe weather and thunderstorm warnings as these are rarely confined to a single region or area and also play an important role in sharing riverine and flash flood information via state-based standard communication channels.

During some emergencies, VICSES may alert communities by sounding a local siren (where this exists) or via media broadcasters by the use of SEWS, or by using the Emergency Alert (EA) platform to send an SMS to mobile phones or a voice message to landlines. EMCOP Public Publishing Business Rules for Riverine Flood, Flash Flood and Severe Weather / Thunderstorm are available in the Public Information tab of the IMT Toolbox, providing further guidance on specific triggers, roles and responsibilities. VICSES SOP057 and JSOP 04.01 provide further guidance.

VICSES Flood Warning Products

VICSES distributes flood emergency information to the media through “Flood Watches and Warnings”. Flood watches and warnings provide BoM flood warning information combined with other relevant sources of intelligence to provide communities information regarding possible flood consequences and safety advice, that is not contained in BoM flood warning products.

The relevant VICSES RDO, in conjunction with the RAC, or the established ICC will normally be responsible for drafting, authorising and issuing flood warnings, using the EMCOP to publish these to the VicEmergency channels.

Flood watch and warning products should refer to the warning title within the Bulletin header, for example Flood Bulletin for Major Flood Warning on Yarra River.

VICSES Flood Warnings should follow the following structure by describing:

- Critical details: including what the current and predicted flood situation is

- Action Statement: An action statement that is consistent with the Australian Warnings System (AWS) https://www.australianwarningsystem.com.au/
- What you should do: what the community should do in response to flood warnings
- Potential Impacts: what flood consequences are or the likely flood consequences

More Information: including where the community should go to seek further information and who the community should call if they require emergency assistance.

It is important that the description of the predicted flood situation is consistent with and reflects the relevant BoM Flood Warning and is tailored and made relevant to at risk communities using a range of intelligence sources.

In areas covered by a Total Flood Warning System (TFWS) VICSES Flood Watches should be issued for a whole river catchment. Additionally, VICSES flood Warnings should be issued at the pre-determined sub-catchment level focused on specific gauge reference areas. These are the area in which flood consequences specifically relate to the relevant flood gauge.

There may also be a need to issues warnings for areas not covered by the TFWS using available intelligence. The issue of these warnings is guided by the likely or observed impacts of the floodwater with guidance provided in the VICSES Riverine Flood Business Rules.

VICSES Flood Warnings should be prepared and issued after receipt of each Flood Watch and Flood Warning from the BoM, or after Severe Weather or Thunderstorm Warnings indicating potential for severe flash flooding.

To ensure VICSES flood warnings are released in a timely manner much of the relevant information is built into warnings templates in EMCOP, including a range of pre-development statements that can be ‘dragged and dropped’ into messages as relevant.

Flood Warning Example

Advice - Flood

Message reference number: 14767

Issued For:	the Ovens River at Wangaratta
Incident Location:	the Ovens River at Wangaratta
Incident Name:	FloodNorthEastOctober
Issued:	12/10/2020 10:51 AM
Next Update Expected:	13/10/2020 11:00 AM
Contact For Media:	SES - 1300 783 933

This **Minor Flood Warning** is being issued for the Ovens River at Wangaratta.

MINOR FLOODING EASING IN THE OVENS AND KING RIVERS.

Minor flooding is easing in the Ovens River and in the King River at Docker Rd Bridge. River levels will continue to fall during Monday.

No significant rain is forecast for the next few days.

Ovens River downstream of Rocky Point:
Minor flooding is easing along the Ovens River downstream of Rocky Point.

The Ovens River at Wangaratta peaked at 11.91 metres around 04:45 am Monday 12 October (minor flood level 11.90 m) and is currently at 11.88 metres and falling.

River levels will continue to fall during Monday.

Stay informed - monitor yo ur local conditions and remain alert.

What you should do:

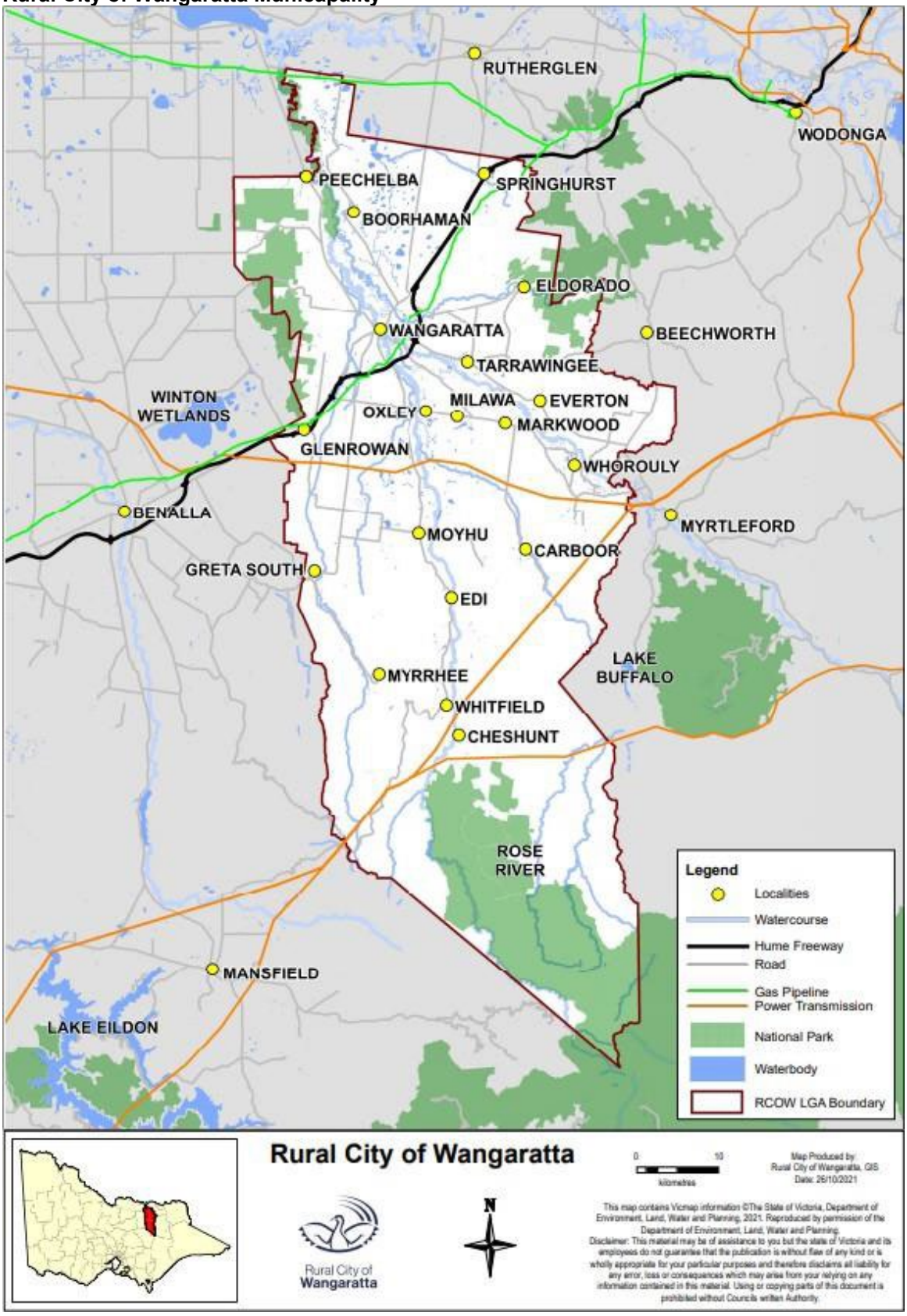
- Listen to emergency broadcasters and monitor warnings.
- Decide what you and your family will do if flooding impacts you.
- For information on how to prepare goto www.ses.vic.gov.au/get-ready/floodsafe (https://www.ses.vic.gov.au/get-ready/floodsafe).
- Review your emergency plan and check your emergency kit is fully stocked, if you have one.
- Farmers should consider moving livestock and machinery to higher ground.
- Floodwater is dangerous - never drive, walk or ride through floodwater.

Impacts in your area:

- Low lying caravan parks and camping grounds may be flooded.
- Access routes into Lower Ovens National Park cut by flows in Boundary Creek (Francis Ln, Frosts Crossing).
- Heavy rainfall increases the risk of landslides and debris in fire affected areas. Trees damaged by heat or fire may be unstable and more likely to fall in windy or wet conditions.
- Local roads may be closed and low bridges may be underwater.
- At this flood level, inundation of farmland is likely to occur in some locations.
- The Great Alpine Road is closed near Wangaratta due to flooding of Yellow Creek, with detour traffic by Detour Road.
- Riverside carparks are closed due to predicted flooding including; Sydney Beach, Bickerton Street and Baker Street.
- Bike paths and walking tracks around and downstream of Apex Park and the Northern Beaches are closed.

