Hindmarsh Shire

FLOOD EMERGENCY PLAN

A Sub-Plan of the Municipal Emergency Management Plan

For Hindmarsh Shire Council
and
VICSES Nhill and Dimboola Units

Version 1, April 2020

Hindmarsh Shire Council

VICTORIA State Government

SES

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Distribution of MFEP

Once endorsed and signed the, MFEP should be distributed to all MFEP committee members, MEMPC Chair, council, MERO, Deputy MERO, Representatives from; BoM, CMA, DELWP, Parks Victoria, Ambulance Victoria, VicRoads, DHHS, relevant utilities, MFB, MERC, RERC, Police station, VICSES Units, VICSES Regional office, CFA Brigades, CFA Regional office.

Document Transmittal Form / Amendment Certificate

This Municipal Flood Emergency Plan (MFEP) 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 MidWest@ses.vic.gov.au.

The VICSES MFEP template 5.3 was used to develop this Plan.

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
0.1	June 2008	Tony Grimme	Draft version
1	March 2020	Clare Mintern	Rewrite report.

This Plan will be maintained on the VICSES website at www.ses.vic.gov.au/get-ready/your-local-flood-information and Hindmarsh Shire website https://www.hindmarsh.vic.gov.au/page/HomePage.aspx

List of Abbreviations & Acronyms

The following abbreviations and acronyms are used in the Plan			
AAR	After Action Review	**IIA**	Initial Impact Assessment
AEP	Annual Exceedance Probability	**IEMT**	Incident Emergency Management Team
AHD	Australian Height Datum (the height of a location above mean sea level in metres)	**JSOP**	Joint Standard Operations Procedure
AIDR	Australian Institute of Disaster Resilience	**IMS**	Incident Management System
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	**MFB**	Metropolitan Fire Brigade
CERA	Community Emergency Risk Assessment	**MFEP**	Municipal Flood Emergency Plan
CFA	Country Fire Authority	**MFEPC**	Municipal Flood Emergency Planning Committee
CMA	Catchment Management Authority	**MRM**	Municipal Recovery Manager
RERC	Regional Emergency Response Coordinator	**PMF**	Probable Maximum Flood
RERCC	Regional Emergency Response Coordination Centre	**RAC**	Regional Agency Commander
DHHS	Department of Health and Human Services	**RCC**	Regional Control Centre
DJPR	Department of Jobs, Precincts and Regions	**RDO**	Regional Duty Officer
DELWP	Department of Environment, Land, Water and Planning	**SAC**	State Agency Commander
EMLO	Emergency Management Liaison Officer	**SBO**	Special Building Overlay
EMMV	Emergency Management Manual Victoria	**SCC**	State Control Centre
EMT	Emergency Management Team	**SDO**	State Duty Officer
ERC	Emergency Relief Centre	**SERP**	State Emergency Response Plan
EO	Executive Officer	**SEWS**	Standard Emergency Warning Signal
FO	Floodway Overlay		

Part 1. Introduction

1.1 Approval and Endorsement

This Municipal Flood Emergency Plan (MFEP) has been prepared by VICSES, Wimmera CMA and Hindmarsh Shire Council staff and with the authority of the Hindmarsh Municipal Emergency Management Planning Committee (Hindmarsh MEMPC) pursuant to Section 20 of the Emergency Management Act 1986 (as amended).

VICSES staff has undertaken consultation with the Hindmarsh staff, Wimmera CMA staff and Dimboola and Nhill VICSES Unit members regarding the arrangements contained within this plan.

This MFEP is a sub plan to the Hindmarsh Shire Emergency Management Plan (MEMP), is consistent with the Emergency Management Manual Victoria (EMMV) and the Victorian Floodplain Management Strategy (2016), and takes into account the outcomes of the Community Emergency Risk Assessment (CERA) process undertaken by the Municipal Emergency Management Planning Committee (MEMPC).

The MFEP is consistent with the Mid West Regional Flood Emergency Plan (RFEP) and the State Emergency Response Plan (SERP) – Flood sub-plan.

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

This Plan is approved by the VICSES Regional Manager.

This Plan is endorsed by the Hindmarsh MEMPC as a sub-plan to the MEMP.

Approval

Stephen Warren Date 20 March 2020

Grampians Mid West Region VICSES Regional Manager



Endorsement

Angela Hoy Date 17 August 2020

Chair – Municipal Emergency Management Planning Committee



Purpose and Scope of this Flood Emergency Plan

The purpose of this MFEP is to detail arrangements agreed for managing a flood emergency before, during and after it occurs or potentially occurs within the Hindmarsh Shire.

As such, the scope of the Plan is to:

- Identify the local flood 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 and wider planning arrangements with a specific emphasis on those relevant to flood.

1.2 Municipal Flood Planning Committee (MFPC)

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

- VICSES (i.e. Unit Controller & Regional Officer – Emergency Management) (Chair),
- Council (i.e. Municipal Emergency Manager, Drainage Engineer, Statutory Planning Officer)
- Victoria Police (i.e. Municipal Emergency Response Co-ordinator) (MERC),
- Wimmera Catchment Management Authority (CMA),
- Department of Health and Human Services (DHHS) as required,
- Department of Environment, Land, Water and Planning (DELWP) as required,
- GWMWater
- Bureau of Meteorology as required,
- Local community representatives and
- CFA

1.3 Responsibility for Planning, Review & Maintenance of this Plan

This MFEP must be maintained in order to remain effective.

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 plan should be reviewed following:

A new flood study;

A significant change in flood mitigation measures;

After the occurrence of a significant flood event within the Municipality;

Or if none of the above occur, every 3 years.

Part 2. BEFORE: Prevention / preparedness arrangements

2.1 Community Engagement and Awareness

Details of this MFEP will be released to the community through; local media, any FloodSafe engagement initiatives and websites (VICSES and the Municipality) upon formal adoption by VICSES and the Municipality

VICSES with the support of the Hindmarsh Shire and Wimmera CMA will coordinate targeted community flood engagement programs within the council area.

Refer to appendix H (LFG and FloodSafe Information. Attach any broader FloodSafe details).

2.2 Structural Flood Mitigation Measures

An earthen levee has been constructed in Jeparit to provide flood protection up to a 50 year ARI event. For flood events greater that a 50 year event, floodwater overtops the Jeparit Levee. Refer to **Appendix** C2 for more details regarding the Jeparit Levee.

2.3 Non-structural Flood Mitigation Measures

2.3.1 Exercising the Plan

Arrangements for exercising this Plan will be at the discretion of the MEMPC. It is recommended that the MFEP is exercised on annual basis and reviewed in line with Section 1.4.

2.3.2 Flood Warning

Arrangements for Bureau issued Flood Watch and Flood Warning products are contained within the SERP Sub Plan – Flood (www.ses.vic.gov.au/em-sector/vicses-emergency-plans) and on the Bureau of Meteorology (BoM) website www.bom.gov.au.

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

2.3.3 Local Knowledge

Community 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.

Specific details of arrangements to capture local knowledge are provided in **Appendix H.**

Part 3. DURING: Response arrangements

3.1 Introduction

3.1.1 Activation of Response

Flood response arrangements may be activated by the Regional Duty Officer (RDO) VICSES – Mid West Region or Regional Agency Commander (RAC).

The VICSES Incident Controller (IC)/RDO will activate agencies as required as documented in the State Emergency Response Plan - Flood.

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 within the Hindmarsh Shire. These agencies will be engaged through the IEMT (Incident Emergency Management Team) when enacted or via the RAC when the IEMT is not enacted.

The general roles and responsibilities of supporting agencies are as agreed within the: MEMP, EMMV (Part 7 'Emergency Management Agency Roles') and SERP Sub Plan - Flood and Regional Flood Emergency Plan.

3.1.3 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 / ICC will liaise with the centre directly if no Division/Sector Command is established.

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 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 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 Part 3 of the EMMV.

3.2 The six C's

Arrangements in this MFEP must be consistent with the 6 C's detailed in State and Regional Flood Emergency Plans and the MEMP. For further information, refer to Part 3 of the EMMV.

- **Command:** Overall direction of response activity in an emergency.
- **Control:** Internal direction of personnel and resources within an agency.
- **Coordination:** Bringing together agencies and resources to ensure effective preparation for response and recovery.
- **Consequence:** Management of the effect of emergencies on individuals, communities, infrastructure and the environment.
- **Communication:** Engagement and provision of information across agencies and proactively with the community around preparation, response and recovery in emergencies.
- **Community Connection:** Understanding and connecting with trusted networks, leaders and communities around resilience and decision making.

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

3.2.1 Control

Functions 5(a) and 5(c) at Part 2 of *the Victoria State Emergency Service Act 1986 (as amended)* detail the authority for VICSES to plan for and respond to flood.

Part 7 of the EMMV prepared under the *Emergency Management Act 1986 (as amended)*, identifies VICSES as the Control Agency for flood. It identifies DELWP as the Control Agency responsible for "dam safety, water and sewerage asset related incidents" and other emergencies. A more detailed explanation of roles and responsibilities is provided in later sections of Part 7 of the EMMV.

All flood response activities within the Hindmarsh Shire including those arising from a dam failure or retarding basin / levee bank failure incident will therefore be under the control of the appointed IC, or delegated representative.

3.2.2 Incident Controller (IC)

An Incident Controller (IC) will be appointed by the VICSES (as the Control Agency) to command and control available resources in response to a flood event on the advice of the Bureau of Meteorology (or other reliable source) that a flood event will occur or is occurring. The IC responsibilities are as defined in Part 3 of the EMMV.

3.2.3 Incident Control Centre (ICC)

As required, the IC will establish an Incident Control Centre (ICC) from which to initiate incident response command and control functions. The decision as to if and when the ICC should be activated, rests with the Control Agency (i.e. VICSES).

Pre-determined ICC locations are available in the MEMP.

3.2.4 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 following Divisions and Sectors may be established to where applicable to assist with the management of flooding within the Municipality:

Table 1. Divisions and sectors for the Hindmarsh Shire.

Incident Level	ICC / ICP	Division	Division Control Point	Sector	Sector Control Point
Level 2-3	Horsham ICC	Horsham	Horsham CFA	Dimboola	TBD as needed
Level 2-3	Horsham ICC	Horsham	Horsham CFA	Jeparit	TBD as needed

3.2.5 Incident Management Team (IMT)

The IC will form an Incident Management Team (IMT).

Refer to Part 3 of the EMMV for guidance on IMTs and Incident Management Systems (IMSs).

3.2.6 Incident Emergency Management Team (IEMT)

The IC will establish a multi-agency Incident Emergency Management Team (IEMT) to assist the flood response. 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 are able to provide high level strategic guidance and policy advice to the IC for consideration in developing incident management strategies.

Organisations, including the Hindmarsh Shire, 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.

Refer to 3 of the EMMV for guidance on IEMTs.

3.2.7 On Receipt of a Flood Watch / Severe Weather Warning

SOP008 and SOP009 outline in detail the actions to be undertaken upon receipt of a Flood Watch/Flood Warning or Severe Weather Warning. VICSES RDO (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 – www.bom.gov.au
- Assess Command and Control requirements.
- Review local resources and consider needs for further resources regarding personnel, property protection, flood rescue and air support
- 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
- Ensure flood mitigation works are being checked by owners
- Develop and issue incident action plan, if required
- Develop and issue situation report, if required

3.2.8 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).** General considerations by the IC/VICSES RDO will be as follows:

- Develop an appreciation of current flood levels and predicted levels. Are floodwaters, rising, peaking or falling?
- Review flood intelligence to assess likely flood consequences.
- Consider:
  - What areas may be at risk of inundation?
  - What areas may be at risk of isolation?
  - What areas may be at risk of indirect affects as a consequence of power, gas, water, telephone, sewerage, health, transport or emergency service infrastructure interruption?
  - 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 (i.e. water and power utilities)
- 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

3.3 Initial Impact assessment

Initial impact assessments will be conducted in accordance with Part 3 section 5.2.5 of the EMMV to assess and record the extent and nature of damage caused by flooding. This information may then be used to provide the basis for further needs assessment and recovery planning by DHHS and recovery agencies.

3.4 Preliminary Deployments

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 might include emergency service personnel, food items and non-food items such as medical supplies, shelter, assembly areas, relief centres etc.

3.5 Response to Flash Flooding

Emergency management response to flash flooding should be consistent with the guideline for the emergency management of flash flooding contained within the State Emergency Response Plan - Flood.

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

1. Determine if there are barriers to evacuation by considering warning time, safe routes, resources available etc;
2. 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;
3. Where it is likely people will become trapped by floodwaters due to limited evacuation options safety advice needs to be provided to people at risk. Advice should be given to not attempt to flee by entering floodwaters if they become trapped, it may be safer to seek the highest point within the building and to telephone 000 if they require rescue.
4. For buildings known to be structurally un-suitable an earlier evacuation trigger will need to be established (return to step 1 of this cycle).
5. If an earlier evacuation is not possible then specific preparations must be made to rescue occupants trapped in structurally unsuitable buildings either pre-emptively or as those people call for help.
6. Contact the Hindmarsh Shire MERC and MERO 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. This is normal practice but this is insufficient justification for not adopting evacuation.

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

3.6 Evacuation

The IC decides whether to warn people to evacuate or if it is recommended to evacuate immediately.

Once the decision is made VicPol are 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 EMMV Part 8, Appendix 9 and the Evacuation Guidelines for guidance of evacuations for flood emergencies.

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

3.7 Flood Rescue

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

The following resources are available within Hindmarsh Shire to assist with rescue operations:

- Flood Rescue boats are located at Stawell and Nhill Units.
- Ballarat and Ararat Units have a land based Swift Rescue Team.
- HEMS 4 Rescue helicopter is located at the Warrnambool Aerodrome. Fixed wing and helicopter air base facilities are located at Horsham, Nhill Aerodromes.

3.8 Aircraft Management

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

Air support operations will be conducted under the control of the IC

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

Suitable airbase facilities are located at:

- Horsham Aerodrome, off Geodetic Road, north of Horsham.
- Nhill Aerodrome, off Aerodrome Road north of Nhill.

3.9 Resupply

Communities, neighbourhoods or households can become isolated during floods 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.

3.10 Essential Community Infrastructure and Property Protection

Essential Community Infrastructure and Property (e.g. residences, businesses, roads, power supply etc.) may be affected in the event of a flood.

The Hindmarsh Shire Council maintains a small stock of sandbags that will be made available at community collection points at Dimboola SES Unit, Jeparit Hindmarsh Council Depot, Nhill Hindmarsh Shire Depot and Rainbow Hindmarsh Shire Depot, refer to **Appendix I** for further details. These details will be advertised by both VICSES and Hindmarsh Shire at appropriate times prior to and during an event. Back-up supplies are available through the VICSES Regional Headquarters. The IC will determine the priorities related the use of sandbags, which will be consistent with the strategic priorities.

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 points.

3.11 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 Hindmarsh Shire.

3.12 Road Closures

Hindmarsh Shire and Regional Roads Victoria will carry out their formal functions of road closures including observation and placement of warning signs, road blocks etc. to its designated local and regional roads, bridges, walking and bike trails. Hindmarsh Shire staff should also liaise with and advise Regional Roads Victoria as to the need or advisability of erecting warning signs and / or of closing roads and bridges under its jurisdiction. Regional Roads Victoria is responsible for designated main roads and highways and councils are responsible for the designated local and regional road network.

Regional Roads Victoria and the Hindmarsh Shire will communicate community information 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.

3.13 Dam Spilling/ Failure

DELWP is the Control Agency for dam safety incidents (e.g. breach, failure or potential breach / failure of a dam), however VICSES is the Control Agency for any flooding that may result.

DELWP have 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 contained in **Appendix A**.