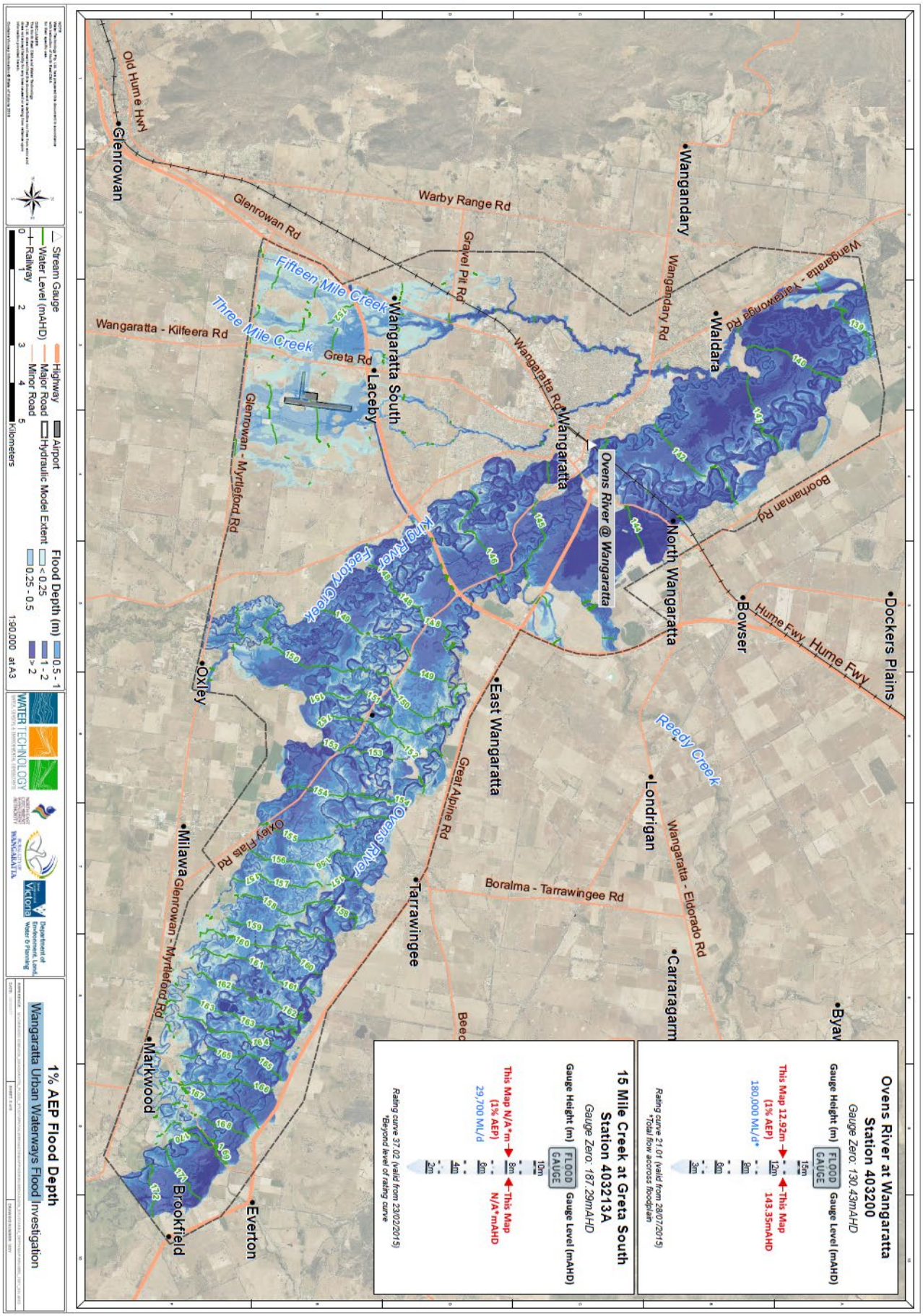
APPENDIX F – MAPS & SCHEMATICS

Rural City of Wangaratta Municapality



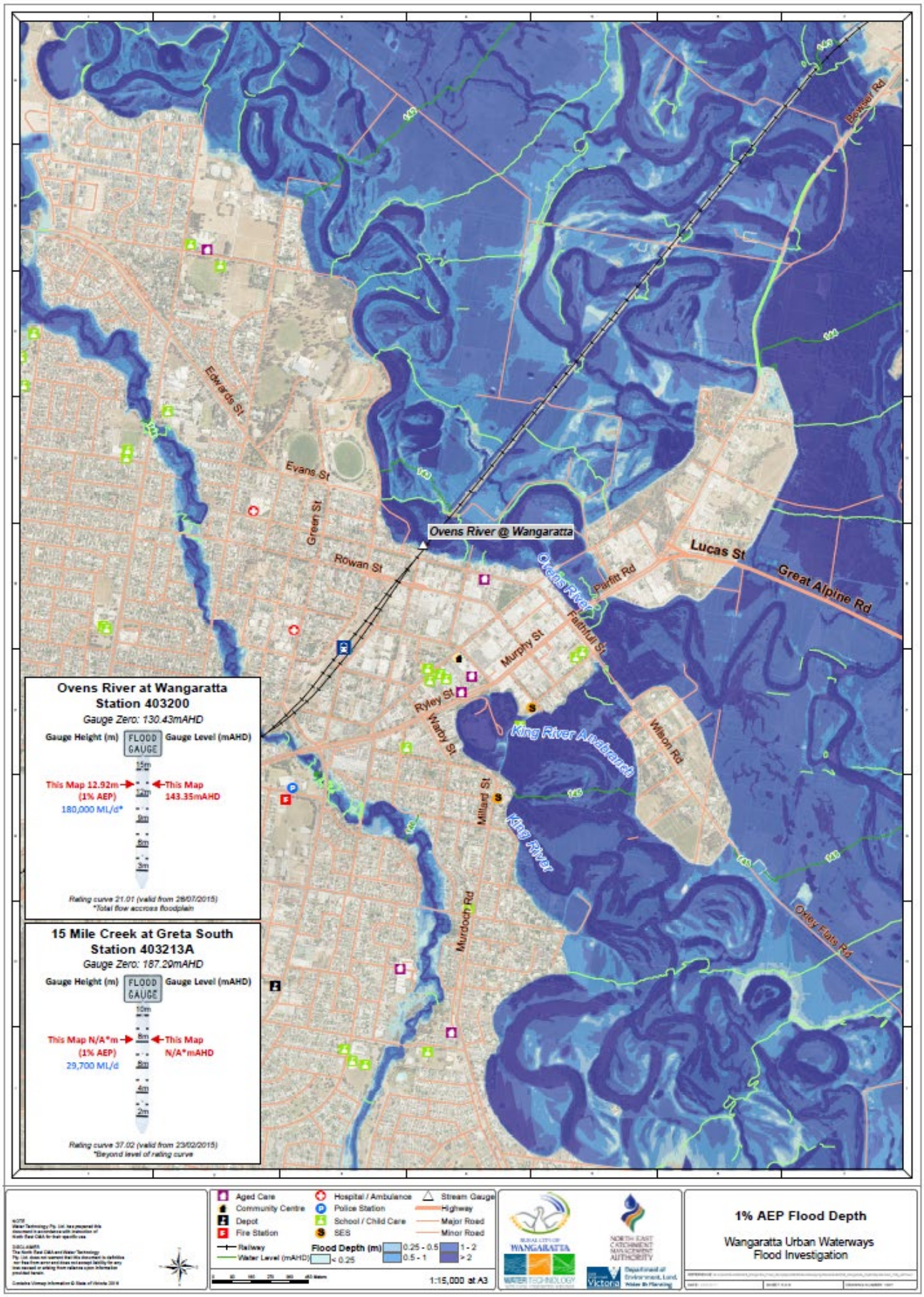
Existing 1% AEP flood extent from Victorian Flood Database for the Ovens & King Rivers & 15 Mile Creek systems

1% AEP Flood Depth Wangaratta Urban Waterways Flood



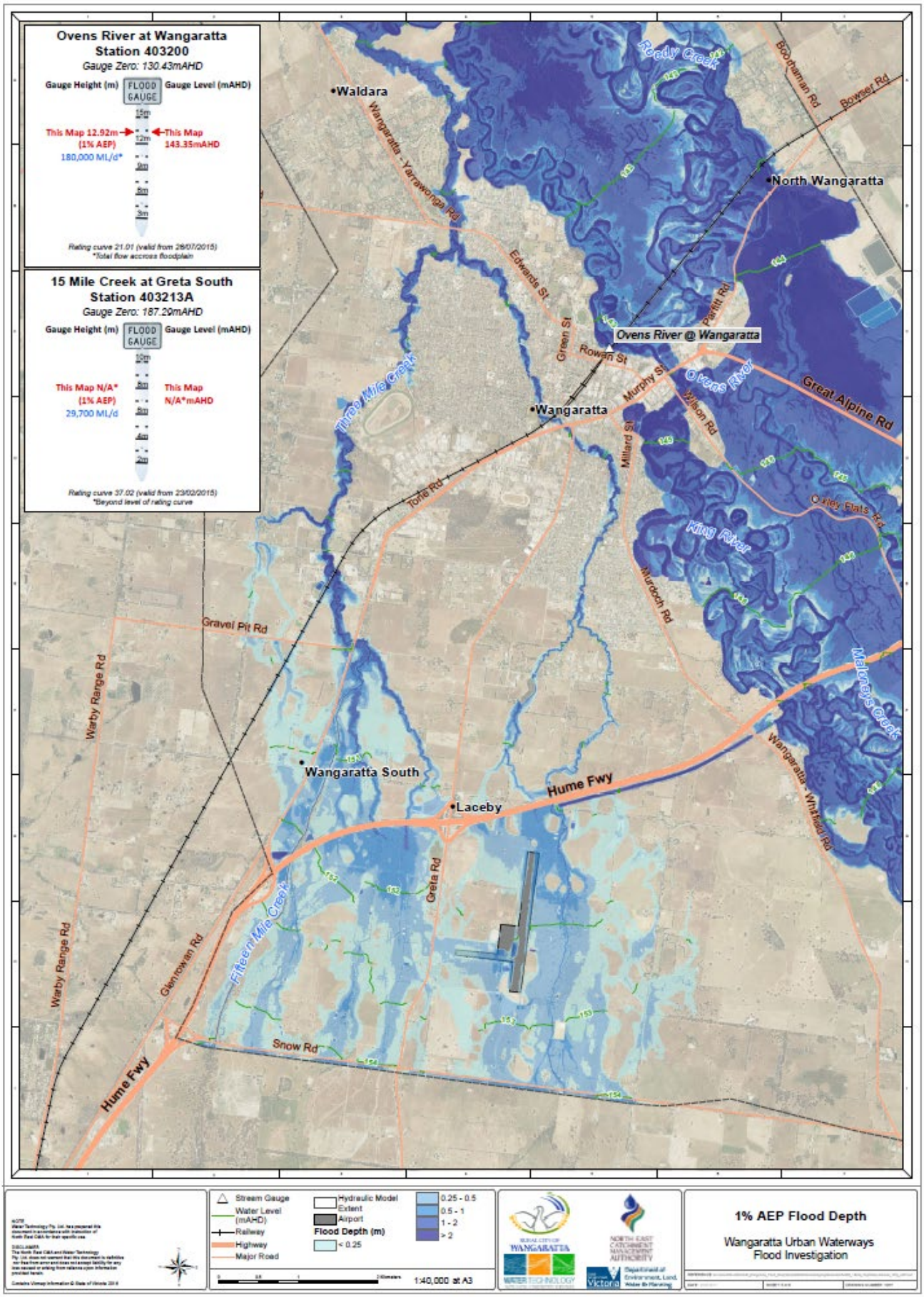
1% AEP Inundation Map – Wangaratta Township

Ovens River at Wangaratta & 15 Mile Creek at Greta South Gauges both at 1% AEP



1% AEP Inundation Map – Wangaratta Township and aerodrome

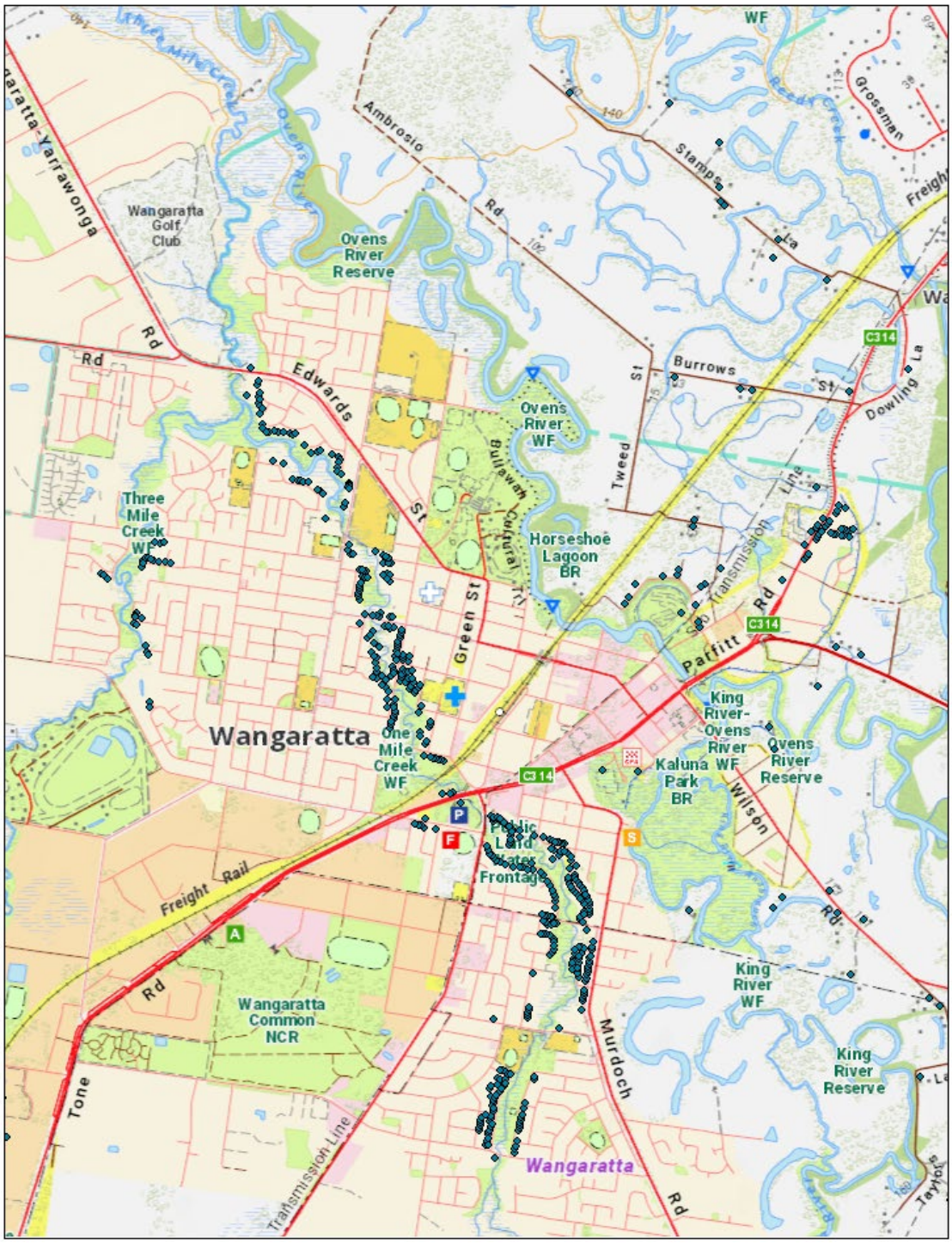
Ovens River at Wangaratta & 15 Mile Creek at Greta South Gauges both at 1% AEP



Parfitt & Wilson Road levees at 1% AEP Flood extent

Wangaratta Flood Study 2017 Floor Level impacts by location – Wangaratta Township