3.14 Waste Water 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 responsibility 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 Hindmarsh Shire Environmental Health Officer to inspect and report to the MERO and the ICC on any water quality issues relating to flooding.

3.15 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.

3.16 After Action Review

VICSES will coordinate the after action review arrangements of flood operations as soon as practical following an event.

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

Part 4. AFTER: Emergency relief and recovery arrangements

4.1 General

Arrangements for recovery from a flood incident within the Hindmarsh Shire is detailed in the Hindmarsh Shire MEMP.

4.2 Emergency Relief

The decision to recommend the opening of an emergency relief centre sits with the IC. The IC is responsible for ensuring that relief arrangements have been considered and implemented where required under the State Emergency Relief and Recovery Plan (Part 4 of the EMMV).

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. Refer to Part 4of the EMMV for details of the range of emergency relief services that may be provided.

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

Details of the relief arrangements are available in the MEMP.

4.3 Animal Welfare

Matters relating to the welfare of livestock and companion animals (including feeding and rescue) are to be referred to DJPR.

Requests for emergency supply and/or delivery of fodder to stranded livestock or for livestock rescue are passed to DJPR.

Matters relating to the welfare of wildlife are to be referred to DELWP.

4.4 Transition from Response to Recovery

VICSES as the Control Agency is responsible for ensuring effective transition from response to recovery. This transition will be conducted in accordance with existing arrangements as detailed in Part 3 of the EMMV or location of the transition arrangements are available in the MEMP

Appendix A: Flood threats for the Hindmarsh

This Appendix provides a broad overview of flood risk within the Municipality. Detailed flood risk information for individual communities is detailed in **Appendix C.**

5.1 Stormwater and Riverine Flooding

Hindmarsh Shire Council has towns that are subject to stormwater and riverine flooding. Towns that are impacted by stormwater flooding include Jeparit, Dimboola, Rainbow and Nhill.

Hindmarsh Shire has a long history of riverine flood events. Towns impacted by riverine flooding include Jeparit and Dimboola.

While flood events within the Hindmarsh Shire have been frequent over the last decade, the frequency of flood events has reduced since 1996. Prior to 1996 flood events in the Wimmera River occurred on average once every four years. Water diversion to storages in the upper catchment of the GWMWater stock and domestic water supply system has significantly reduced flooding in Dimboola, Jeparit and the downstream terminal lakes. Given these storages have the capacity (770,000 ML) to capture a significant proportion of high flows over a long period, water diversion to these storages has significantly reduced the frequency and magnitude of flooding in Dimboola, Jeparit and downstream terminal lakes, Lake Hindmarsh and Lake Albacutya.

The most significant recent flood event was recorded in 2011, refer to table 2 of significant flood events below.

Table 2. Historic flood events.

Year	Description
September 2016	Minor flood impacts to Dimboola and Jeparit causing access to be cut to minor and major roads.
January 2011	This flood event was the largest recent flood event on record and caused significant damage to buildings, roads and infrastructure in Dimboola, Jeparit, Rainbow and surrounding areas. Buildings were damaged by both riverine and stormwater flooding. The Dimboola and Jeparit Weirs were damaged. Reconstruction of these Weirs took several years to complete.
2010	Minor flooding in the Wimmera River impacting rural land and minor roads.
1999	Significant stormwater flooding occurred in Nhill and Rainbow causing damage to buildings, roads and other assets.
1996	Minor flood impacts to Dimboola and Jeparit causing access to be cut to minor and major roads.
1992	Minor flood impacts to Dimboola and Jeparit causing access to be cut to minor and major roads.
1981	This flood event caused significant damage to buildings and infrastructure. The Jeparit levee was reconstructed in Jeparit during this flood event.
1974	This flood event caused significant damage to buildings and infrastructure in Dimboola, Jeparit and Nhill. In Nhill more than six houses were flooded above floor, the Sewage Pumping Station and a section of the Nhill Caravan Park was impacted by flooding. Flooding also cut access to the Western Highway to the west of Nhill. The Jeparit levee was reconstructed in Jeparit during this flood event.
1956	This flood event caused significant damage to buildings and infrastructure in Dimboola and Jeparit. A levee was constructed in Jeparit during this flood event.

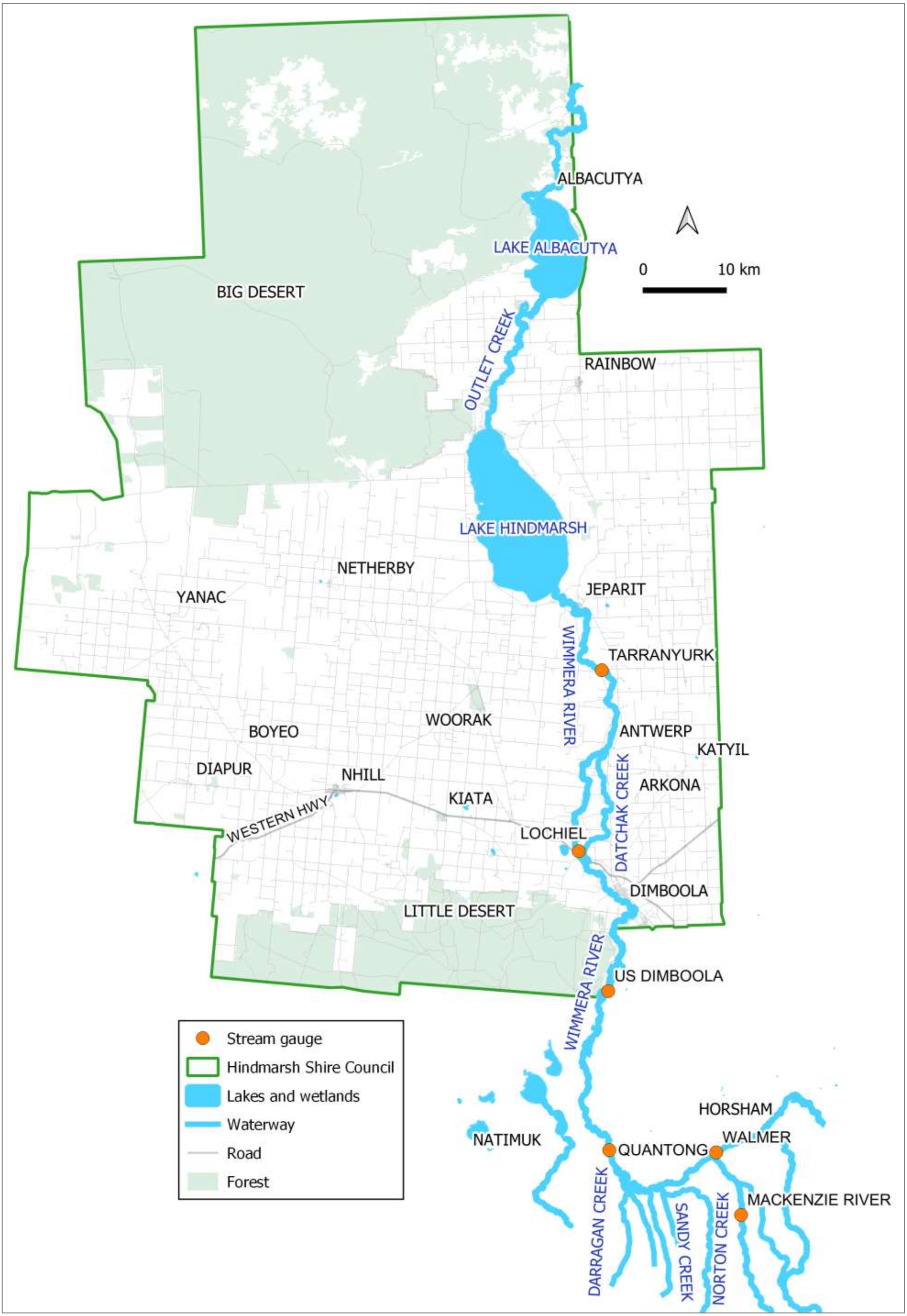


Figure 1. Hindmarsh waterways.

5.2 Major Waterways

The major waterways within the Hindmarsh Shire Council are listed in the table below.

Waterway	Description
Wimmera River	The upper reaches of the Wimmera River originates in the Pyrenees Ranges, near Elmhurst, and flows westward toward Horsham, then northwards through Dimboola and Jeparit to Lake Hindmarsh. The catchment area of the Wimmera River upstream of the Walmer stream gauge is approximately 4,000 km^2. The Wimmera River receives inflows from MacKenzie River, Norton Creek, Darragan Creek and Sandy Creek between Horsham and Quantong. Downstream of Quantong the Wimmera River has very flat topography and has limited tributary inflows. The Wimmera River frequently causes flooding in Dimboola and Jeparit. There are five stream gauges along the lower Wimmera River at Walmer, Quantong, Upstream Dimboola, Lochiel and Tarranyurk that provide flood warning to Dimboola and Jeparit. Flooding may start to occur in Dimboola 1.5 to 2.5 days after rainfall in the upper catchment, and in Jeparit 3.6 to 4 days after rainfall in the upper catchment.
MacKenzie River	The upper reaches of Mackenzie River are located to the north west of the Grampians National Park and are fed by Lake Wartook, with an approximate catchment area of 400 km^2. Mackenzie River joins the Wimmera River downstream of Horsham, immediately downstream of the Walmer stream gauge. Given that much of the runoff is generated in the headwaters of the Grampians, the level of Lake Wartook is critical to the peak flow generated in Mackenzie River. The Mackenzie River stream gauge rating table is only reliable up to 1,000 ML/d. The January 2011 flood event recorded a peak flow of 4,270 ML/d. This is well beyond the reliable section of the rating curve. The Mackenzie River flood peak generally arrives 2.5 to 3.5 days before the Wimmera River Walmer gauge flood peak.
Norton Creek, Sandy Creek, Darragan Creek	The upper reaches of Norton Creek drains the northern section of the Black Range State Park, with an approximate catchment area of 380 km^2. Norton Creek then flows north and joins the Wimmera River upstream of Quantong. Darragan Creek and Sandy Creek are smaller tributaries that also enter the Wimmera River upstream of Quantong. Currently there is no stream gauge monitoring available for these waterways. Stream monitoring at the Quantong gauge shows that the contribution of peak flood flow from these tributaries is substantially less than the peak Wimmera River flows, approximately 3,000 ML/d vs 35,000 ML/d from the Wimmera River. The timing of the flood peak from Norton Creek, Darragan Creek, Sandy Creek and surrounding tributaries enters the Wimmera River before the Wimmera River flood peak arrives at the Walmer stream gauge.
Datchak Creek	Datchak Creek is a small tributary of the lower Wimmera River, approximately 28 km long. Datchak Creek breaks out to the east of the Wimmera River downstream of Dimboola, flows through Arkona before it joins the Wimmera River near Antwerp.

5.3 Building Damages

Refer to the table below for property and building damages for flood events within the Hindmarsh Shire Council. The table also provides an indication of when a Level 2 and 3 Incident Control Centre (ICC) will be required, based on the number of above floor damages.

Table 3. Hindmarsh Shire Council building damages.

Average Recurrence Interval (ARI)	Total number of properties flooded (buildings flooded above floor)				Total damages for the Hindmarsh Shire Council
	Dimboola (Appendix C1)	Jeparit (Appendix C2)	Nhill (Appendix C3)	Rainbow (Appendix C4)	
5	2 (0)	0 (0)	0 (0)	0 (0)	2 (0)
10	6 (0)	0 (0)	0 (0)	0 (0)	6 (0)
20	24 (1)	0 (0)	0 (0)	0 (0)	24 (1)
50	55 (8)	3 (2)	0 (0)	0 (0)	58 (10)
100	78 (11)	32 (16)	29 (13)*	5 (2)^	144 (42)
200	87 (14)	34 (20)	>29 (13)*	>5 (2)^	155 (49)
500	100 (15)	35 (21)	>29 (13)*	>5 (2)^	169 (51)

*Damages estimated using the results from the Nhill Flood Study (SRWSC 1973).

^Estimated damages using anecdotal flood information provided by the Hindmarsh Shire Council.

Level 2 ICC

Level 3 ICC

5.4 Dams Spill / Failure

Significant dams or lakes that influence flooding within Hindmarsh Shire Council area are listed below.

Table 4. Dams and lakes that influence flooding.

Dam	Owner	Full Supply Volume	Comments
Lake Wartook	GWMWater	29,300 ML	During flood events, Lake Wartook has frequently spilled, contributing to flood flows in the lower Wimmera River via Mackenzie River. In January 2011 Lake Wartook's peak spill was 3,780 ML/d and lasted for 5 days. This spill flooded 3 buildings. The high velocity flows washed away the Wartook Road Bridge (north of Mount Victory Road), the Northern Grampians Road Bridge (west of Zumsteins) and large sections of roads downstream. The storage outlet can release up to 500 ML/d. During the September 2016 flood event, the peak spill was 1,000 ML/d, the spill lasted for several days. During this event no buildings were flooded, however access was cut to adjacent roads and there was extensive inundation of farmland. Spills cause very high risks to tourists walking downstream of Lake Wartook in the Grampians National Park. For current storage levels refer to the GWMWater website link. Also refer to the Wartook Reservoir stream gauge (415228) for early warning of Lake Wartook spills.
Hindmarsh Lake	GWMWater	431,700 ML	Lake Hindmarsh heavily influences the flood behavior of Jeparit when full. High Lake water levels increases the peak flood levels and flood duration in Jeparit (Water Technology 2008). During the January 2011 flood event Lake Hindmarsh was relatively empty, and therefore had no impact on flooding.
Dimboola Weir	Hindmarsh Shire Council	1,933 ML	The Dimboola Weir must be fully opened when flooding is likely to reduce flooding from impacting adjacent properties. During the January 2011 flood event not all of the Dimboola Weir boards were able to be removed. The boards for two bays were unable to be removed due to the walkway being constructed above them. This reduced the flow capacity of the Weir. Flooding significantly damaged the Weir, washing away sections of the walkway. The Weir has since been redesigned and reconstructed. Refer to section C1 for more details regarding the Dimboola Weir.
Jeparit Weir	Hindmarsh Shire Council	1,575ML	The Jeparit Weir must be fully opened when flooding is likely to reduce flooding from impacting adjacent properties. During the January 2011 flood event flooding significantly damaged the Weir. The Weir has since been redesigned and reconstructed. Refer to section C2 for more details regarding the Jeparit Weir.

Lake Wartook

During flood events, Lake Wartook has frequently spills contributing flood flows to the lower Wimmera River via Mackenzie River. Lake Wartook is located to the north west of the Grampians National Park, refer to the map below. Lake Wartook is an important storage managed by GWMWater that is primarily used to supply water for Horsham and the Wimmera Mallee Pipeline. Lake Wartook has a storage capacity of 29,300 ML (full supply level), with a further 1,400 ML buffer of airspace until it spills. Lake Wartook has a catchment area of 75 km^2, and has an average annual inflow of 26,000 ML (GWMWater 2009).