FloodZoom Default View



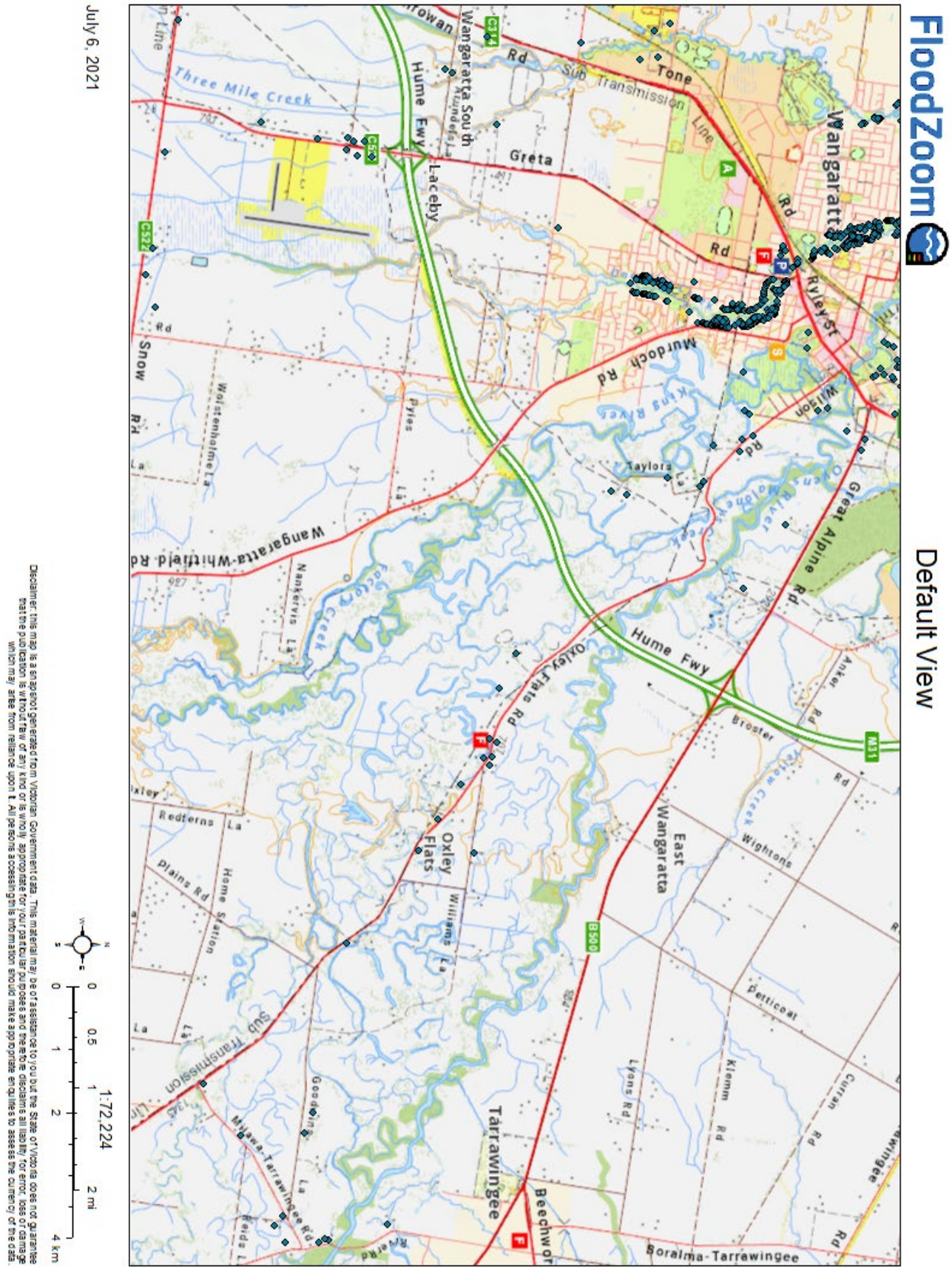
July 6, 2021

1:36,112

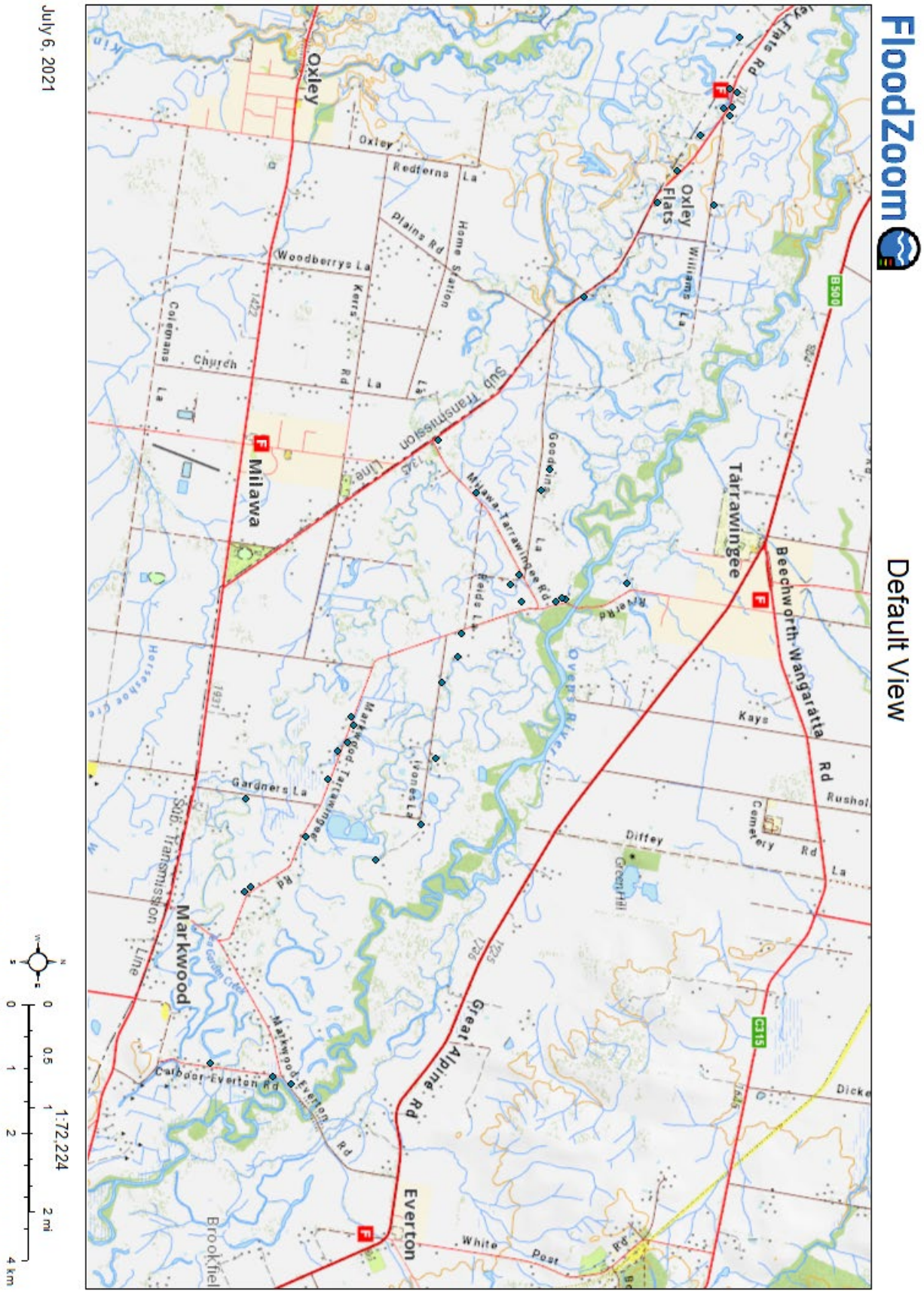
0 0.3 0.6 1.2 mi

0 0.5 1 2 km

Wangaratta Flood Study 2017 Floor Level impacts by Location – Wangaratta, Greta and Oxley

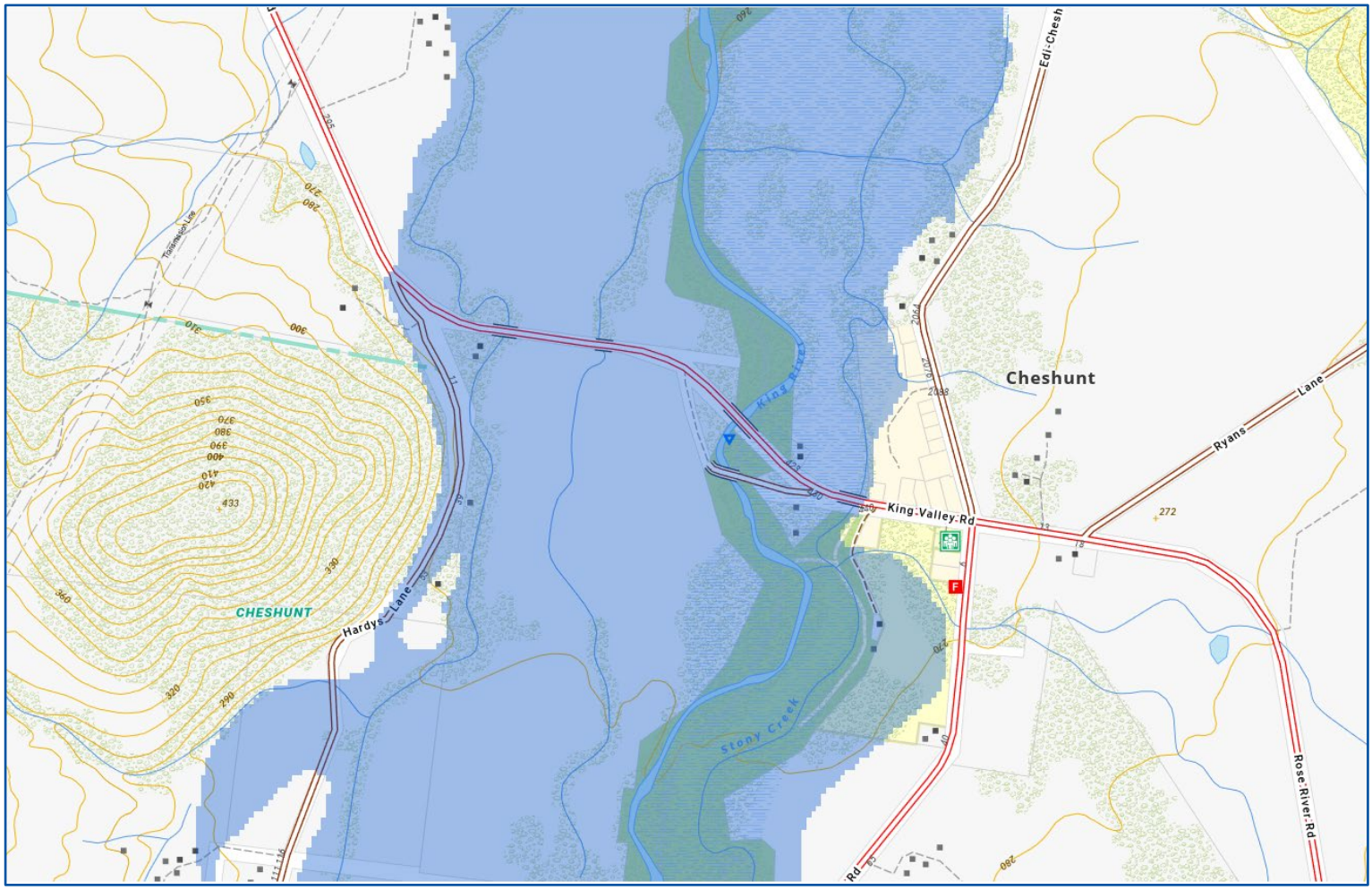


Wangaratta Flood Study 2017 Floor Level by location – Oxley Flats, Milawa, Markwood

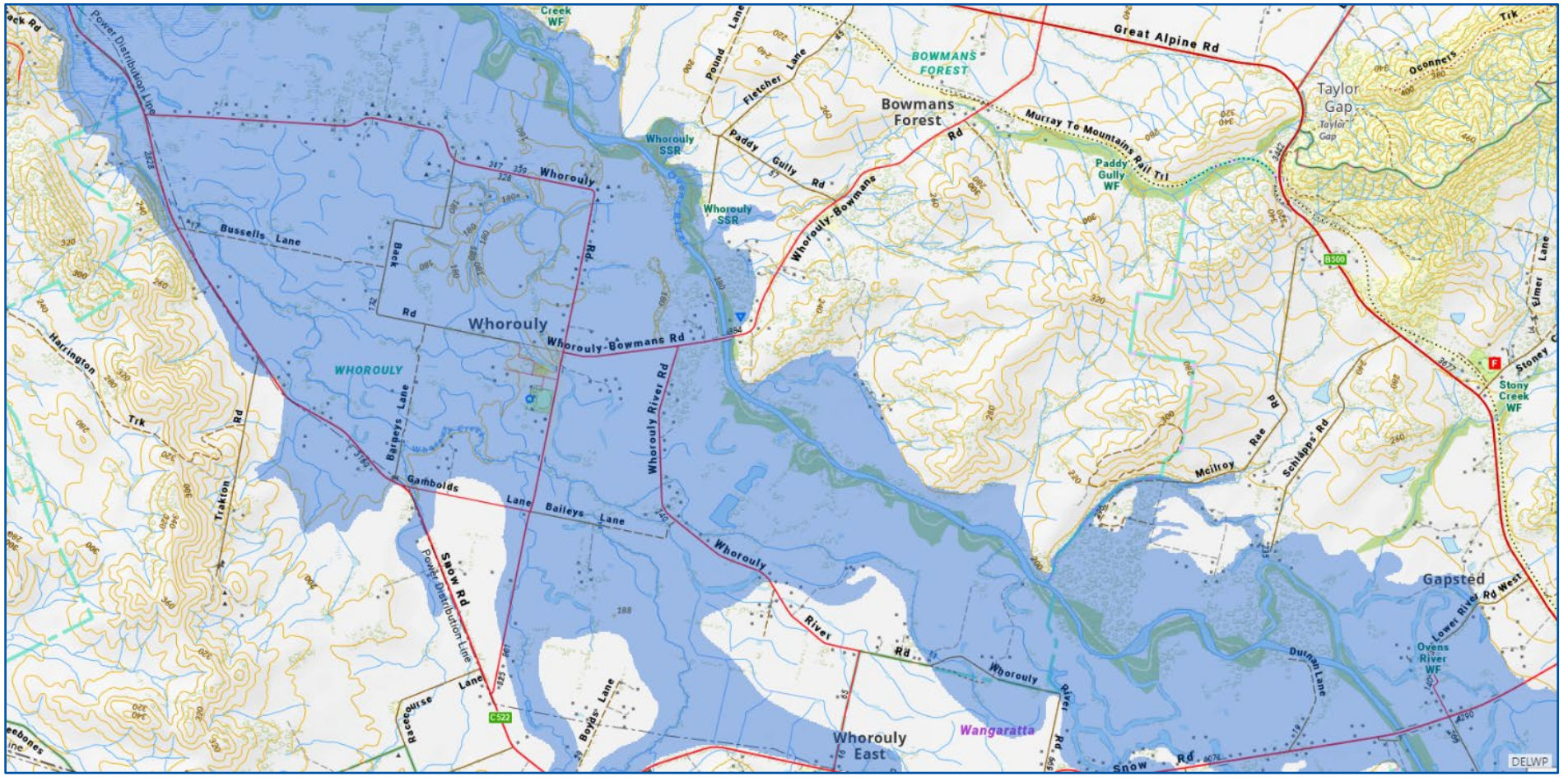


1% AEP Inundation Map – Cheshunt

King River at Cheshunt at 1% AEP



1% AEP Inundation Map – Whorouly
Ovens River at Whorouly at 1% AEP



APPENDIX G – SEVERE WEATHER (STORM & FLOOD) EVENTS

As control agency for flood in Victoria, VICSES is committed to ensuring the incorporation of local knowledge in decision making before, during and after incidents. This is guided by the VICSES policy 10.02 Local Knowledge.