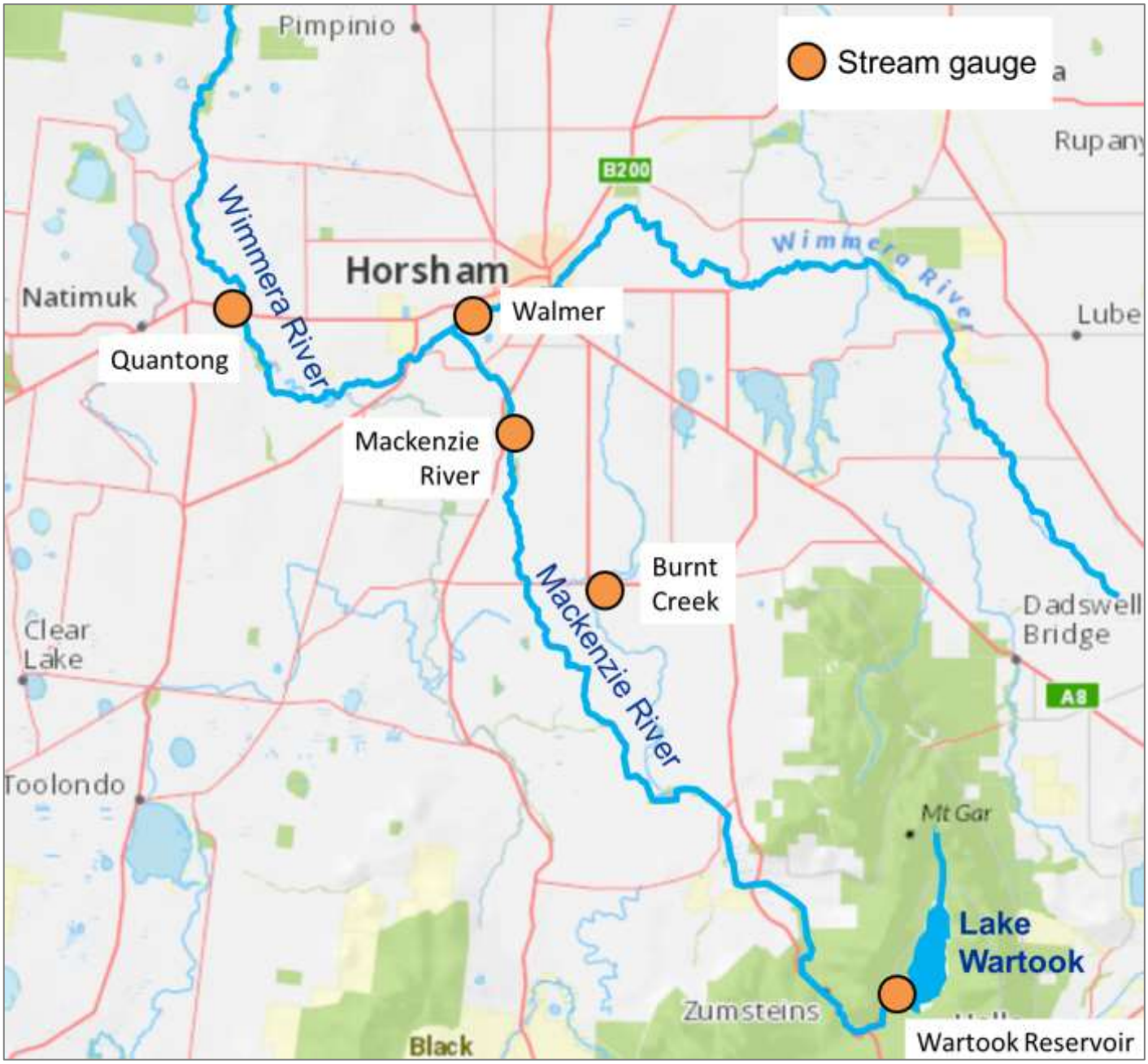


Figure 2. Location of Lake Wartook.

Operation of Lake Wartook

Lake Wartook is operated at its capacity in the summer months, 29,300 ML at Full Supply Level (FSL) which is 0.15 metres below the spillway crest. This means that when Wartook is at its FSL, an additional 1,400 ML is required before it will spill.

To assist in managing Lake Wartook storage levels, a variable operating level has been adopted between June and October of each year, refer to the graph below of the target Lake Wartook operating level. This provides a maximum of 8,000 ML of air space in June, which is progressively reduced with the objective of having the storage at its FSL by the end of October. Lowering the water level of Lake Wartook over winter provides flood mitigation, reducing the spill risk. This target curve also provides some attenuation of flood flows to allow controlled harvesting of this water downstream. It also reduces the frequency of road closures at Zumsteins and surrounding areas of the Grampians National Park.



Figure 3. Lake Wartook storage level control release target curve (source GWMWater).

January 2011 flood event

Leading into the January 2011 rainfall event Lake Wartook's storage was at 26,700 ML or 91%. Approximately 100 ML/d was being released prior to the rainfall, this volume increased during the event to 450-500 ML/d, the upper threshold of the outlet capacity. However it became apparent that Wartook would fill and spill as the rate of increase greatly exceeded the ability to drawdown.

During the January 2011 flood event over 200 mm of rainfall was recorded during the event, the volume rising to approximately 4,000 ML until it spilled at 2:30pm on Thursday 13 January. The spill lasted for five days, peaking at 3,780 ML/d, refer to flood photos below.

At the beginning of January 2011 Lake Wartook contained 27,980 ML (95%). During the 2011 event, Lake Wartook's peak storage volume was approximate 32,120 ML (109.6%). The maximum inflow was 15,780 ML/d with a maximum outflow of 3,780 ML/d. This indicates a peak flow through Lake Wartook was attenuated by 12,000 ML/d, substantially reduced the potential flood impacts downstream of Lake Wartook (Water Technology 2016).

Following the spill GWMWater undertook controlled releases of 200 ML/d to lower the storage level to reduce the risk of additional spills. The storage outlet can release up to 500 ML/d.

During the September 2016 flood event Lake Wartook's peak spill was 1,000 ML/d, the spill lasted for several days.



Figure 4. Lake Wartook spilling during the January 2011 flood event.



Figure 5. Flooding impacting Mackenzie Falls (downstream of Lake Wartook) during the January 2011 flood event.



Figure 6. Flooding impacting Mackenzie Falls (downstream of Lake Wartook) during the January 2011 flood event.

Lake Wartook Spill Warning

A stream gauge immediately downstream of Lake Wartook on Makenzie River (Wartook Reservoir 415228) provides early warning of Lake Wartook spills. Refer to figure 2 above for the location of the Wartook Reservoir stream gauge.

Lake Wartook Historic Spills

Water may be released from Lake Wartook up to the safe maximum rate of 500 ML/day to maintain target levels. When inflows exceed this rate of controlled release, levels within the reservoir will increase and a spill may occur. Lake Wartook's primary spillway is located at the west end of the embankment. A secondary spillway is located at the east end of the embankment. Spills from Lake Wartook pass into the Mackenzie River.

The management of Lake Wartook's water level significantly influence the potential for floodwater to overtop the spillway. Refer to figure 8 below for the spills that have occurred in 2011 and 2016 with the target curve.

Table 5. Mackenzie River at the Wartook Reservoir gauge historic flood event events.

Start	End	Peak Flow (ML/d)	Duration (days)
14/1/2011	24/1/2011	3,780	10
14/9/2016	14/9/2016	2,027	10
18/12/1992	25/12/1992	2,327	7
8/10/1975	18/10/1975	1,805	10
7/10/1992	16/10/1992	1,660	9
23/10/1975	4/11/1975	1,627	12
21/09/1992	26/09/1992	1,429	5
30/08/1992	7/09/1992	1,345	8
21/11/1992	24/11/1992	1,218	3
11/09/1992	17/09/1992	1,173	6
28/09/1992	1/10/1992	1,156	3
31/08/1983	30/09/1983	1,027	30

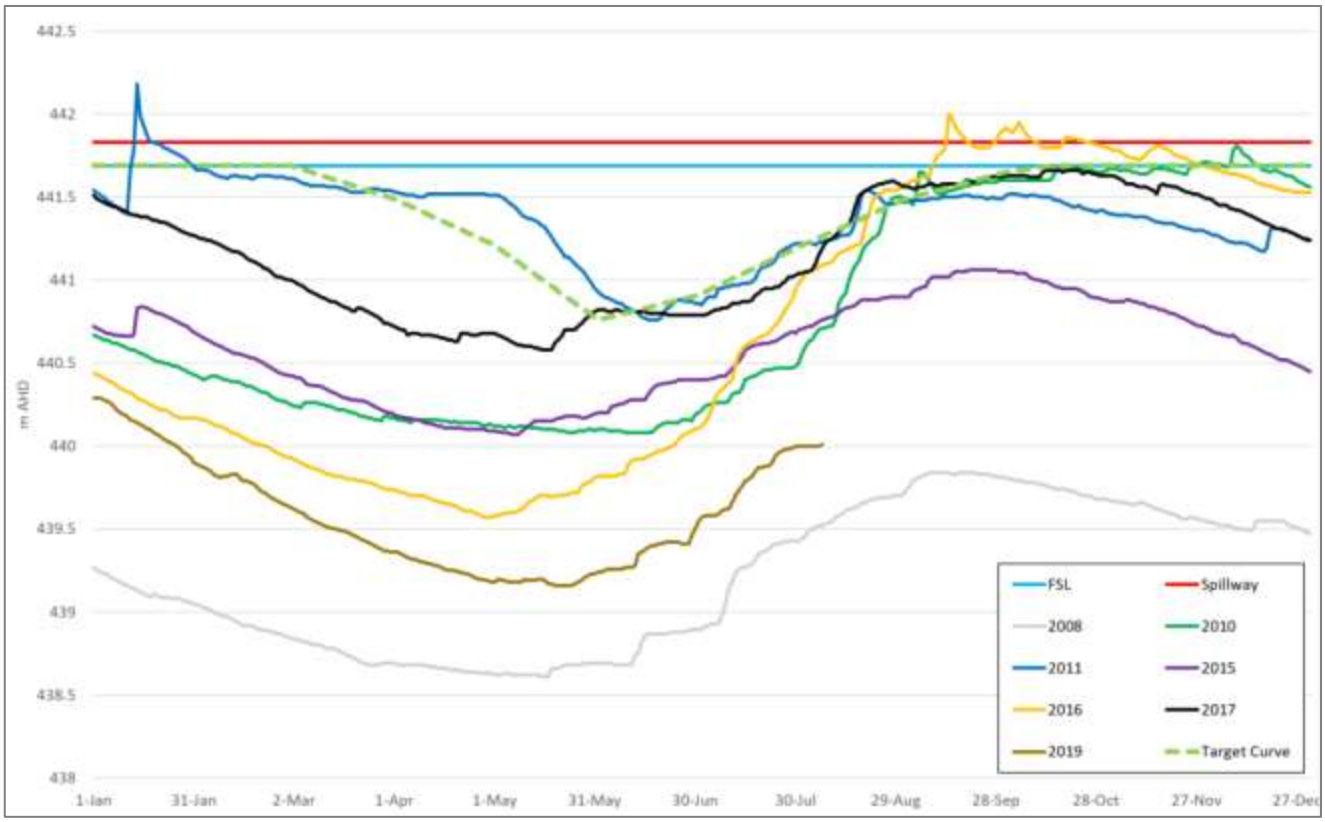


Figure 7. Lake Wartook water level target curve and historic spill levels.

An analysis of the annual peak stream flow indicates a change in distribution of flows greater than 500 ML, which is the maximum regulated outflow from Lake Wartook. It also estimates the 100 year ARI flow of 3,570 ML/d which is in line with anecdotal evidence of the January 2011 flood event being between a 50 year and 200 year ARI flood event, refer to the graph below.

Historic records for the gauge indicate for floods greater than a 10 year ARI a typical flood duration of 8 days can be expected. The table below provides a summary of his historic flood events, showing the January 2011 flood was the largest spill on record.

A model was developed to assess the impact of various starting water levels in Lake Wartook using a spillway height 441.83m and volume 30,741ML with a 95%, 90% and 85% capacity from spillway height. The figure below shows the impact on flows from Lake Wartook for the 12 hour and 72 hour storm events respectively.

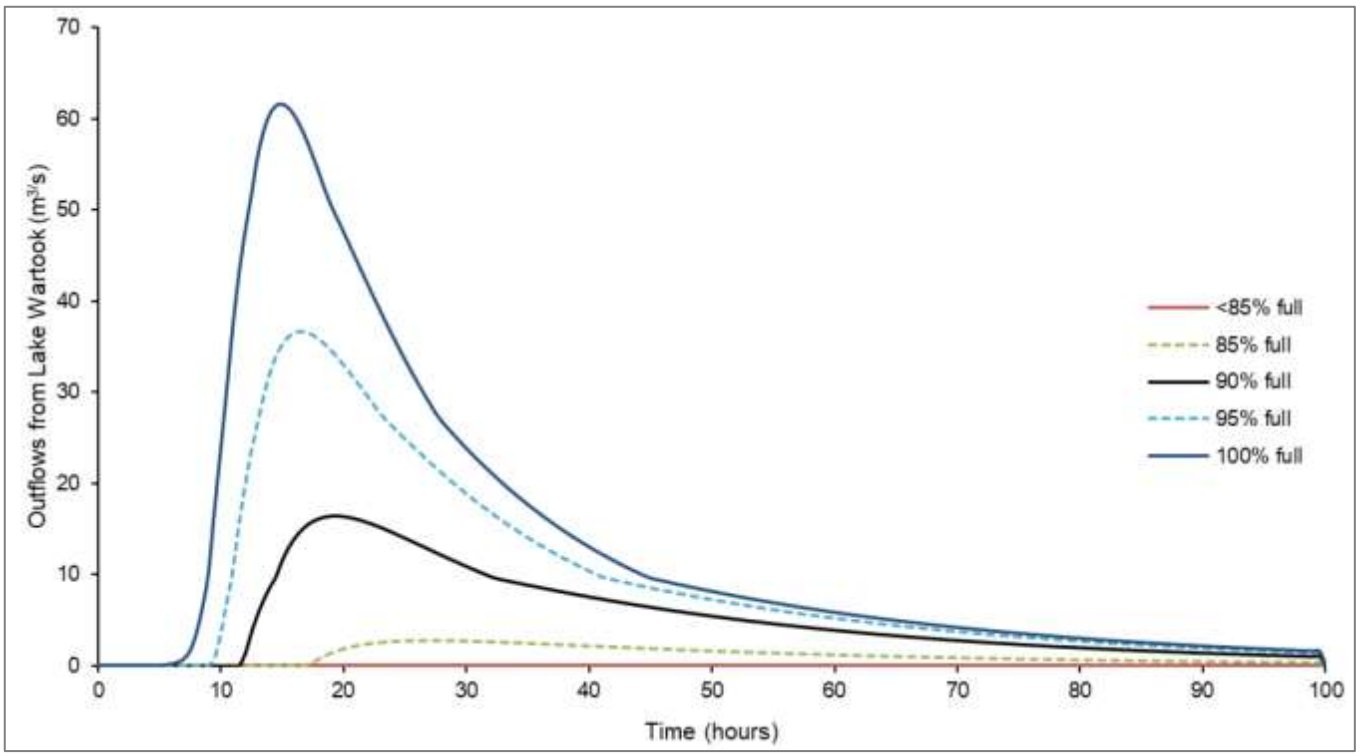


Figure 8. The impact of increasing the Lake Wartook water level during a 12 hour storm event (Water Technology 2019).