Information from community sources including but not limited to observations, historical information and information about current and possible consequences of an incident may be utilised to help inform the process of incorporating local knowledge into decision making during an incident

Field Observers

Field Observers may support:

- the monitoring and reporting on observations of incidents. For example, during a flood event a Field Observer may be regularly taking photos via mobile app technology of the local stream gauge board if it is safe to do so.
- The provision of local advice regarding the consequences of incidents.
- Establishing linkages with key groups within local communities during emergency management planning and operational response. During operational response, this may be through an LIO or direct to the Intelligence cell. In some circumstances it may also be through a Community Liaison Officer if one is in place within the Public Information Unit or via a Community Field Officer.
- The provision of authorised information to community members where requested.

Local Information Officers

LIOs operating out of sectors or divisions provide a key communication interface to field observers and other sources of local knowledge.

Intelligence Gathering System

Historically, the gathering of local flood/storm or other VICSES hazard intelligence during an event has been varied and inefficient. It creates a frustrating and difficult environment for intelligence teams in an Incident Management Team (IMT) to sift through relevant information. VICSES has teamed up with Snap Send Solve to create a flood/storm and other VICSES hazard observation App and Portal.

Snap Send Solve is an existing app currently used by the community to notify local councils and other authorities of issues that need addressing such as cracked pavements, parking problems, dumped rubbish and graffiti.

The existing functionality of the smartphone app has been adapted for VICSES in a well presented and user-friendly way. The app is used to capture field observations during an event such as a flood, by filling in a simple form on a smartphone and using the camera to upload photos. This information is then displayed through an administration portal to collate and view the data.

The app component will be made available to trusted field observers in the community, and their observations will be visible via EMCOP where Intelligence personnel in Incident Management Teams can access them during events. The intent is that better access to local knowledge will add to information sources in order to maximise public information communications and response efforts.

Trusted field observers include both internal and external stakeholders (community members, ESOs such as CFA/VicPol). They can be activated and deployed by the VICSES RDO to use the app during an event and to report on valuable information with a level of accuracy.

The portal has been successfully integrated with EMCOP and eMap, both platforms are available to use in an IMT. The Snap Send Solve logo also appears within the intelligence section on the EM-COP desktop for easy access to the portal.

Important Notes

These arrangements do not give field observers and existing agency networks any responsibility for operational decisions. Nor does it permit field observers and existing agency networks to direct operational activity, including the management of flood levees.

Information provided from sources of local knowledge must be processed and validated before it can become intelligence to inform decision making.

APPENDIX H – Local Flood Information

Local Flood Guides

Communities can use local flood guides to identify and better understand their local flood risk. They include information about flood history, how to prepare & respond to floods and who to contact.

Local Flood Guides can be accessed via the VICSES website

Within the Alpine Shire, there are the following Local Flood Guides:

- Wangaratta
- King Valley
- Whorouly

APPENDIX I – STORM RESPONSE

Consequences of severe thunderstorm

Severe thunderstorms and its associated weather conditions such as a tornado or microburst may have the same effect on the community and the natural environment. The difference is likely to be in terms of the geographic expanse. A severe thunderstorm can move over a large part of the land mass whereas in Victoria, a tornado or microburst is likely to be heavily concentrated in a small geographic area affecting one or two localities.

Consequences of storm damage typically involve the following:

- wind damage to residence and buildings
- fallen trees damaging buildings and blocking roadways
- flooding
- road damage and road closures
- power outages
- telecommunications outages
- impacts on a wide range of critical infrastructure.
- Entrapment of people in vehicles or in homes.

Areas most likely to be affected by Storm damage

The Rural City of Wangaratta has experienced and is susceptible to severe weather events all year around. A combination of topography throughout the municipality, the public and private land interface, rural and agricultural settings with townships and the City of Wangaratta itself nestled amongst mature native vegetation and bushland means tree damage during wind events is a significant risk.

BoM's storm archive (www.bom.gov.au/australia/stormarchive/) and VICSES' records of recent events show the North East (Hume) Region to be very susceptible to severe storms, including tornadoes, large hail, flash flooding, severe winds and lightning. Though there are few dust storm events that have specifically impacted this region. There have also been isolated occurrences of atmospheric downbursts/microburst in adjacent municipalities that have been very damaging.

People in the open, under trees or camping, are statistically the most vulnerable to death due to storm.

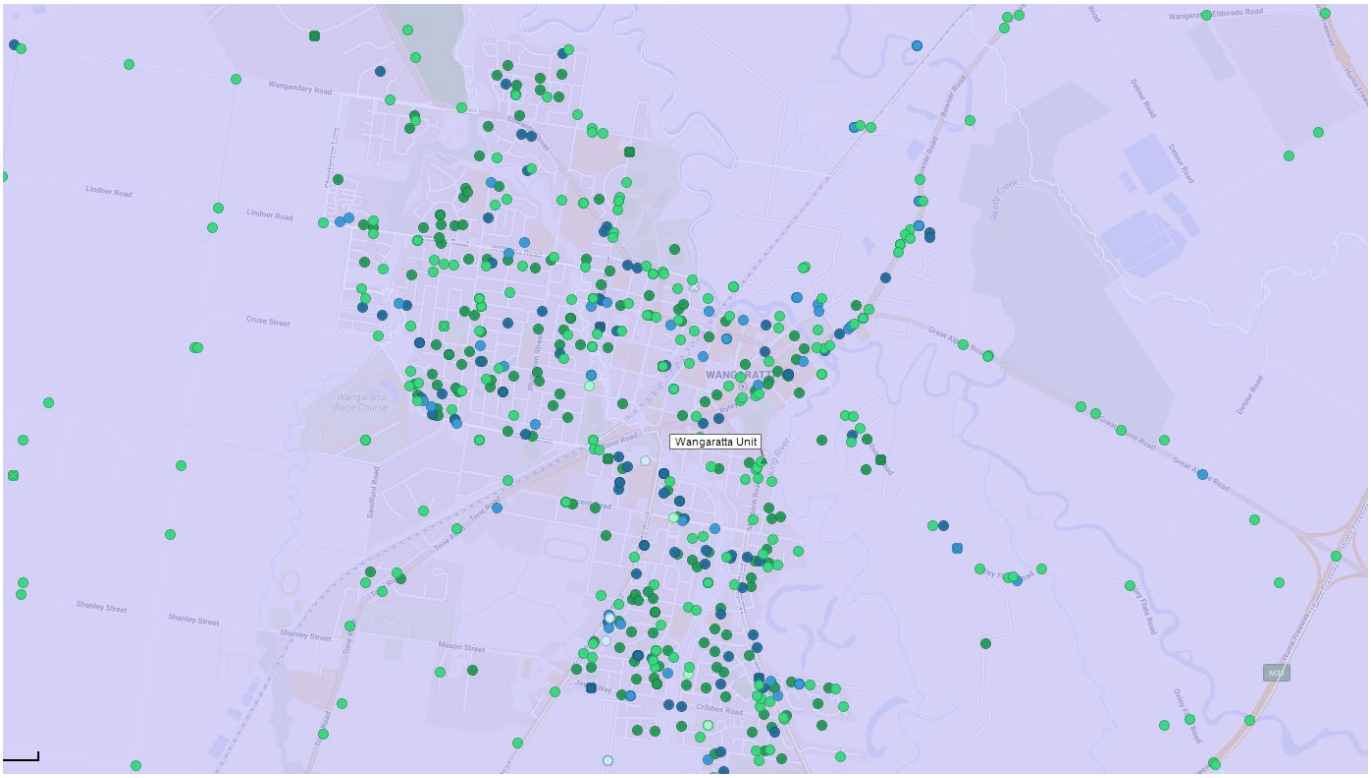
Older homes may be more susceptible to damage, as can properties undergoing development and renovation. Construction works can interfere, and excavations can interfere with natural drainage or stability of existing trees. Blocked drains and pits, or drainage systems that may be insufficiently sized also contribute to the effects of storm activity. Severe storm activity could result in injuries and an increase in road accidents. Damaging wind events can lead to trees down, with damage to the built and natural environment.

Obstructions across roads could disrupt services, affect community functioning and have great potential for road traffic delays for access and egress of the community and emergency services. Infrastructure near waterways, such as pedestrian bridges or their approaches may become damaged either directly or from debris that has been washed into the current.

Locations of historic storm damage

The following map indicates where the hot spots have been for historic storms of significance that have generated a larger than normal number of requests for assistance. Note that while the map is based on historic data, a severe storm can affect any part of the municipality.