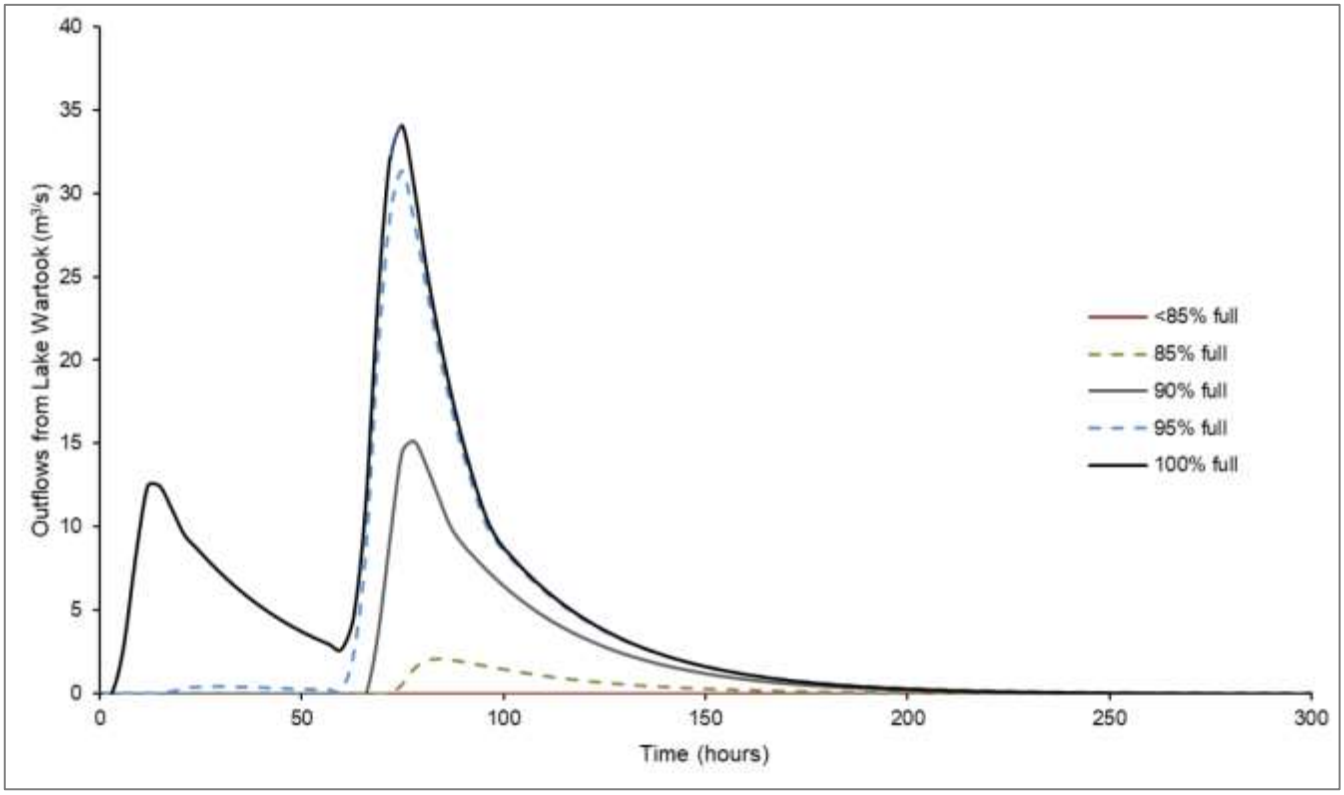


Figure 9. The impact of increasing the Lake Wartook water level during a 72 hour storm event Water Technology 2019).

The change to outflows from Lake Wartook was significant with the Lake able to fully absorb the 100 year ARI event volume at 85% full for both the 12hr and 72 hour events, meaning no spills would occur.

5.5 Levees

An earthen levee has been constructed in Jeparit to provide flood protection up to a 50 year ARI event. For flood events greater that a 50 year event, floodwater overtops the Jeparit Levee. Refer to **Appendix** C2 for more details regarding the Jeparit Levee.

Appendix B: Typical flood peak travel times

Table 6. Flood peak travel times.

Location From	Location To	Typical Travel Time	Comments	Duration
Rainbow (Stormwater flooding)				
Start of rainfall	Rainbow	2 – 6 hours	begin to rise from normal levels	1 day
Start of rainfall	Rainbow	3 – 12 hours	to peak	
Nhill (flooding from Nhill Swamp)				
Start of rainfall	Nhill	4 - 6 hours	begin to rise from normal levels	1-3 days
Start of rainfall	Nhill	12 - 18 hours	to peak	
Dimboola (Wimmera River)				
Peak at the Mackenzie gauge	Quantong	0.5 - 1 day	to peak	2-3 days
Peak at the Walmer gauge (downstream of Horsham)	Dimboola	1 - 2 days	begin to rise from normal levels	
Peak at the Walmer gauge (downstream of Horsham)	Dimboola	1 - 4 days	to peak	
Jeparit (Wimmera River)				
Peak at the Walmer gauge (downstream of Horsham)	Jeparit	3 - 6 days	begin to rise from normal levels	2-3 days
Peak at the Walmer gauge (downstream of Horsham)	Jeparit	5.4 – 6.4 days	to peak	

Appendix C1: Dimboola Flood Emergency Plan

Dimboola has experienced extensive and frequent riverine flooding from the Wimmera River. The focus of this section includes the area along the Wimmera River from the upstream Dimboola stream gauge to Arkona. The upper reaches of the Wimmera River originates in the Pyrenees Ranges near Elmhurst and flows westward towards Horsham, then northward through Dimboola. The Wimmera River catchment area upstream of Dimboola is approximately 6,113 km^2 (Alluvium 2014).

Dimboola also experiences stormwater flooding. For detail regarding Dimboola's stormwater flood risk, refer to the Stormwater Flood Risk section below.

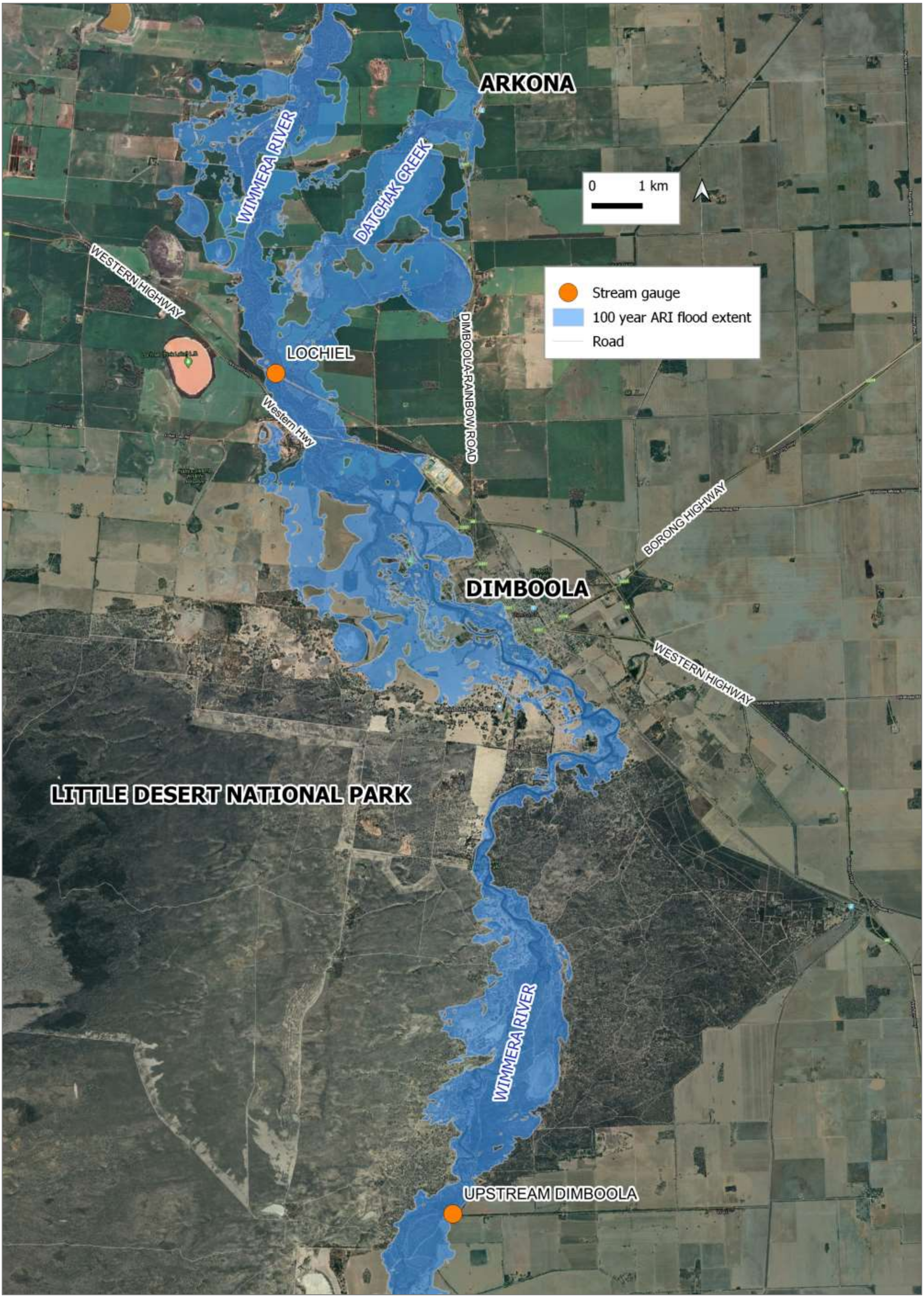


Figure 10. Dimboola waterways and stream gauges.

Historic Flood Events

Dimboola has experienced frequent and extensive flood events, refer to the graph below. Significant flood events have occurred in 1971, 1973, 1974, 1975, 1979, 1980, 1981, 1983, 1984, 1986, 1988, 1989, 1992, 1995, 1996, 2010, 2011 and 2016.

The Wimmera River stream gauge at Walmer (downstream of Horsham) was used to indicate historic flood events that have occurred in Dimboola given there are large gaps in the Upstream Dimboola stream gauge record.

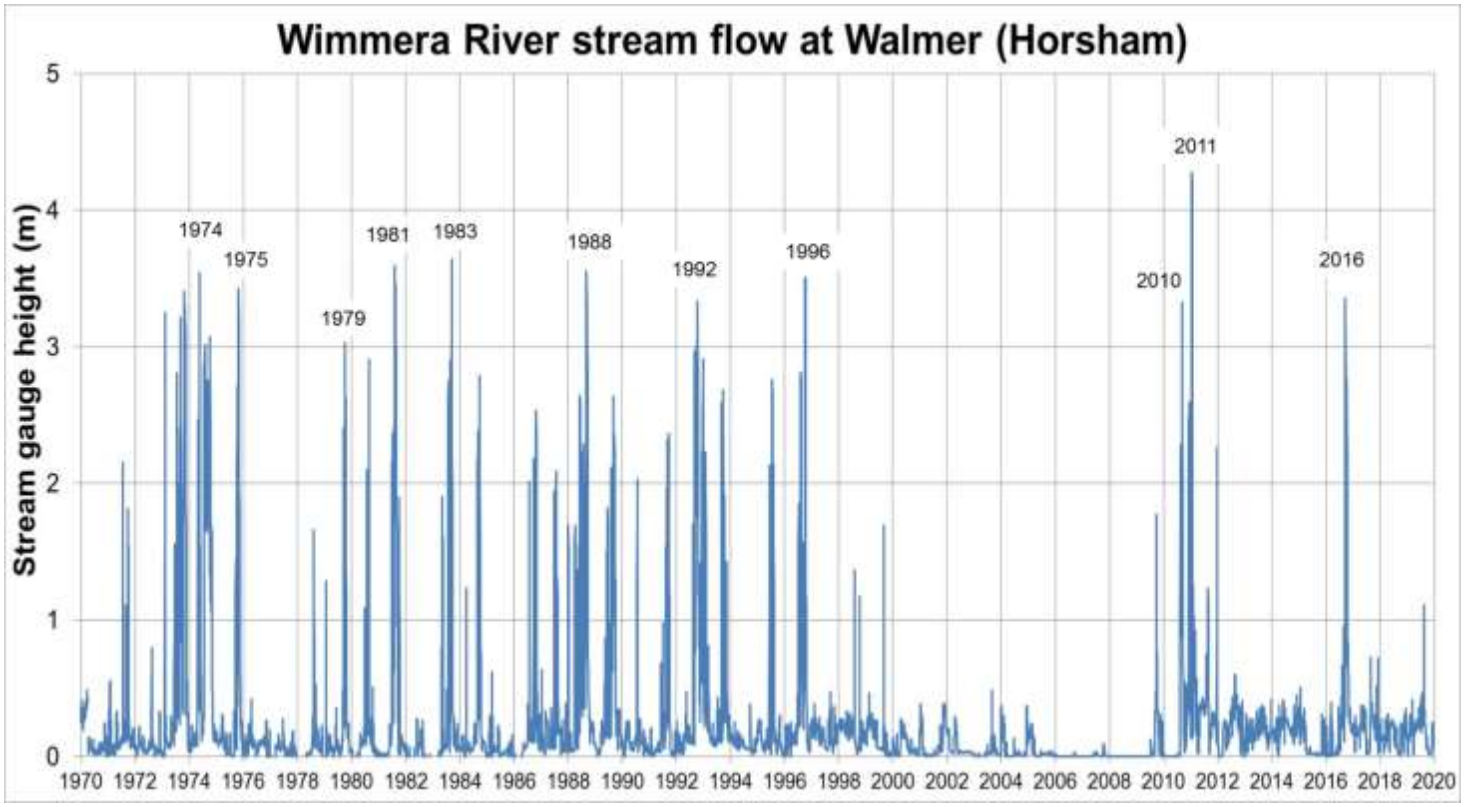


Figure 11. Dimboola historic flood events.

The 2011 flood was Dimboola's largest recent flood event on record, estimated to be between a 100 and 200 year ARI event. Dimboola recorded 148.4 mm of rainfall over 3 days, with 104.2 mm on the 12th of January. Six houses were reported to be impacted by stormwater flooding. Since this event the Hindmarsh Shire has undertaken significant drainage works to reduce flood risk.

During the January 2011 flood event all of the Dimboola Weir boards were unable to be removed. The boards for two bays were unable to be removed due to the walkway being constructed above them. This reduced the flow capacity of the Weir. Flooding significantly damaged the Weir, washing away sections of the walkway and affecting the electronic systems, refer to flood photos below. The Weir has since been redesigned and reconstructed.

For more details refer to the Dimboola Flood Intelligence Card below.



Figure 12. Flooding in Dimboola during the 2011 flood event.



Figure 13. Houses impacted by flooding in Wimmera Street, Dimboola during the 2011 flood event.



Figure 14. Houses impacted by flooding in Wimmera Street during the 2011 flood event.



Figure 15. The Dimboola Recreation Reserve Clubrooms and oval impacted by flooding during the 2011 flood event.



Figure 16. The Dimboola clubrooms impacted by flooding during the 2011 flood event.



Figure 17. Flooding cut access to the Lochiel Street Bridge in Dimboola during the 2011 flood event.

Flood Warning Time and Flood Behaviour

There are three four stream gauges upstream of Dimboola that provide flood warning, Walmer, Mackenzie, Quantong and Upstream Dimboola. Refer to the map below of the gauge locations.



Figure 18. Stream gauge locations upstream of Dimboola.

There are several minor waterways that contribute inflows into the lower Wimmera River between the Walmer and the Quantong gauge, Mackenzie River, Norton Creek, Darragan Creek and Sandy Creek. With Mackenzie River the only tributary that has a stream gauge.

The Mackenzie River flood peak generally arrives 2.5 to 3.5 days before the Walmer gauge flood peak. An analysis of the timing and influence of the Mackenzie River flow in relation to the lower Wimmera River flood peak flows for the January 2011 flood event is shown in the graph below. It shows Mackenzie River peaked several days before the Wimmera River peaked at the Walmer gauge. As seen in the graph below the Mackenzie River inflow increased the water levels on the rising limb of the hydrograph, but didn't significantly alter the peak water level during the flood event. A detailed analysis showed that the impact of the Mackenzie River inflows on peak flood levels in Dimboola was found to be generally less than 0.05 m. The contribution of flood flow from the Mackenzie River is up to 60 times less than the Wimmera River peak flood flow.

The travel time of historic flood events provides an indication of expected travel time, refer to the table and graph below. The travel time between heavy rainfall in the upper Wimmera River catchment and rise in floodwater in Dimboola is between 1.5 to 2.5 days. The flood peak is expected to arrive between 1.5 to 4 days after heavy rainfall in the upper Wimmera River catchment.

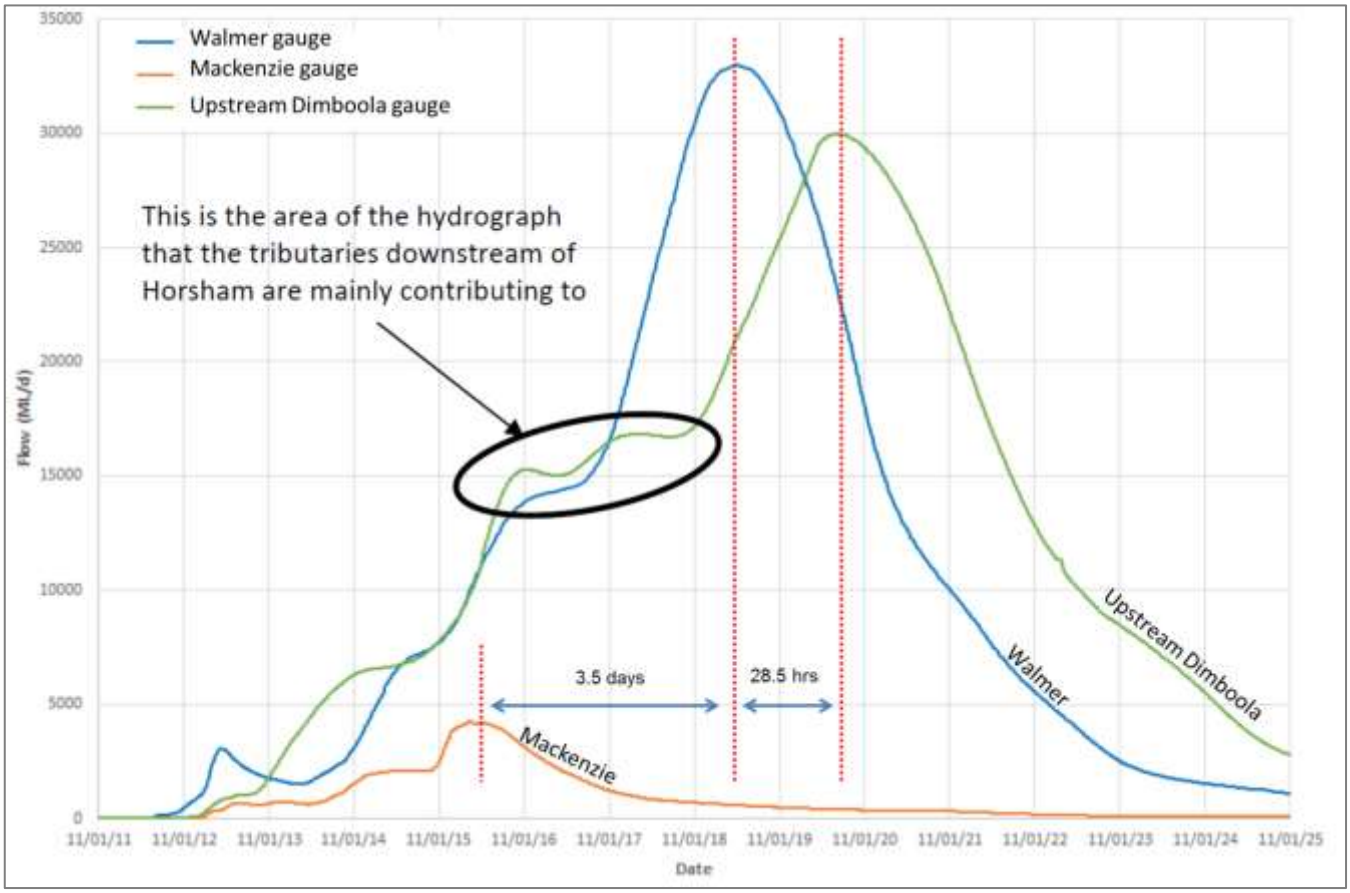


Figure 19. Peak flood flows in Mackenzie River and the Wimmera River during the 2011 flood event.

Table 7.Lower Wimmera River and Mackenzie River January 2011 flood peak travel times (Water Technology 2017).

Gauge	Max. level (m)	Max. flow (ML/d)	Time/date	Time (hrs)
Mackenzie	2.13	2,614	15/01/2011 00:00	-
Walmer	4.27	32,971	18/01/2011 11:30	0
Quantong	7.36	-	18/01/2011 21:30	10
Upstream Dimboola	5.81	29,979	19/01/2011 16:00	28.5

Dimboola Weir Management during floods

Given the Dimboola Weir significantly influences flood levels in Dimboola, it's important that all the Weir gates and boards are open before peak flood flows arrives. If sections of the Weir remain closed, this will reduce the flow capacity of the Weir and increase the number of buildings at risk of flooding in Dimboola.

The Dimboola Weir consists of six overshot gates and twelve drop boards, has the capacity of 1,933 ML (Alluvium 2014), refer to the image below. The Weir is located west of Dimboola along Horseshoe Bend Road, refer to the map below. Water in the Weir has a significant social value, serves to provide the community with both a recreational asset, but also a sense of place and forms part of the identity of the town. The Weir is very important to Dimboola's community recreation.

The maximum flow rate of the Dimboola Weir is 3,054 ML/d. Trigger that the Hindmarsh Shire Council may use in their decision making to open the Dimboola Weir gates include;

- When high river flows occur in Horsham, Walmer stream gauge height of 2.18 m (flow of 3,054 ML/d) or greater
- When high river flows occur upstream of Dimboola, Upstream of Dimboola stream gauge height of 2.88m (flow of 3,054 ML/d) or greater



Figure 20. The Dimboola Weir.



Figure 21. The location of the Dimboola Weir.

As seen in the photo below the Dimboola Weir was extensively damaged by the January 2011 flood event. Since this flood the Dimboola Weir has been redesigned and reconstructed, refer to the photo below. there have been extensive changes to the Weir since the flood event.


Figure 22. The Dimboola Weir damaged by flooding during the 2011 flood event.



Figure 23. The Dimboola Weir reconstructed following the January 2011 flood.

Stormwater Flood Risk

During the 2011 flood event Dimboola recorded 104.2 mm of rainfall on the 12th of January. 6 houses were reported to be impacted by stormwater flooding. Since this event the Hindmarsh Shire has undertaken significant drainage works to reduce flood risk.

Flood Impacts and Actions Required

Key assets at risk of flooding in Dimboola and along the Wimmera River floodplain from the Upstream Dimboola stream gauge to Arkona are listed in the table below.

Table 8. Key assets at risk of flooding.

Asset register				
Asset Name and location	**Average Recurrence Interval (ARI)**	**Consequence / Impact**	**Mitigation/ Action**	**Lead Agency**
Dimboola Golf Course, Dimboola.	5 year flood	The Dimboola Golf Course starts to be impacted by flooding during a 5 year flood event, depth 3 m.	Notify the Golf Club management committee.	Council
Riverside Road, south of Dimboola.	5 year flood	Flooding may cut access to Riverside Road, during a 5 year flood event, depth 0.30 m.	Deploy road closure signs as needed.	Council
Horseshoe Bend Road, west of Dimboola.	10 year flood	Flooding may cut access to Horseshoe Bend Road, during a 10 year flood event.	Deploy road closure signs as needed.	Council
Dimboola Caravan Park, Wimmera Street, Dimboola.	10 year flood	Flooding may cut access to the Dimboola Caravan Park during a 10 year flood event.	Deploy road closure signs as needed.	Council
Dimboola Wimmera Street Bridge, crossing the Wimmera River.	10 year flood	Flooding may cut east west access across the Wimmera Street Bridge in Dimboola during a 10 year flood event.	Deploy road closure signs as needed.	Council
The Dimboola-Rainbow Road, south of Arkona.	10 year flood	Flooding may cut access to the Dimboola-Rainbow Road, during a 10 year flood event, depth 0.37 m.	Deploy road closure signs as needed.	Council
The Western Highway, north west of Dimboola.	10 year flood	Flooding may cut access to the Western Highway, during a 10 year flood event, depth 0.27 m.	Deploy road closure signs and undertake traffic management as needed.	Regional Roads Victoria
A house at 1 Wimmera Street, Dimboola.	20 year flood	A house at 1 Wimmera Street may be impacted by flooding above floor during a 20 year flood event.	Sandbag building as needed.	VICSES
Lloyd Street, Dimboola.	20 year flood	Flooding may cut access to Lloyd Street during a 20 year flood event, depth 0.43m.	Deploy road closure signs as needed.	Council
Park Street, Dimboola.	20 year flood	Flooding may cut access to Park Street, during a 20 year flood event, depth 0.38m.	Deploy road closure signs as needed.	Council
Moulder Street, Dimboola.	50 year flood	Flooding may cut access to Moulder Street, during a 50 year flood event, depth 0.34 m.	Deploy road closure signs as needed.	Council
Dimboola Rowing Club, at the Dimboola Recreation Reserve.	50 year flood	Flooding may impact the Dimboola Rowing Club building above floor during a 50 year flood event.	Sandbag building as needed.	VICSES
Dimboola Recreation Reserve, Dimboola.	50 year flood	Flooding may impact the Dimboola Recreation Reserve Clubroom building above floor during a 50 year flood event.	Sandbag building as needed.	VICSES

For more detailed information regarding buildings and roads impacted refer to the Dimboola Flood Intelligence Cards and flood impact maps below. Also refer to the Dimboola flood depth maps in **Appendix F,** a list of flood observers in **Appendix H** and community sandbag collection point in **Appendix I**

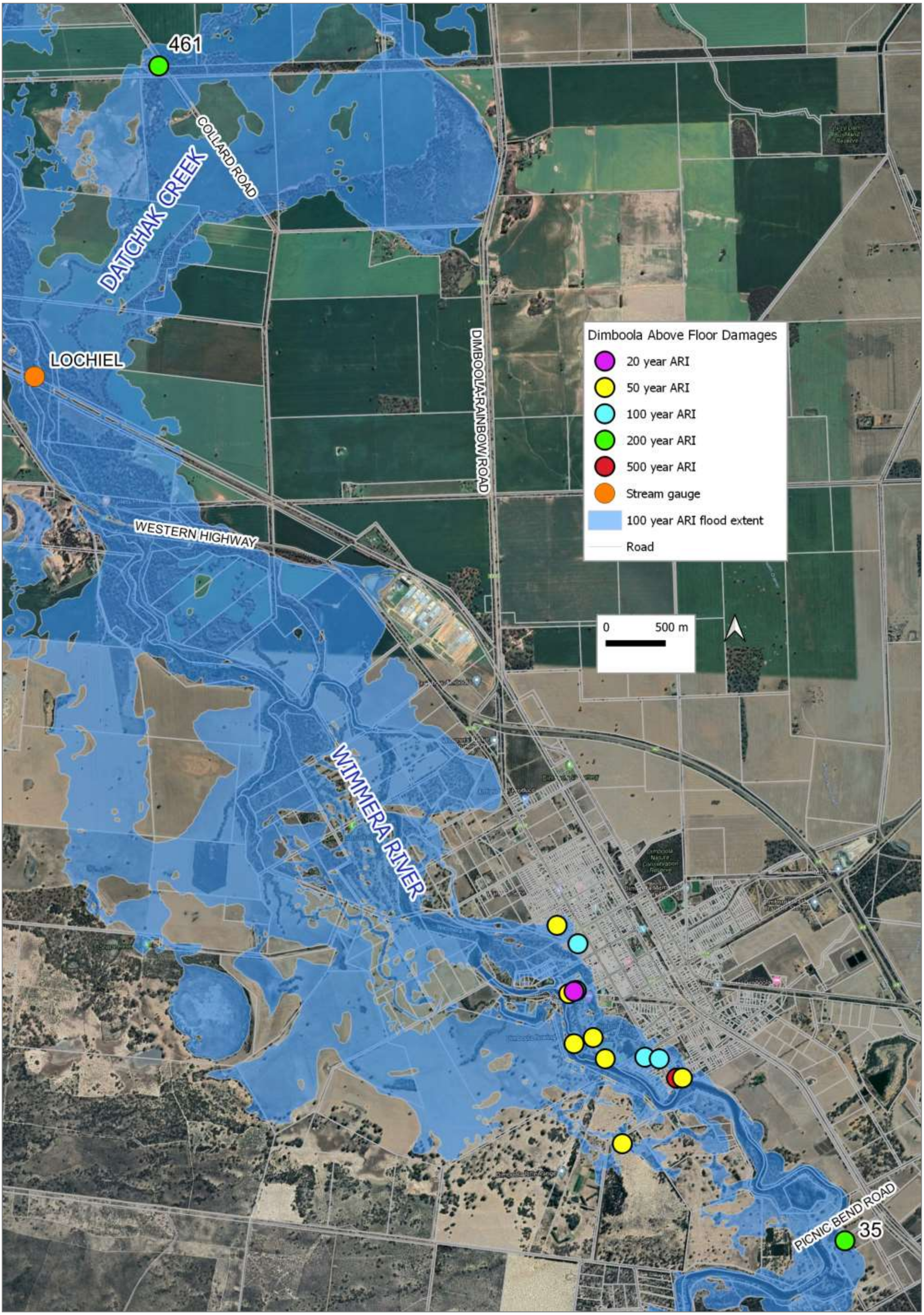


Figure 24. Dimboola buildings impacted by flooding over the 100 year flood extent (Water Technology 2017).

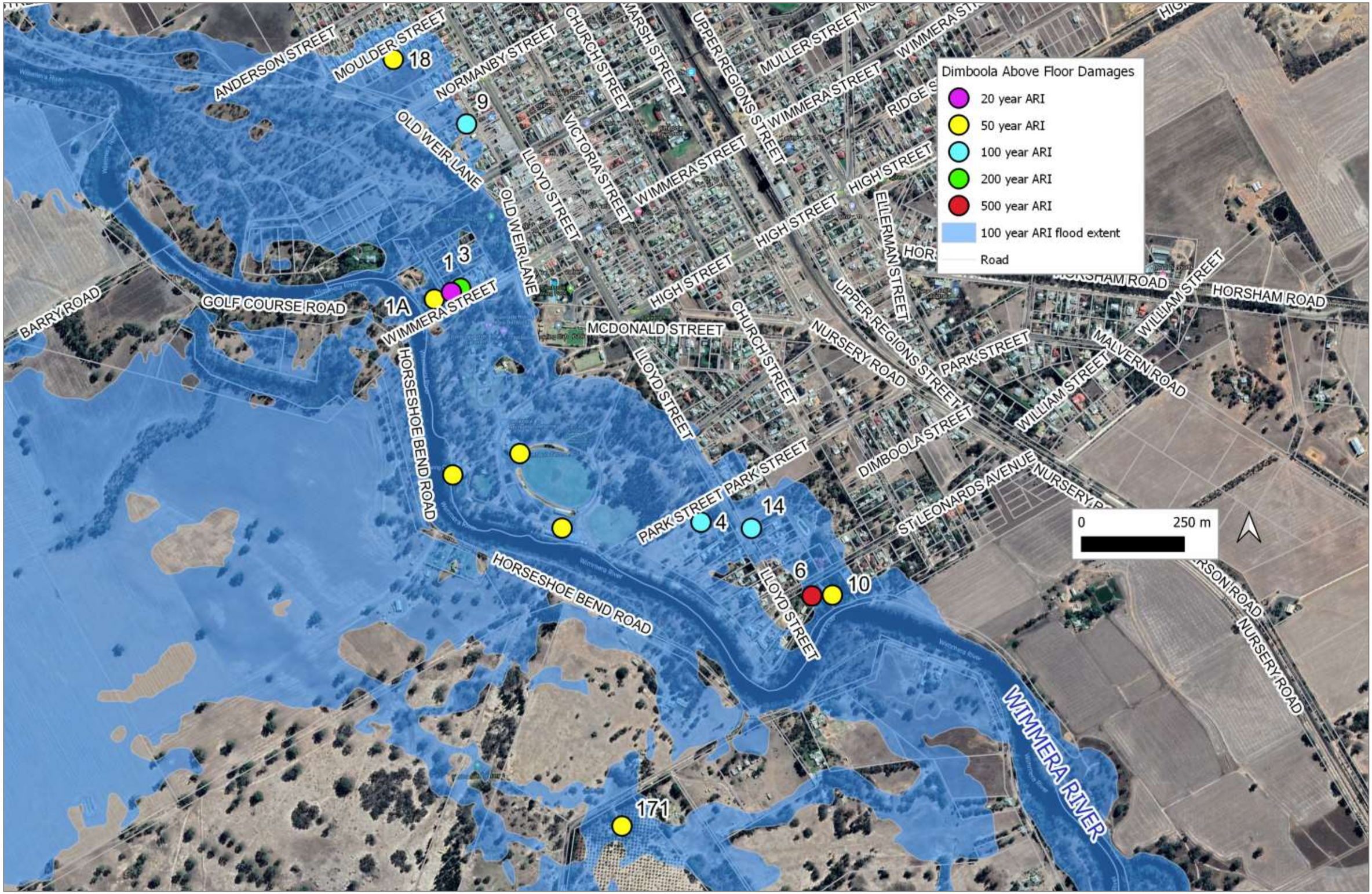


Figure 25. Dimboola roads impacted by flooding with the 100 year flood extent (Water Technology 2017).