Storm and Flood Incidents: Rural City of Wangaratta – Last 10 years (Jan 2013 to Dec 2024)



Summary of Storm and Flood Incidents for Wangaratta SES Unit by Incident Type

VICSES Storm and Flood Incidents: Wangaratta SES Unit - Jan 2013 to Dec 2024

Incident Type	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019	2019-2020	2020-2021	2021-2022	2022-2023	2023-2024	2024-2025
BLD DAMAGE - INT / EXT							1	1	2	3	9	5
BLD DAMAGE - ROOF - MULTI								2		1	2	2
BLD DAMAGE - ROOF - SINGLE							6	26	15	16	32	12
BUILDING DAMAGE	15	41	40	13	53	19	4					
FENCE DOWN											1	
FLOOD - APPL/INTERNAL SRC										3	5	
FLOOD - ENT. PREMISES							2	5		16	19	1
FLOOD - POT TO ENT. PREMISES							5	7	4	36	19	2
FLOODING	6	27	11	25	10	40	1		1		2	
LANDSLIDE									2			2
LANDSLIDE / HAZARDS										2		
LOOSE DEBRIS / OBJECTS						2	1	2	1	3		2
SANDBAG REQUEST						4			1	9	2	
TREE DOWN	15	15	13	21	45	7	2					1
TREE DOWN - NO THREAT							8	7	2	2	13	15
TREE DOWN - ON VEHICLE								3	1	1		3
TREE DOWN - POWER LINES							2	1	1	5	4	1
TREE DOWN - RESTRICT ACCESS							2	6	3	8	8	4
TREE DOWN - STRUC - MULTI										1	2	
TREE DOWN - STRUC - SINGLE								2	4	4	6	3
TREE DOWN - THREAT TO FALL							2	3	4	7	6	6
TREE DOWN - TRAFFIC HAZ							82	106	126	177	136	91
Grand total	**36**	**83**	**64**	**59**	**108**	**72**	**118**	**171**	**167**	**294**	**266**	**150**

Summary of Significant Storm Events: Rural City of Wangaratta

Year	Location	Details
Feb 2022	Markwood	A storm cell impacted the Rural city of Wangaratta around the Milawa, Markwood, Great Alpine Road are cutting off King Valley area. Many kilometres of trees down and power outages were experienced. Although the event was short lived the financial expenses to council for tree clearing contractors and machinery was such it qualified for disaster funding.
Dec 2018	Flash Flooding in North Wangaratta, Eldorado, Londrigan, Tarrawingee, Boorhaman, Byawatha	Heavy Rainfall of 268mm in approx. 6 hours was recorded in Eldorado which created a flash flood event and subsequent over land flood to the Hume Freeway North of Wangaratta. Several rescues from vehicles were conducted and some over floor flooding of approx. 40 properties and damage to 4 bridges occurred. Areas in Byawatha, Londrigan, Eldorado and Tarrawingee experienced significant overland flooding with agricultural losses to 440km of fences, 5000 tonnes of hay lost and 37,000ha of grazing land impacted. Hodgsons Creek at Tarrawingee flooded impacting access and egress and the closure of the Great Alpine Road at the Tarrawingee bridge. Estimated to be a 1/2000year rainfall event.
Mar 2018	Tolmie	Tornado - 8 homes damaged.
Dec 2017	Wangaratta & King Valley	Severe wind event occurred. Homes and businesses without power, telecoms, road and property access for several hours (to days/weeks) Building Damage in Wangaratta & King Valley
2016	Most of RCOW	Over 300 mm across the Warby Ranges. That scenario in the flood info above.
2010	Wangandary/Wangaratta	Microburst.
Jan – March 2003	King Valley	Multiple lightning strikes resulted in 1.3 million hectare Alpine Fires
2001	Eldorado	71.1mm in 30 minutes anecdotally

Bureau of Meteorology weather districts

The municipality falls within the weather district 4 - North East

Storm specific community education programs

VICSES provides standard community education material on what to do during a storm on its public website.

APPENDIX I2 – STORM DAMAGE SPECIFIC RESPONSE ARRANGEMENTS

In the initial response phase, managing the response to widespread property damage resulting from a severe thunderstorm involves the coordinated assignment of resources to individual requests for assistance. It is akin to a fire service suddenly having to respond to a widespread outbreak of individual domestic house fires at the same time.

This is different to the approach taken for some other hazards such as riverine flooding or bushfire, where there is more likely to be a need to undertake common tasks around building defensive structures or control lines.

After the initial response phase, and in the most severe cases, relief and recover may take on a more familiar look to other natural hazards. However, there may be unique aspects that vary from planning associated with riverine flooding.

An example of this may be assisting vulnerable people. In a flood, the plans typically identify the areas subject to inundation, whereas in a storm, the damage may occur anywhere. As such, there may be high risk premises such as aged care or medical facilities that need assistance after a severe storm but are not identified as at risk from riverine flooding.

In the example of the 2021 cyclogenesis windstorm event that affected the Dandenong Ranges, parts of Gippsland, Macedon Ranges and other localities, the effect on the community lasted weeks with access and power restoration taking weeks to achieve. In the aftermath of that event the community gained value from the sector establishing early on, relief centres and community hubs, however, their establishment was hindered due to the consequences of the flood and storm event.

In addition, initial welfare calls made to community members by the Department of Families, Fairness and Housing (DFFH) and AusNet due to being listed as a power dependent customer or experiencing prolonged power outages were generally appreciated.

Incident Control Centres and Divisional/Sector command points

Unless stated otherwise here, the same pre-determined locations are to be used for Incident Control Centres

Each unit local headquarters listed below are suitable for use as a divisional or sector command point.

Unit name and Location/address	Divisional or sector command point suitability	Ability to manage small, medium or large-scale response
Wangaratta SES Unit, 36 Handley Street, Wangaratta	Incident Control Point Division and / or Sector Control Point	Large

The nature of severe storm damage may preclude one of the above locations from being used as intended due to factors such as road blockages (trees down), damage to its infrastructure or loss of mains power. In that case.

Response planning and escalation

In the initial response phase, units will receive requests for assistance (RFA's) direct from Triple Zero Victoria and will typically respond in a business-as-usual mode, typically attending events in order of receipt or priority. This is in accordance with the VICSES Operations Management Manual.

As a unit begins to receive a volume of RFAs, it is important that it shifts focus to efficient use of resources through the application of:

- ensuring it has geographic situational awareness through visualising the location and spread of RFAs via EM-COP situation map or if unable to login, via the public access Emergency.vic.gov.au incidents and warnings page. This will prevent unnecessary travel times and can assist in allocating resources to manage a number of RFAs located in nearby streets.
- Triaging RFAs including call-backs to residents where appropriate to clarify needs and priority
- Seeking support via the RDO and escalation of response arrangements as appropriate (transfer of control from level 1 to level 2 response arrangements).
- Potential deployment of field observers and intelligence gathering via Snap Send Solve to assess areas where the storm impacted as in many cases, there will be unreported cases of damage that requires assistance from the community

Support arrangements – other agencies assistance

While VICSES units provide the initial response to storm damage, this section details the local arrangements for events where VICSES will require support from local emergency services and government departments/agencies to manage a large number of requests for assistance from the community.

For agencies that are likely to provide regular assistance such as CFA brigades and FRV, it is strongly encouraged that these organisations promote to its responders the benefit of completing the E-learn Maintain safety at storm and flood operations. This E-Learn is accessible via the EMV intranet site EM-Learning.

In the municipality, the following agencies typically provide immediate support to assist VICSES units in responding to RFAs.

- Rural City of Wangaratta
- CFA
- FRV
- Forest Fire Management Victoria (DEECA, Parks Victoria)
- DTP (Vicroads)
- Panel of contractors

Considerations for operating with other agencies

As other agencies are deployed to assist the IC should consider the following actions:

- Establish a communications plan to enable the tasking of other agency resources. This may include:
    - Use of other agency portable radios at the Sector/Division command point
    - Embedding an CFA member in the comms team so that they can page allocated tasks via EAS/VIPER direct to its brigade resources

- Embedding an EMLO from other assisting agencies at the sector/Division command point for comms purposes
- Use of mobile phones or sat phones to communicate

- Embed Power Company / Utilities / DEECA EMLOs into the IMT / Division Command Points to support operations involving downed powerlines, and to also ensure that the relevant control agency for Power Outages is able to communicate directly to the IMT / Division.
- Ensuring other agency personnel who are undertaking EMLO roles have access to EM-COP
- Preparing a briefing to support in-coming other agency resources to identify
  - staging area location and any safety issues with accessing it (closed roads/powerlines down)
  - resources available such as re-supply of consumables (tarps/sandbags)
  - welfare arrangements
  - duty time limitations (these should be consistent with VICSES SOP 003

APPENDIX J – PUBLIC INFORMATIONS AND WARNINGS

VICSES uses VicEmergency EMCOP Public Publishing and Emergency Alert Telephone warnings to distribute riverine and flash flood (and other hazards) warnings in Victoria.

BoM Flood Warning products and Flood Class Levels can be found on the BoM website. Flood Warning Products include Severe Thunderstorm Warnings, Severe Weather Warnings, Flood Watches and Flood Warnings.

The EMCOP platform enables automatic publishing to the VicEmergency app, website, hotline (1800 226 226) and Emergency Broadcasters. Communities can also access this information through EMV and VICSES social media channels (VicEmergency, Victoria State Emergency Service on Facebook and VICSES News on Twitter etc) and emergency broadcasters, such as Sky News TV, ABC Goulburn Murray radio and various other local emergency broadcaster radio stations (current list available via the EMV website).

Sky News TV (current list available via the EMV website).

VICSES Regional staff (typically the RDO) or ICCs where established lead the issuing of warnings for riverine flood events when pre-determined triggers are met (issuing of a BOM Flood Watch or Warning), and share locally tailored information via the EMV (Vic Emergency) and standard VICSES communication channels (VICSES social media, traditional media, web and face to face). These activities are coordinated by the VICSES RDO and approved by the VICSES RAC, or the PIO and IC respectively (when an ICC is active).

If verified reports are received of flash flooding posing, or resulting in, a significant threat to life or property, VICSES Regions (or ICCs) will issue a flash flood warning product via EM-COP.

VICSES at the state tier (or SCC Public Information Section) plays an important role in sharing riverine and flash flood information via state-based standard communication channels.

During some emergencies, VICSES may alert communities by sounding a local siren (where this exists) or via media broadcasters by the use of SEWS, or by using the Emergency Alert (EA) platform to send an SMS to mobile phones or a voice message to landlines. The use of sirens for higher-end warnings has been pre- determined and mapped to relevant warning templates in EMCOP. Sirens also appear in the warning polygon when drawn over an area where official community alerting sirens exist.

EMCOP Public Publishing Business Rules for Riverine and Flash Flood are available in the Public Information tab of the IMT Toolbox, providing further guidance on specific triggers, roles and responsibilities. VICSES SOP057 and JSOP 04.01 provide further guidance.

APPENDIX K – VICSES SPECIFICATIONS FOR MUNICIPAL FLOOD AND STORM EMERGENCY SUBPLANS AND LOCAL FLOOD GUIDES

Overview

Victoria State Emergency Service (VICSES) had developed this specification to provide guidance to the preparers of information that contributes to flood investigations and flood management studies. It is specifically for information that will be used as a direct input into municipal flood and storm emergency sub-plans (MFSEPs) and/or Local Flood Guides (LFGs).

The information within these sub-plans and guides is used to inform emergency management efforts before, during and after flood events and to increase community resilience through awareness and engagement of local flood risks.

MFSEPs are developed to assist emergency management agency personnel in their planning for the preparation, response and recovery from local flood and storm events. LFGs are the community facing guides used to identify their local risks, sources of information and how they should prepare for potential flooding.

To promote a consistent and robust approach for the development of MFSEPs and LFGs across Victoria, VICSES have developed an MFSEP Template, an LFG template and tools and resources to support the development and socialisation of MFSEPs and LFGs. This appendix is an attachment to the MFSEP template.

The VICSES Emergency Management Planning team encourage Innovation in relation to the process for developing MFSEPs and LFGs. You can send your suggestions via email for improvement or innovation to the standard process, or any other queries you may have to: emp@ses.vic.gov.au.

Key Considerations

Where a provider/consultant is preparing a product or output as part of a flood investigation that VICSES will be including in either an MFSEP or LFG, they should consider the following:

- Is there an existing MFSEP or LFG that relates to the area(s) defined in the scope of the flood investigation?
- If yes, how will the outputs of the study integrate with the existing MFSEP and/or LFG?
- Based upon the outcomes of the flood investigation, are there any amendments which VICSES should be making to the MFSEP/LFG?
- Which communities and/or catchment areas will be covered within the MFSEP and LFG outputs?

Text to include in body of flood study project brief (if possible)

The consultant shall prepare the flood intelligence and mapping for the municipal flood and storm emergency sub-plan and the local flood guide in accordance with the Victoria State Emergency Service's Specifications for municipal Flood and storm emergency sub-plans (MFSEPs) and Local Flood Guides (LFGs).

Table 1 – Desired municipal flood and storm emergency sub-plan outputs

Note – Please see MFSEP template for examples of how the following information could be formatted/represented.

Section of MFSEP	Floodplain manager and flood consultant output	Notes
Appendix A – 'flood threats for municipality	Information required: ■ Overview of flood risks including catchments and communities prone to flooding. ■ Historic flooding information. ■ Overview of main flood impacts including to infrastructure. ■ Identification of major dams, waterways, drains and any water storage failure risks, including properties and communities likely to be impacted. ■ Identification of significant flood mitigation works, (eg levees etc)	*It should be determined whether the 'Flood Intelligence' outputs will be limited to those that relate to the area defined in the scope of the flood investigation or provided for the whole Municipality.* *Where there are multiple catchments being covered within a Municipality each may be separated by the catchment or river system they apply to using a logical title structure (e.g. A1, A2, A3 etc.)*
Appendix B – typical flood peak travel times	Information required: ■ Waterway(s) and relevant gauges that relate to the area(s) defined in the scope of the flood investigation. ■ Typical travel times from one key location to another and any relevant comments/additional information. ■ Include when there are steep rises before the peak arrives (when damages occur) to define how much time is available before damages occur.	*The table may make reference to typical travel times for historic or design events and use datum (RL or AHD) that is consistent with what is used in the local flood warning service.*

Section of MFSEP	Floodplain manager & flood consultant output	Notes
Appendix C – [enter name of community] flood emergency plan	Information required for community/township flood emergency plans that relate to the area(s) defined in the scope of the flood investigation including: ■ Overview of flooding risks and consequences ■ Description of significant flood mitigation systems and measures ■ Flood impacts and required actions ■ Information for Flood Intelligence Cards, including consequence and impact information that relate to river height derived in the relevant datum in use. If river height data is not available, AEP/ARI events or river flow (ML/d) and a rainfall based simulation may be used (mm/hour). ■ If relevant, summarise the existing flood warning system arrangements in place for the community/ township.	*- Where there are multiple Community Flood Emergency Plans needed each community / township should have its own plan and be separated by using a logical title structure (e.g. Appendix C1, C2, C3 etc.)* *- The datum used (RL or AHD) should be consistent with what is used in the local flood warning service.* *- For column 4, under the 'Actions' heading of the Flood Intelligence Card template, please provide suggested input if possible and highlight any text added to this section.*
Appendix D – flood evacuation arrangements	Where relevant and where flood intelligence is available, the following information is required: ■ Areas likely to require evacuation ■ Time available for evacuation ■ Suitable evacuation routes and closure of evacuation routes ■ Suitable predicted trigger heights for evacuation	*Where there are multiple Flood Evacuation Plans needed each community / township should have its own plan and be separated by using a logical title structure (e.g. Appendix D1, D2, D3 etc.).*

	▪ Evacuation trigger points for any essential infrastructure or vulnerable facilities e.g. nursing homes, hospitals and caravan parks.	

Section of MFSEP	Floodplain manager & flood consultant output	Notes
Appendix E – maps and schematics	Maps that relate to the area defined in the scope of the flood investigation. May include: ▪ Township Map ▪ Catchment Map ▪ Damages Map ▪ Schematics If data is available maps should be produced related to a river gauge. If not,flood extent should be shown to relevant historical flood extent(s) and/or design AEP/ARI event(s) as specified. Where data is available maps should be developed to show flood depths and velocities. Please see the 'VICSES Map Specifications for MFSEPs and LFGs' and 'VICSES Flood Mapping Symbol Set' attached here for guidance on content and format. The specifications include a **standard disclaimer note** to be added to each map, see text below. *This map publication is presented by Victoria State Emergency Service for the purpose of disseminating emergency management information. The contents of the information have not been independently verified by Victoria State Emergency Service. No liability is accepted for any damage, loss or injury caused by errors or omissions in this information or for any action taken by any person in reliance upon it. Flood information is provided by*	*Where there are multiple maps, each map should be separated into sections (for example, catchment areas, townships /communities and so forth.) and a logical title structure should be used (for example, Appendix F1, F2, F3).*

	<CMA name>. Maps should be scaled A1 and A4 size.	

Table 2 – Desired local flood guide outputs

Note – Please see the attached local flood guide template for formatting and contextual considerations.

Section of LFG	Floodplain manager & flood consultant output
Township map	Flood extent map that relates to the area defined in the scope of the flood investigation including a 'township' scale map for the targeted community in accordance with VICSES standard format for LFGs maps. Please see the 'VICSES Map Specifications for MFSEPs and LFGs' and 'VICSES Flood Mapping Symbol Set' attached here for guidance on content and format. Maps should be scaled A4 size for the document and A1 for an online version.
Flood gauge table	*See attached Local Flood Guide Template for a blank example.* A flood gauge table needs to include flood impact and consequence information that relates to at least 3 river heights (m) on the gauge. When no gauge heights are available, relevant historical flood events and/or AEP/ARI modelled events can be used in place. The impact and consequence information should relate to Flood Class Levels where they exist. Where Flood Class Levels don't exist, impact and consequence information should relate to relevant historical flood events and AEP/ARI modelled events. Information in this table should be easy for the general community to understand and include practical information such as road closures, property and above floor flood inundation risks and likely services disrupted. The table should not include actions for emergency services to undertake at that time or any tactical planning information.

Section of LFG	Floodplain Manager & Flood Consultant output
Local Flood Information	Brief, community focussed summary information that relates to the area defined in the scope of the flood investigation including: ■ Information about the types of flooding that may occur in the town and why. For example, riverine, flash or overland flows from surrounding areas. ■ Summary of historic floods, the flood heights and known flood impacts and consequences including houses inundated, road closures, impacts to essential services. ■ Specific information that affects flooding in the town, such as levees.

Attachment 1 - VICSES map specifications for municipal flood emergency plans and local flood guides

Data Quality Hierarchy for MFSEP and LFG inundation Maps	MFSEP township	MFSEP catchment	MFSEP building damages	LFG township	Schematics
					Note: no data hierarchy applicable
	Map				
Riverine 1. Flood class levels (minor, moderate, major) 2. Historical extent(s) 3. Modelled extent(s) **Flash flood** 1. Historical extent(s) 2. Modelled extent(s)	Railways Roads **waterways Levees River gauges, rain gauges & combined gauges Cadastre *Features of interest Markers and directions for neighbouring towns and gauge locations	Railways Roads **waterways River gauges, rain gauges & combined gauges Cadastre * Features of interest Markers and directions for neigbouring towns and gauge locations	Railways Road Roads impacted by flooding **Waterways Levees River gauges, rain gauges & combined gauges Cadastre Flood model extent(s) Buildings flooded above floor buildings isolated Land parcel boundary *Features of interest Markers and directions for neighbouring towns and gauge locations	• Spatial Vision base map includes roads and waterways. • Small scale map default features of interest: Ambulance Station, Camp Ground, Coast Guard, Fire Station, Hospital (Emergency), Hospital / Day Procedure, Lifesaving Club, Mine / Quarry, Municipal Office / Civic Centre, Police Station, SES Unit, Caravan Park, Group Camp, Helipad, Airport / Airfield. • Large scale map (under 50k scale) default features of interest: Aged Care / Disability Support, Ambulance Station, Camp Ground, Childcare/Kindergarten, Coast Guard, Community Venue, Education Facility, Fire Station, Hospital (Emergency), Hospital / Day Procedure, Lifesaving Club, Mine / Quarry, Municipal Office / Civic Centre, Place of Worship, Museum, Police Station, SES Unit, Caravan Park, Group Camp, Retirement Village, Helipad, Airport / Airfield. • Drainage infrastructure (to be included at any scale if available and within map boundary): River gauge, rain gauge, river and rain gauge, levees, retarding basins. • Cadastre: Only where it doesn't impact the overall ease of interpreting the map, generally most suitable to zoomed in maps, (likely scale range 1-24k). • Markers and directions for neighbouring towns and gauge locations.	River gauges, rain gauges & combined gauges Flood class levels **waterways Towns Population data Typical food peak travel times Major highways Local Government names SES unit names Summary flood risk information Property damage historical or AEP/ARI

				Used for regional maps to limit the extent of the map but show an item of detail (eg. Broken River @ Doggetts Bridge gauge, 2km or 10km to Echuca)	
	Map references				
	SES, CMA and Council logo Legend Title, Scale and North Reference VICSES disclaimer	SES, CMA Council logo Legend Title, Scale md North Reference VICSES disclaimer	SES, CMA and Council logo Legend Title, Scale and north reference VICSES disclaimer	• Legend including map title. • Scale • North reference Included within the document, but not the map itself: Logos of VICSES, CMA, LGA and the map disclaimer.	SES, CMA and Council logo Legend Title, Scale and North Reference VICSES disclaimer Flow direction
	Flood extend and overlays				

	Flood extent overlay(s). Up to 3 extents per map include 1% AEP/I in 100 yr ARI	Flood extent 0verlay (1 % AEP preferred)	Up to 5 model events represented per map, each showing properties impacted in a different colour.	• The default is generally 1% AEP or Minor, Moderate and Major where flood extents for these levels exist. • The inclusion of both the 1% AEP and Minor, Moderate and Major flood extents should only be included only where there is a noticeable difference between the overlays. • 5% AEP and/or 20% AEP can also be included with the 1% AEP where this information exists but should only be used where there is a noticeable difference between the overlays.	