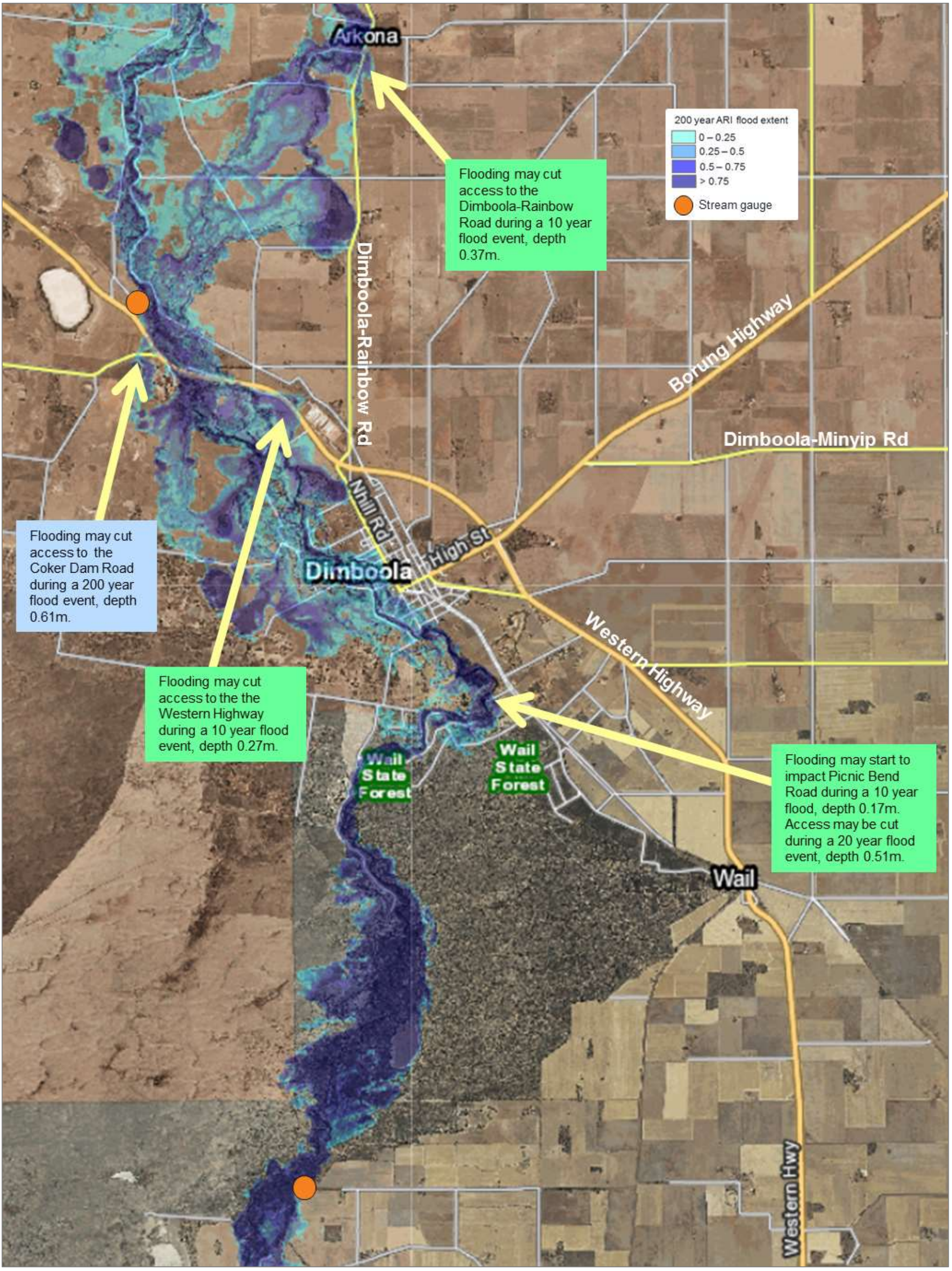


Figure 26. Dimboola roads impacted by flooding with the 100 year flood extent (Water Technology 2017).

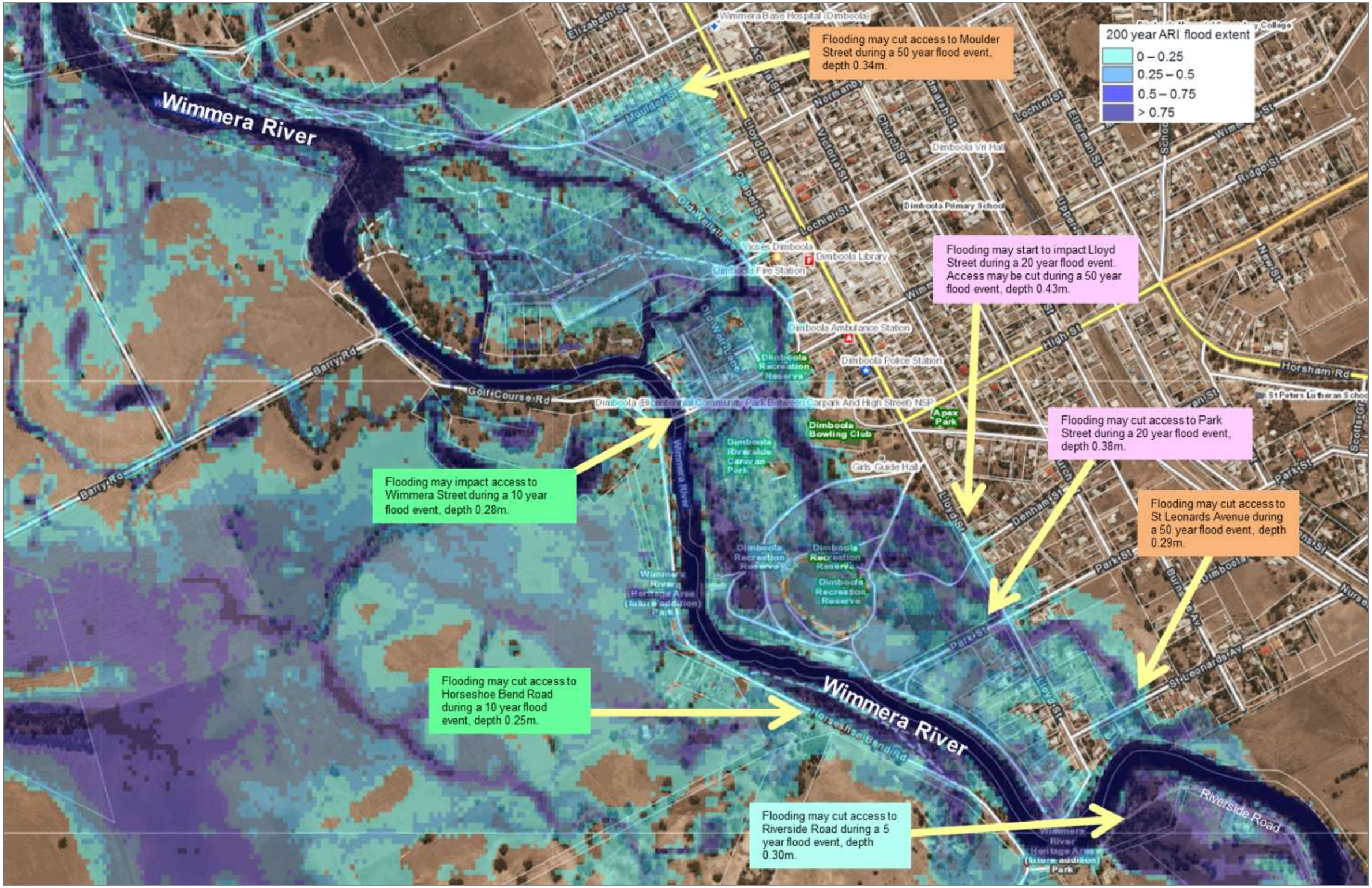


Figure 27. Dimboola roads impacted by flooding with the 200 year flood extent (Water Technology 2017).

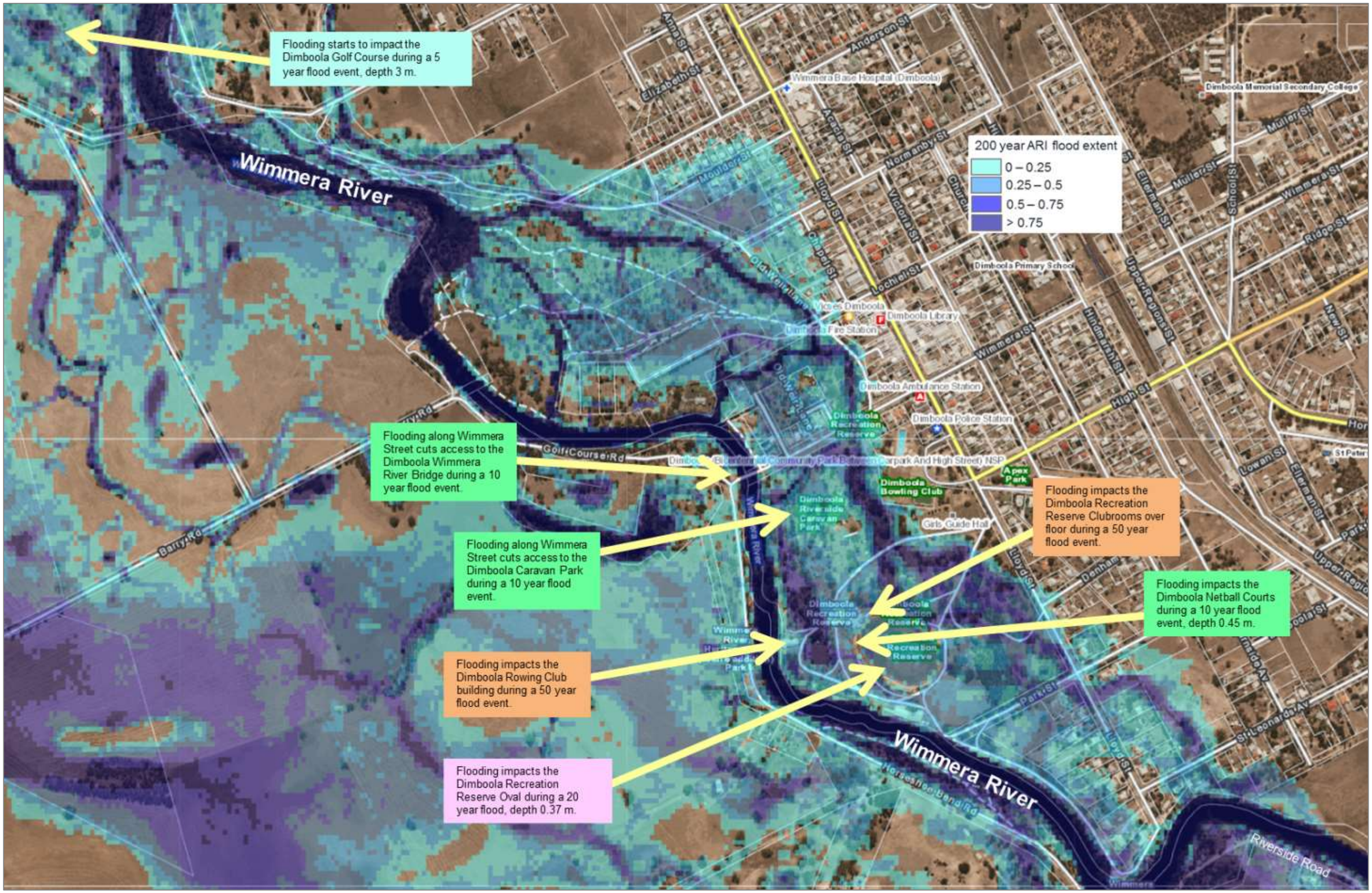


Figure 28. Dimboola assets impacted by flooding with the 200 year flood extent (Water Technology 2017).

Table 9. Dimboola Flood Intelligence Card (Wimmera River)

Flood travel time	
	Time from peak in Horsham to steep rise in Dimboola floodwater approximately 1 day plus
	Time of peak flow from MacKenzie River, Norton Creek, Sandy Creek and Darragan Creek arrives 2 - 3.5 days before the Wimmera River peak
	Time between Horsham and Dimboola peak 1 to 4 days
	Riverine flooding duration: 2-3 days

Wimmera River at Walmer gauge height 415200 (m)	MacKenzie River at (D/S of the Walmer) gauge height 415251 (m)	Wimmera River at Quantong gauge height 415261 (m)	Wimmera River at U/S Dimboola gauge height 415256 (m)	Average Recurrence Interval (ARI)	Wimmera River flow at U/S Dimboola gauge 415256 (ML/d)	Damages between Horsham and Dimboola total number properties flooded (above floor)	Dimboola damages total number properties flooded (above floor)	Consequence / Impact	Houses/ buildings flooded / isolated	Roads Impacted	Action
2.18 (3,054 ML/d)			2.88 (3,054 ML/d)					Given the maximum flow rate of the Dimboola Weir is 3,054 ML/d, the Hindmarsh Shire Council will open all the Dimboola Weir gates and pull out all drop boards before the flow of 3,054 ML/d is reached (2.18 m at the Walmer gauge and 2.88 m at the Upstream Dimboola gauge).			
	1.41 (628 ML/d)		4.65	September 2010							
	1.6 (1,000 ML/d)		4.73	September 2016							
3.40 (13,100 ML/d)		6.72 (12,300 ML/d)	4.78	5	11,900	0 (0)	2 (0)	Floodwater breaks out of the main channel of the Wimmera River along low lying areas to the north of Dimboola, adjacent to Anderson Street and Picnic Bend Road, south of Dimboola. Flooding starts to impact the Dimboola Golf Course.		Wimmera Street depth 0m Moulder Street depth 0m Horseshoe Bend Road depth 0m St Leonards Avenue depth 0m Park Street depth 0m Lloyd Street depth 0m Riverside Road depth 0.30m Dimboola-Rainbow Road depth 0m	VICSES activate ground observers to take photos and record flood levels at key crossings. Council deploy road closure signs as needed
3.72 (19,200 ML/d)		6.98 (18,300 ML/d)	5.19	10	18,000	0 (0)	6 (0)	Flood levels rise in Dimboola impacting Market Lane, the Dimboola Caravan Park and the Dimboola Recreation Reserve Netball Courts. Deep flooding cuts access to Wimmera Street and across the Wimmera River Bridge.		Wimmera Street depth 0.28m Moulder Street depth 0m Horseshoe Bend Road depth 0.25m St Leonards Avenue depth 0m Park Street depth 0m Lloyd Street depth 0m Riverside Road depth 0.96m Dimboola-Rainbow Road depth 0.37m	Council clear debris from waterway crossings, drains and culvers as needed.
			5.3	Minor flood level	20,560						
3.96 (25,000 ML/d)		7.18 (24,000 ML/d)	5.49	20	23,600	0 (0)	24 (1)	Flooding cuts access to Park Street. A house in Wimmera Street is flooded above floor. Flood depth at the Dimboola Caravan Park is 0.18m.	One house in Dimboola at 1 Wimmera Street may be flooded over floor.	Wimmera Street depth 0.54m Moulder Street depth 0m Horseshoe Bend Road depth 0.33m St Leonards Avenue depth 0m Park Street depth 0.38m Lloyd Street depth 0.13m Riverside Road depth 1.29m Dimboola-Rainbow Road depth 0.58m	VICSES sandbag a building as needed.
			5.7	Moderate flood level	27,721						
	2.36 (4,296 ML/d)		5.75	January 2011	28,660			A rainfall total of 104 mm was recorded in Dimboola causing substantial stormwater flooding before the Wimmera River peak arrived. It's estimated that 9 houses (from stormwater and riverine) were flooded above floor in Dimboola.			
4.23 (31,900		7.34 (30,100	5.77	50	29,500	1 (0)	55 (8)	Floodwater may impact the Dimboola Recreation Reserve football clubrooms above floor. Floodwater may be close to the Dimboola Recreation Reserve Football Stand and the Riverside Caravan Park	X7 additional buildings may be flooded above floor; The Football Clubrooms and toilets	Wimmera Street depth 0.68m Moulder Street depth 0.34m Horseshoe Bend Road depth 0.47m	Victoria Police evacuate buildings at risk of flooding as needed.