Data Quality Hierarchy for MFEP and LFG inundation maps	MFEP - Township	MFEP – Catchment	MFEP - Building Damages	LFG - Township	Schematics *Note: No data heirarchy applicable*
	Map				
RIVERINE **1.** Flood class levels (minor, moderate, major) 2. Historical extent(s) 3. Modelled extent(s) (AEP/ARI - up to 3 extents per map) **FLASH FLOOD** 1. Historical extent(s) 2. Modelled extent(s) (AEP/ARI - up to 3 extents per map)	Railways Roads **Waterways Levees River gauges, rain gauges & combined gauges Cadastre *Features of interest Markers and directions for neighbouring towns and gauge locations	Railways Roads **Waterways Levees River gauges, rain gauges & combined gauges Cadastre *Features of interest Markers and directions for neighbouring towns and gauge locations	Railways Roads Roads impacted by flooding **Waterways Levees River gauges, rain gauges & combined gauges Cadastre Flood Model Extent(s) Buildings flooded above floor Buidings isolated Land parcel boundary *Features of interest Markers and directions for neighbouring towns and gauge locations	Flood extent (1% AEP/1 in 100 yr ARI) Flood Model Extent (if required) RailwaysRoads **Waterways Levees River gauges, rain gauges & combined gauges Cadastre *Features of interest (ONLY Police, Schools, Hospital, Ambulance, Community Centres, CFA, VICSES) Markers and directions for neighbouring towns and gauge locations (eg 'xxkm to Echuca')	River gauges, rain gauges & combined gauges Flood class levels **Waterways Towns Population data Typical flood peak travel times Major Highways Local Government names SES unit names Summary flood risk information Property damage historical or AEP/ARI
	Map References				
	SES, CMA and Council logo Legend Title, Scale and North Reference VICSES disclaimer	SES, CMA and Council logo Legend Title, Scale and North Reference VICSES disclaimer	SES, CMA and Council logo Legend Title, Scale and North Reference VICSES disclaimer	SES, CMA and Council logo Legend Title, Scale and North Reference VICSES disclaimer	SES, CMA and Council logo Legend Title, Scale and North Reference VICSES disclaimer Flow Direction
	Flood Extents and Overlays				
	Flood extent overlay(s). Up to 3 extents per map, include 1% AEP/1 in 100 yr ARI	Flood extent overlay (1% AEP preferred)	Up to 5 model events represented per map, each showing properties impacted in a different colour.	1% AEP/1 in 100 ARI unless otherwise required.	

* Features of interest Includes:

VICSES units, VICSES regional offices, fire stations, police stations, ambulance, coastguard, hospitals, education facilities, kindergarden / childcare, community centres, aged care facilities, retirement villages, places of worship, municipal building, municipal depot, electrical sub-station / power station, telephone exchange, drainage pumping station, sewerage pumping station, caravan park, camping ground, picnic area, helipad, airport, mine, law court, lifesaving club, museum, prison / justice facility, tip / recycling.

**Waterways Includes:

river, stream/creek, dam/reservoir/lake, drain/channel, swamp/natural wetland

NOTES:

- **Flood depth overlays** are to be provided for the following 3 classifications; 0.05m- 0.3m Low, 0.3m-0.6m Moderate, 0.6m+ High-Extreme.
- **Flood hazard class overlays** where available are to be classified into 6 categories (H1 – H6) in accordance with the Australian Rainfall and Runoff 2019 Guidelines (http://book.arr.org.au.s3-website-ap-southeast-2.amazonaws.com/, Book 6, Chapter 7). They are described as:

Table 6.7.3. Combined Hazard Curves - Vulnerability Thresholds (Smith et al., 2014)

Hazard Vulnerability Classification	Description
H1	Generally safe for vehicles, people and buildings.
H2	Unsafe for small vehicles.
H3	Unsafe for vehicles, children and the elderly.
H4	Unsafe for vehicles and people.
H5	Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust buildings subject to failure.
H6	Unsafe for vehicles and people. All building types considered vulnerable to failure.

Specifications for each classification are as follows.

Table 6.7.4. Combined Hazard Curves - Vulnerability Thresholds Classification Limits (Smith et al., 2014)

Hazard Vulnerability Classification	Classification Limit (D and V in combination)	Limiting Still Water Depth (D)	Limiting Velocity (V)
H1	D*V ≤ 0.3	0.3	2.0
H2	D*V ≤ 0.6	0.5	2.0
H3	D*V ≤ 0.6	1.2	2.0
H4	D*V ≤ 1.0	2.0	2.0
H5	D*V ≤ 4.0	4.0	4.0
H6	D*V > 4.0	-	-

- Symbol colours for each Hazard Vulnerability Classification are contained within the VICSES flood mapping symbol set specification sheet as per attachment 2.
- The preference is for *Flood Hazard Class Mapping*. However where information is only available for flood depth and not flood velocity, *Depth Class Mapping* should be developed.
- Where appropriate and the data is available, maps should be developed for events greater than the major flood level and greater than the 1% AEP/1 in 100 yr ARI flood level.
- All extents used in maps should provide the applicable river gauge height on the map where this information is available.

Attachment 2 – VICSES flood mapping symbol set

Version 6 January 2024

- Stream & Level Gauge
- Stream Level Gauge
- Rain Gauge
- Drainage Pumping Station
- Sewer Pumping Station
- Hospital
- Fire Station
- VICSES Unit
- Ambulance Station
- Police Station
- Coast Guard
- Municipal Office
- Municipal Depot
- Education Centre
- Child Care Centre
- Community Centre
- Aged Care Facility
- Place Of Worship
- Power Facility
- Telephone Exchange
- Caravan Park
- Camping Ground
- Sewer Emergency Relief Point
- Severe Weather RFA Red
- Severe Weather RFA Orange
- Severe Weather RFA Yellow
- Severe Weather RFA Light Green
- Severe Weather RFA Dark Green
- Severe Weather RFA Light Blue
- Severe Weather RFA Dark Blue

- Severe Weather RFA Purple
- Severe Weather RFA Pink
- Flood Gauge - Below Minor
- Flood Gauge - Minor
- Flood Gauge - Moderate
- Flood Gauge - Major
- Flood Gauge - No Scenario
- Severe Weather Grey
- Severe Weather RFA Brown
- Severe Weather RFA White
- Museum
- Mine
- Law Court
- Helipad
- Airfield
- Level, Rain & WQ Gauge
- Level, Rain WQ & FCS Gauge
- Level, Rain & FCS Gauge
- Level FCS Gauge
- Level & Rain Gauge
- Life Saving Victoria
- Law Court
- Hospital (Emergency)
- Museum
- Prison
- Tip / Recycling
- Quarantine
- Emergency Coordination Centre

- Levee
- Stormwater Drain
- Waterway Main
- Bicycle / Walking Trail
- Flood Model Extent
- Flooded Road

- Retarding Basin
- Appendix Area
- Polygon Mask
- Waterbody
- Flash Flood Extent
- Riverine Flood Extent
- Council Flood Extent
- Propety
- Building
- Extent Indicator
- Property at Risk
- Municipal Boundary
- Hazard - H1
- Hazard - H2
- Hazard - H3
- Hazard - H4
- Hazard - H5
- Hazard -H6
- Drainage & Waterway Boundary
- Below Minor Catchment
- Minor Catchment
- Moderate Catchment
- Major Catchment
- No Scenario Catchment
- Unit Boundary
- Coastal Extent
- Retirement Village

- Index Map Numbers
- Municipality
- VICSES Drains for LFG
- Waterway Label

Obtaining the symbol set for use in ArcGIS

The symbols shown above and their specifications reside within a .stylx file maintained by VICSES. The consultant preparing a flood study should add this stylx file into ArcGIS to easily apply symbology to MFSEP & LFG Mapping projects.

Application of the Spatial Vision Mapscape Basemap.

The consultant shall use colour and greyscale basemaps makes, which make map creation easier and more consistent. These basemaps replace previously used vector layer files needed for roads and polygon infrastructure.

The Mapscape Basemap licence for VICSES covers usage for printed and pdf mapping outputs which covers both MFSEP & LFG mapping products.

The following copyright label needs to be applied to each map:

© Spatial Vision, SV

Preferable formats for deliverables

- The MFSEP and LFG outputs should if possible be delivered as ‘stand-alone’ documents.
- Information presented in MFSEPs and LFGs should be consistent yet cater to the two distinct audiences and formats. For example, the flood gauge table should be consistent with the flood consequence and historical information provided within flood intelligence cards.
- There are many different ways of presenting the information in the MFSEPs and LFGs. For example, photos may be used. In MFSEPs tables and graphs may be used to present information (i.e. road closure information table, cumulative rainfall/consequence scenario graph).
- Reference to stage (m) and discharge (ML/d) are often made when describing design flood events and historic flood events. Where the information is available, stage (i.e. elevation of a river level measured to a particular datum) is preferred over the use of discharge (ML/d) (i.e. river flow rates) as it typically provides better links with flood warning systems and flood preparedness activities.