ML/d)		ML/d)						office and amenities building (ADDRESS??).	and the Dimboola Rowing Club Shed at the Dimboola Recreation Reserve, 1A WIMMERA STREET, 18 MOULDER STREET , 171 HORSESHOE BEND ROAD, 10-12 ST LEONARDS AVENUE.	St Leonards Avenue depth 0.29m Park Street depth 0.63m Lloyd Street depth 0.43m Riverside Road depth 1.50m Dimboola-Rainbow Road depth 0.76m	VICSES sandbag additional buildings as needed.
4.40 (36,500 ML/d)		7.43 (34,000 ML/d)	5.93	100	33,400	1 (0)	78 (11)		X3 additional buildings may be flooded above floor; 4 PARK STREET, 14 LLOYD STREET and 9 CHAPEL STREET.	Wimmera Street depth 0.73m Moulder Street depth 0.56m Horseshoe Bend Road depth 0.55m St Leonards Avenue depth 0.41m Park Street depth 0.73m Lloyd Street depth 0.54m Riverside Road depth 1.60m Dimboola-Rainbow Road depth 0.86m	Refer to actions listed above.
			6.00	Major flood level	33,692						
4.52 (40,700 ML/d)		7.5 (37,400 ML/d)	6.07	200	36,800	1 (1)	87 (14)	Floodwater may impact the Dimboola Golf Club.	X3 additional buildings may be flooded above floor; 35 PICNIC BEND ROAD, 461 COLLARD ROAD and 3 WIMMERA STREET.	Wimmera Street depth 0.76m Moulder Street depth 0.58m Horseshoe Bend Road depth 0.61m St Leonards Avenue depth 0.48m Park Street depth 0.80m Lloyd Street depth 0.61m Riverside Road depth 1.68m Dimboola-Rainbow Road depth 0m	Refer to actions listed above.
> 4.60 (45,400 ML/d)		7.58 (41,000 ML/d)	6.21	500	40,600	1 (1)	100 (15)		X1 additional buildings may be flooded above floor; 6 ST LEONARDS AVENUE.	Wimmera Street depth 0.78m Moulder Street depth 0.60m Horseshoe Bend Road depth 0.75m St Leonards Avenue depth 0.50m Park Street depth 0.85m Lloyd Street depth 0.65m Riverside Road depth 1.78m Dimboola-Rainbow Road depth 0.94m	Refer to actions listed above.

Table 15. Dimboola Property Inundation Table (Water Technology 2017).

No	Address		Within 100 mm of flooding over floor				Building type
		Depth of building over floor flooding for each ARI event (m)					
		20	50	100	200	500	
1	1 WIMMERA STREET DIMBOOLA	0.03	0.16	0.21	0.24	0.27	
2	18 MOULDER STREET DIMBOOLA		0.51	0.74	0.77	0.81	
3	171 HORSESHOE BEND ROAD, DIMBOOLA		0.35	0.42	0.46	0.50	GALV. IRON SHED (NON RESIDENTIAL)
4	10-12 ST LEONARDS AVENUE DIMBOOLA		0.08	0.19	0.27	0.33	
5	BOAT SHED, DIMBOOLA RECREATION RESERVE, DIMBOOLA		0.07	0.12	0.16	0.19	
6	FOOTBALL CLUB, DIMBOOLA RECREATION RESERVE, DIMBOOLA		0.07	0.14	0.18	0.23	
7	1A WIMMERA STREET DIMBOOLA		0.06	0.11	0.14	0.27	
8	DIMBOOLA RECREATION RESERVE, DIMBOOLA		0.01	0.08	0.12	0.16	
9	4 PARK STREET DIMBOOLA			0.07	0.14	0.20	
10	14 LLOYD STREET DIMBOOLA			0.05	0.13	0.20	
11	9 CHAPEL STREET, DIMBOOLA			0.04	0.05	0.10	GALV. IRON SHED (NON RESIDENTIAL)
12	35 PICNIC BEND ROAD, DIMBOOLA				0.08	0.18	WEATHERBOARD DWELLING
13	461 COLLARD ROAD, DIMBOOLA				0.03	0.07	BRICK DWELLING
14	3 WIMMERA STREET DIMBOOLA				0.01	0.04	
15	6 ST LEONARDS AVENUE DIMBOOLA					0.03	

Appendix C2: Jeparit Flood Emergency Plan

Jeparit has experienced extensive and frequent riverine flooding from the Wimmera River. The focus of this section includes the area along the lower Wimmera River from Arkona to Lake Hindmarsh. The upper reaches of the Wimmera River originates in the Pyrenees Ranges, near Elmhurst and flows westward towards Horsham, then northwards through Dimboola and Jeparit to Lake Hindmarsh. The Wimmera River is the longest terminal river in Victoria with a catchment area of 6,984 km^2 (Alluvium 2014). During prolonged wet periods Lake Hindmarsh (capacity of 431,700 ML) overflows to the north via Outlet Creek to Lake Albacutya (capacity of 290,000 ML).

The Lochiel and Tarranyurk stream gauges upstream of Jeparit provides 6 to 10 hours warning time for Jeparit. Refer to map below.



Figure 29. Jeparit waterways and stream gauges.

Historic Flood Events

Jeparit has experienced frequent and extensive flood events. Prior to 1996, flood events have occurred on average once every four years. Significant flood events have occurred in 1971, 1973, 1974, 1975, 1979, 1980, 1981, 1983, 1984, 1986, 1988, 1989, 1992, 1995, 1996, 2010, 2011 and 2016.

In wet conditions the Wimmera River provides substantial inflows to a Lake Hindmarsh and Lake Albacutya. Lake water level records for Lake Albacutya indicate that the Wimmera River has experienced regular flood events up until the 80's. Lake Albacutya's last major lake-full event occurred between 1974 and 1977. The Lake retained water as a result of periodic minor inflows until about 1983 (Ecological Associates 2004). Studies have shown that following significant diversion and regulation in the upper catchment the incidence of Lake Albacutya filling has substantially reduced. The incidence has decreased from about 25 times in 100 years, to as rarely as 2 times in 100 years (Ecological Associates 2004). The January 2011 flood event partially filled Lake Hindmarsh.

The Wimmera River stream gauge at Lochiel (upstream of Jeparit) was used to indicate historic flood events that have occurred in Jeparit given there are large gaps in the Tarranyurk stream gauge record, refer to the graph below.

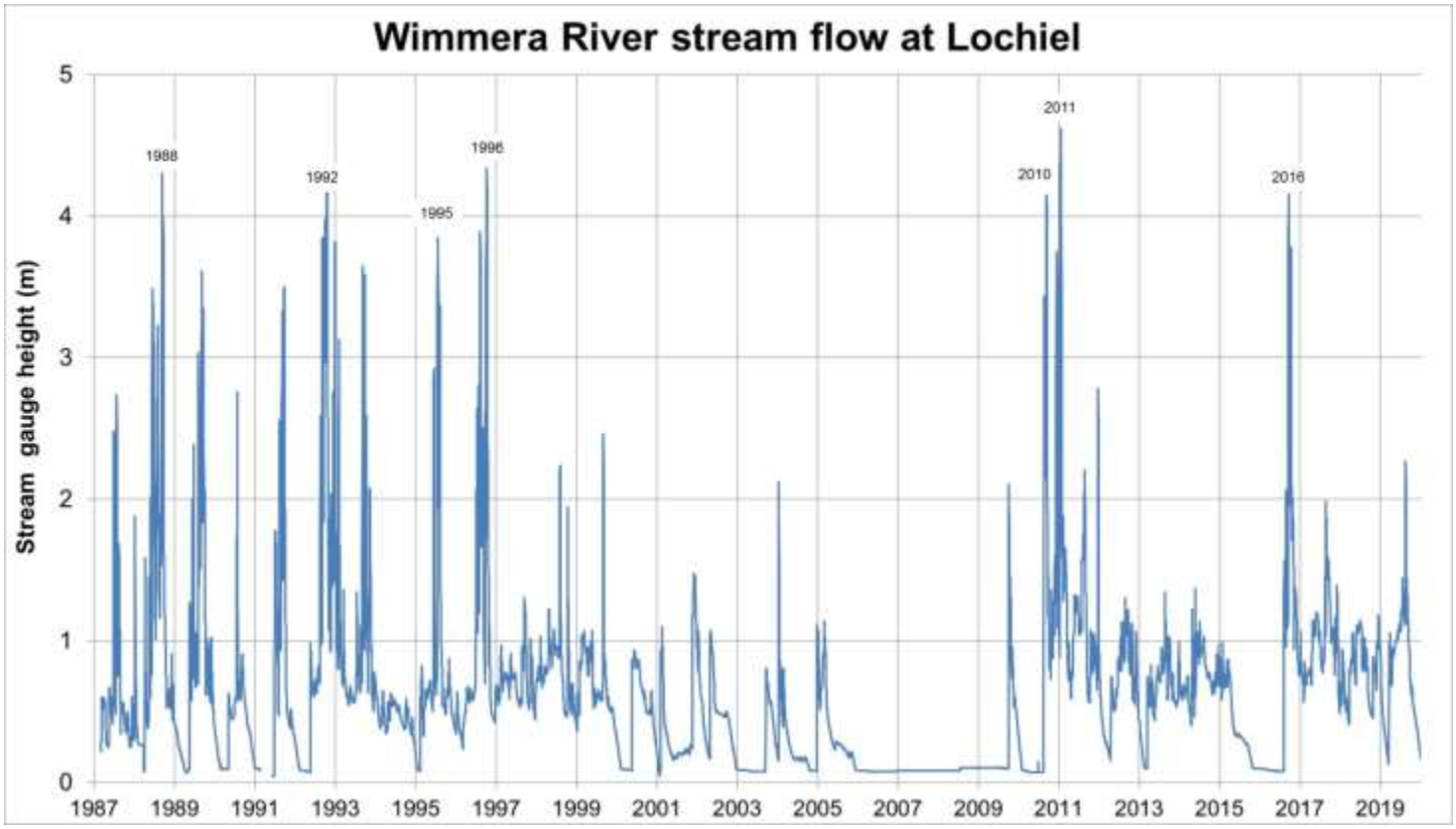


Figure 30. Wimmera River stream flow records indicate the frequency of flood events that have occurred in Jeparit.

The largest recent flood event on record was the January 2011 flood event. Jeparit was significantly impacted by both riverine and stormwater flooding during this event. Jeparit recorded 197.2 mm over 3 days, with 161.2 mm falling on the 12th of January. Direct runoff caused localised flooding in and around Jeparit. For more details regarding impacted areas, refer to the Stormwater Flood Risk section below.

Riverine flooding from the Wimmera River started to impact Jeparit on the 19th of January, peaking on Friday the 21st of January. Flooding caused damage to the railway line at Arkona and the Jeparit Weir, but no houses

were inundated above floor in Jeparit. Within Jeparit there were 6,000 sandbags distributed. The Victoria Police closed Lake Road after floodwaters overtopped the road.

Lake Hindmarsh begun January 2011 relatively empty and had the capacity to receive substantial inflows and therefore did not affect flooding throughout Jeparit.

The Jeparit Weir was damaged during this flood event, with sections of the walkway washed away. A diversion was put in place allowing water past the Weir. This diversion has since been formalised with a rock spillway.



Figure 31.Flooding impacting Jeparit during the 2011 flood event.



Figure 32. Flooding impacting Jeparit during the 2011 flood event.


Figure 33.Flooding impacting Jeparit adjacent to the Jeparit Museum during the 2011 flood event.



Figure 34.Flooding impacting Jeparit adjacent to the Jeparit sports oval during the 2011 flood event.



Figure 35.Flooding impacting the Nhill-Jeparit Road Bridge downstream of Jeparit during the 2011 flood event



Figure 36. Flooding along the lower Wimmera River, downstream of Jeparit, with Lake Hindmarsh in the background during the 2011 flood event.

Warning Time

There is significant flood warning time available to Jeparit, rapid rises in floodwater can occur in Jeparit between 3.6 to 4 days after heavy rainfall in the upper Wimmera River catchment. The flood peak may arrive in Jeparit between 4.6 to 5.6 days after heavy rainfall in the upper Wimmera River catchment. Typically the flood peak travel time between the Walmer gauge and Jeparit is approximately 3 to 4.5 days, refer to the table and graph below for the January 2011 flood event.

It is important to note that all floods are different, and different rainfall patterns falling on dry or wet catchments may respond differently. The streamflow and travel time numbers below should be used as a guide only.

Table 10.Lower Wimmera River and Mackenzie River January 2011 flood peak travel times (Water Technology 2017).

Gauge	Max. level (m)	Max. flow (ML/d)	Time/date	Time (hrs)
Walmer	4.27	32,971	18/01/2011 11:30	0
Quantong	7.36	-	18/01/2011 21:30	10
Upstream Dimboola	5.81	29,979	19/01/2011 16:00	28.5
Lochiel	4.61	28,933	20/01/2011 15:00	51.5
Tarranyurk	5.75	-	21/01/2011 14:15	74.75

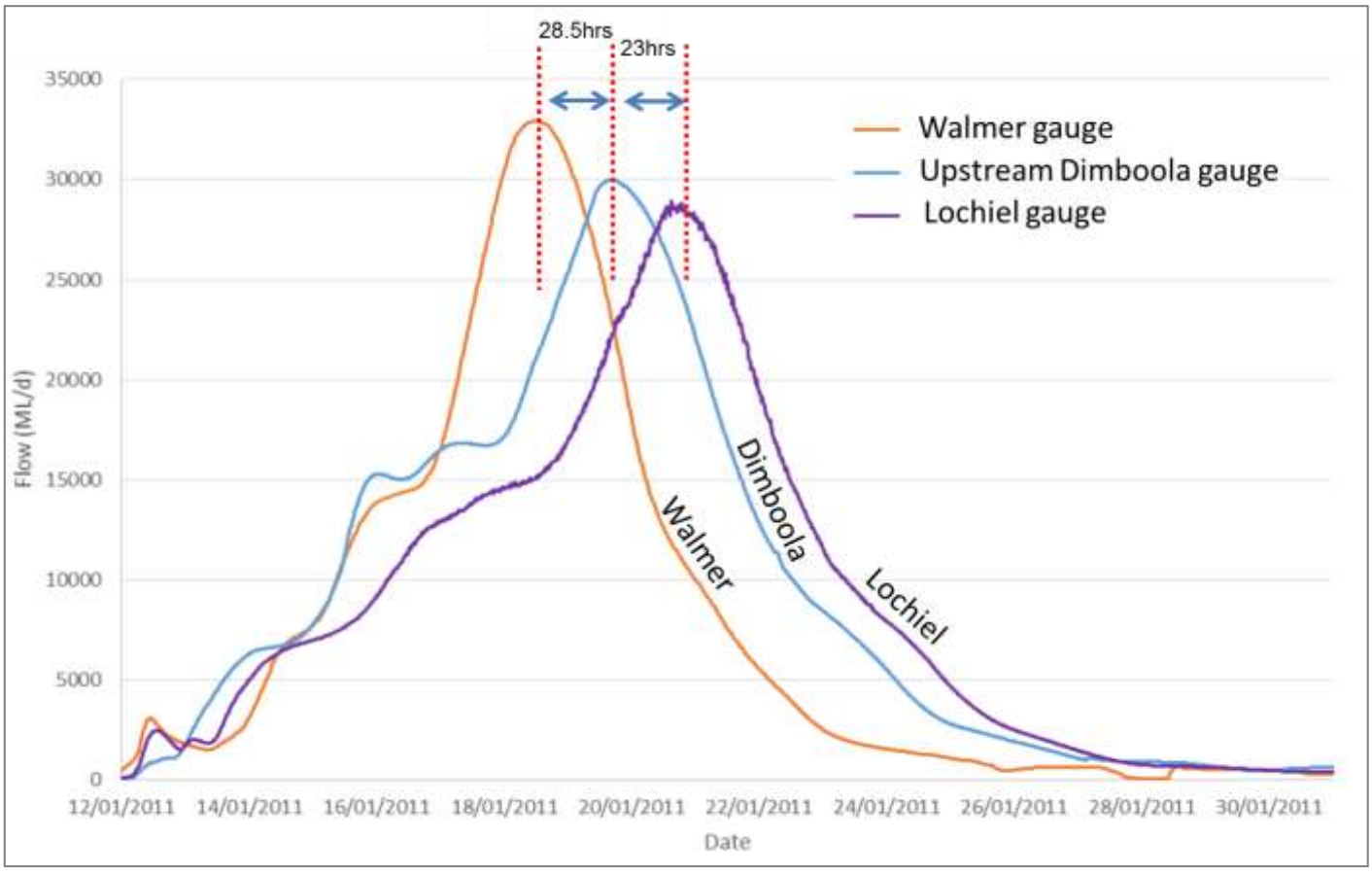


Figure 37. Peak flood flows in the lower Wimmera River during the 2011 flood event.

Jeparit Levee

The Jeparit earthen Levee is approximately 2.84 km long and is located adjacent to the Jeparit Recreation Reserve and the Jeparit Museum, refer to the map and photos below. The approximate height of the Levee ranges from 0.3m to 0.6m.

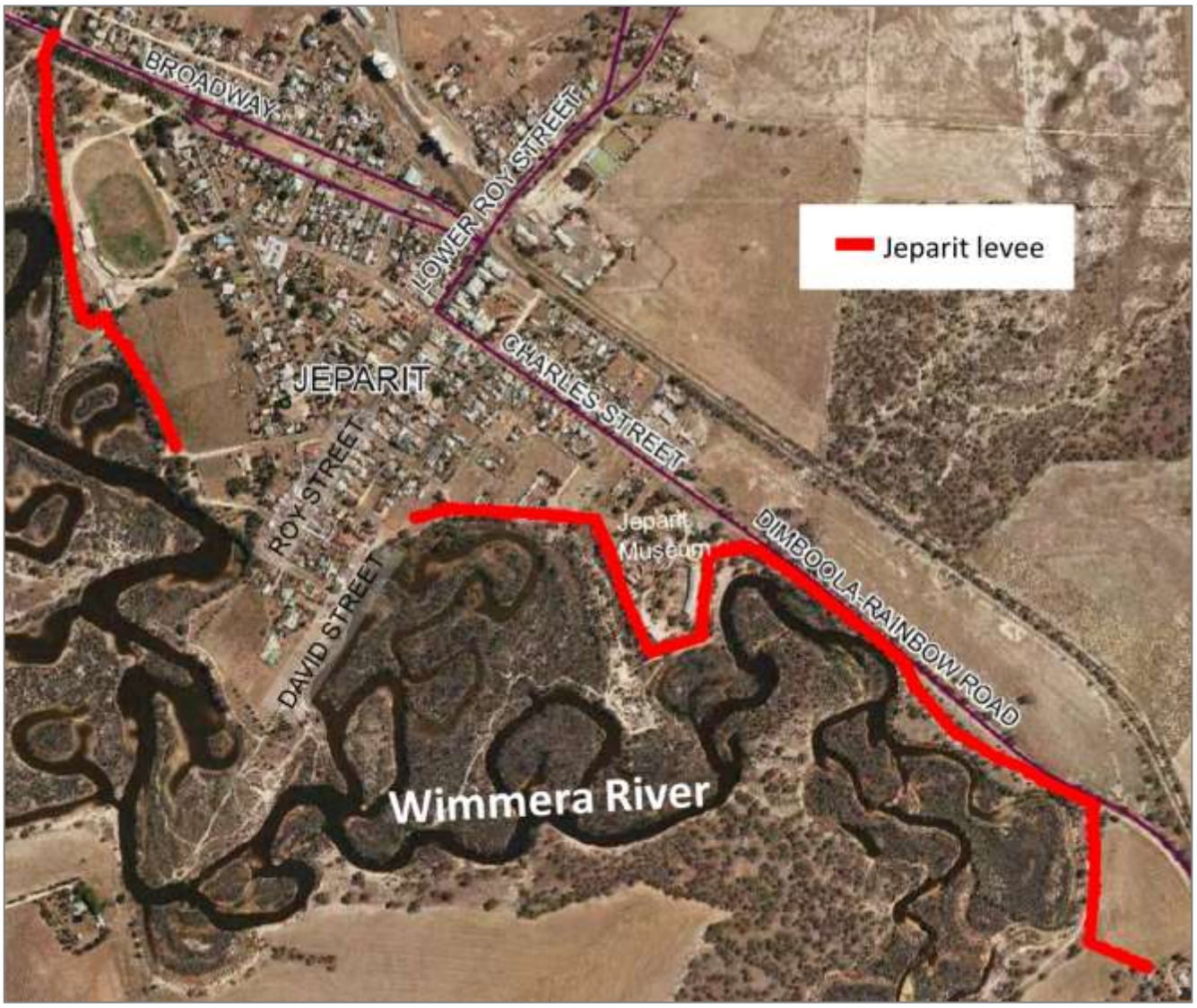


Figure 38. Location of the Jeparit Levee (Water Technology 2017).



Figure 39. The Jeparit Levee along the Dimboola-Rainbow Road, near the Jeparit Museum.



Figure 40. Sandbagging behind the Jeparit Recreation Reserve during the 1956 flood (source David Livingston).

The recently completed Lower Wimmera River Flood Investigation (Water Technology 2017) indicates that the Jeparit Levee provides protection up to a 50 year flood event. The Jeparit Levee is overtopped by floodwater during a 100 year flood event.

Jeparit Weir Management during floods

Given the Jeparit Weir significantly influences flood levels in Jeparit it's important that all the Weir gates and boards are open before peak flood flows arrives. If sections of the Weir remain closed, this will reduce the flow capacity of the Weir and increase the number of buildings at risk of flooding in Jeparit.

The Jeparit Weir consists of six overshot gates and thirteen drop boards and has a capacity of 1,575 ML (Alluvium 2014), refer to the image below. The Weir is located to 2 km north west of Jeparit, refer to the maps below. Water in the Weir has a significant social value, serves to provide the community with both a recreational asset, but also a sense of place and forms part of the identity of the town. The Weir is very important to Jeparit's community recreation.

The maximum flow rate of the Jeparit Weir is 3,054 ML/d. Triggers that the Hindmarsh Shire Council may use in their decision making to open the Jeparit Weir gates include;

- When lower Wimmera River stream flow reaches 3,054 ML/d, a stream height of 2.88 m at the Upstream Dimboola gauge



Figure 41.Jeparit Weir.



Figure 42.Location of the Jeparit Weir.

Given that the Jeparit Weir was extensively damaged during the January 2011 flood event, there have been extensive changes to the Weir since this flood event. Refer to photos below showing damage to the Jeparit Weir following the January 2011 flood event and reconstruction works undertaken.



Figure 43.Flooding impacting the Jeparit Weir, downstream of Jeparit during the 2011 flood event.



Figure 44.The Jeparit Weir reconstructed following the January 2011 flood

Lake Hindmarsh

The Wimmera River flows into Lake Hindmarsh, a terminal Lake with a capacity of 431,700 ML, refer to photo below. Due to the close proximity of Lake Hindmarsh to Jeparit, 6 km north, it heavily influences the flood behavior of Jeparit when full. High Lake water levels increases peak flood levels and flood duration in Jeparit (Water Technology 2008).



Figure 45. Lake Hindmarsh.

Storages in the upper catchment of the GWMWater water supply system have the capacity to capture a significant proportion of high flows over a long period, effectively reducing the frequency and magnitude of flood event in Jeparit. Water diversion to storages has significantly reduced flooding in Jeparit and downstream terminal lakes, Lake Hindmarsh and Lake Albacutya.

A hydrologic analysis of the Lake Hindmarsh water level behaviour (Ecological Associates 2004) compares the frequency of the Lake filling under existing conditions to natural conditions, without harvesting and diversion of flows. Refer to figure 47 below. This analysis considered water level behaviour for the historical period from 1903 to 2000. Under the natural scenario (before the construction of storages), Lake Hindmarsh always contained water, except for the first five months in 1903. Under the natural scenario, Lake Hindmarsh filled 35 times over the modelled period with an average duration of each event of 24 months (Ecological Associates 2004).

In contrast, under current conditions Lake Hindmarsh filled 21 times, with each event 10 months on average. The lake failed to reach the full level for 22 years following 1928 (Ecological Associates (2004). The figure below shows the modelled Lake Hindmarsh storage volumes under the natural and current conditions.

The Lower Wimmera River Flood Investigation (Water Technology 2017) Lake Hindmarsh was assumed to be full, developing very conservative design flood event mapping.

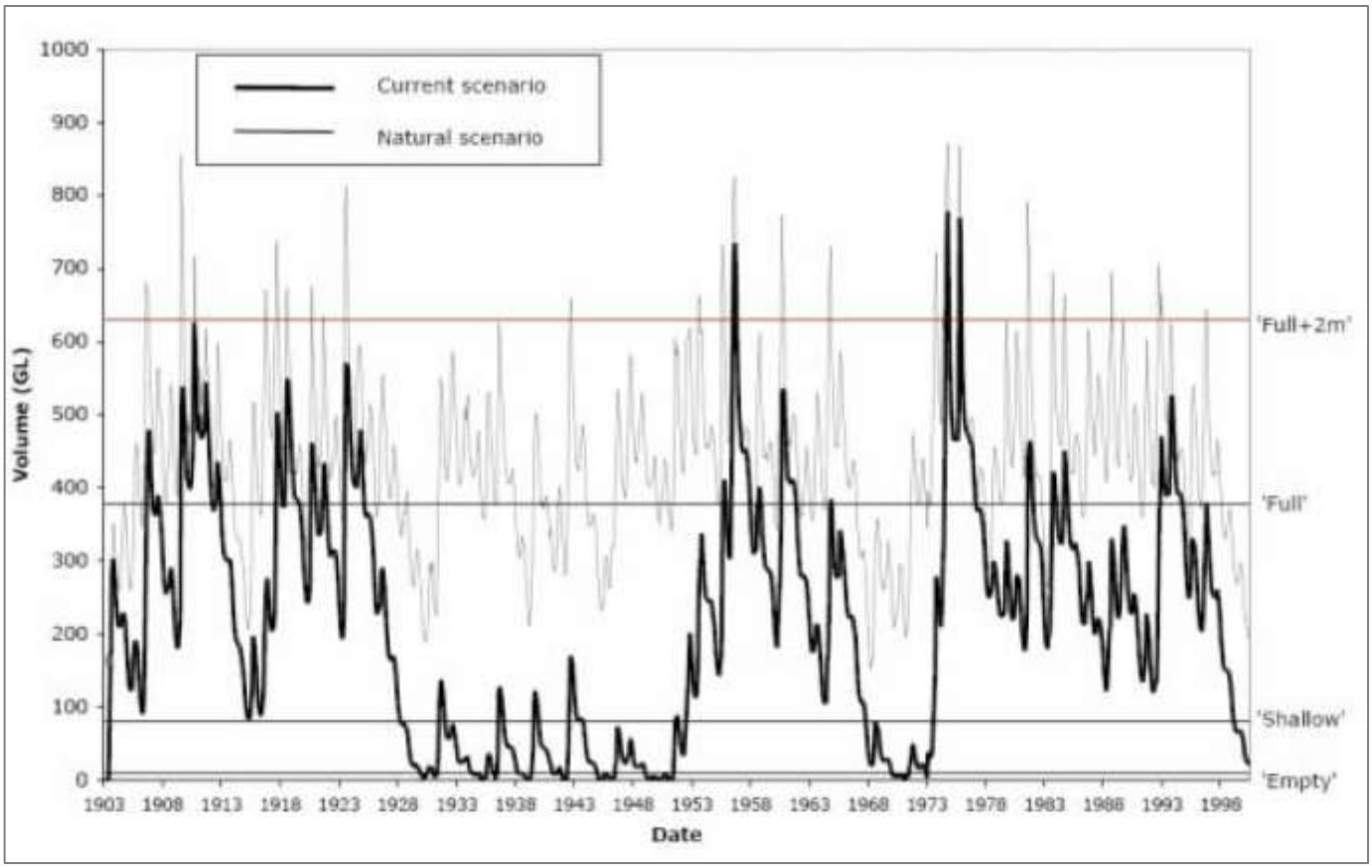


Figure 46. Lake Hindmarsh storage volumes under natural and existing conditions (Ecological Associates 2004).

Jeparit Stormwater Flooding

Heavy localised rainfall in Jeparit can cause stormwater flooding. An assessment of stormwater flood risk (Water Technology 2008) shows considerable stormwater ponding occurs along Broadway, Charles Street, Upper Roy Street and Lower Roy Street.

Considerable ponding also collects to an overland flow path (depression) that runs form near the corner of the Jeparit Museum and continues in a north easterly direction towards the Jeparit East Road. This deeper pooling is experienced in more defined low points surrounding Jeparit which generally correlate to the areas flooded during levee overtopping. This flooding may not present an immediate threat to property owners. These areas surrounding Jeparit can experience nuisance flooding of up to 250 mm depth. Refer to the stormwater map below.

Stormwater flooding can develop quickly as a result of local heavy rainfall. Heavy rainfall events can cause rapid rise of floodwater. The warning time available from rainfall to stormwater flood impacts occurring can range between 2 to 3 hours depending on the rainfall intensity.

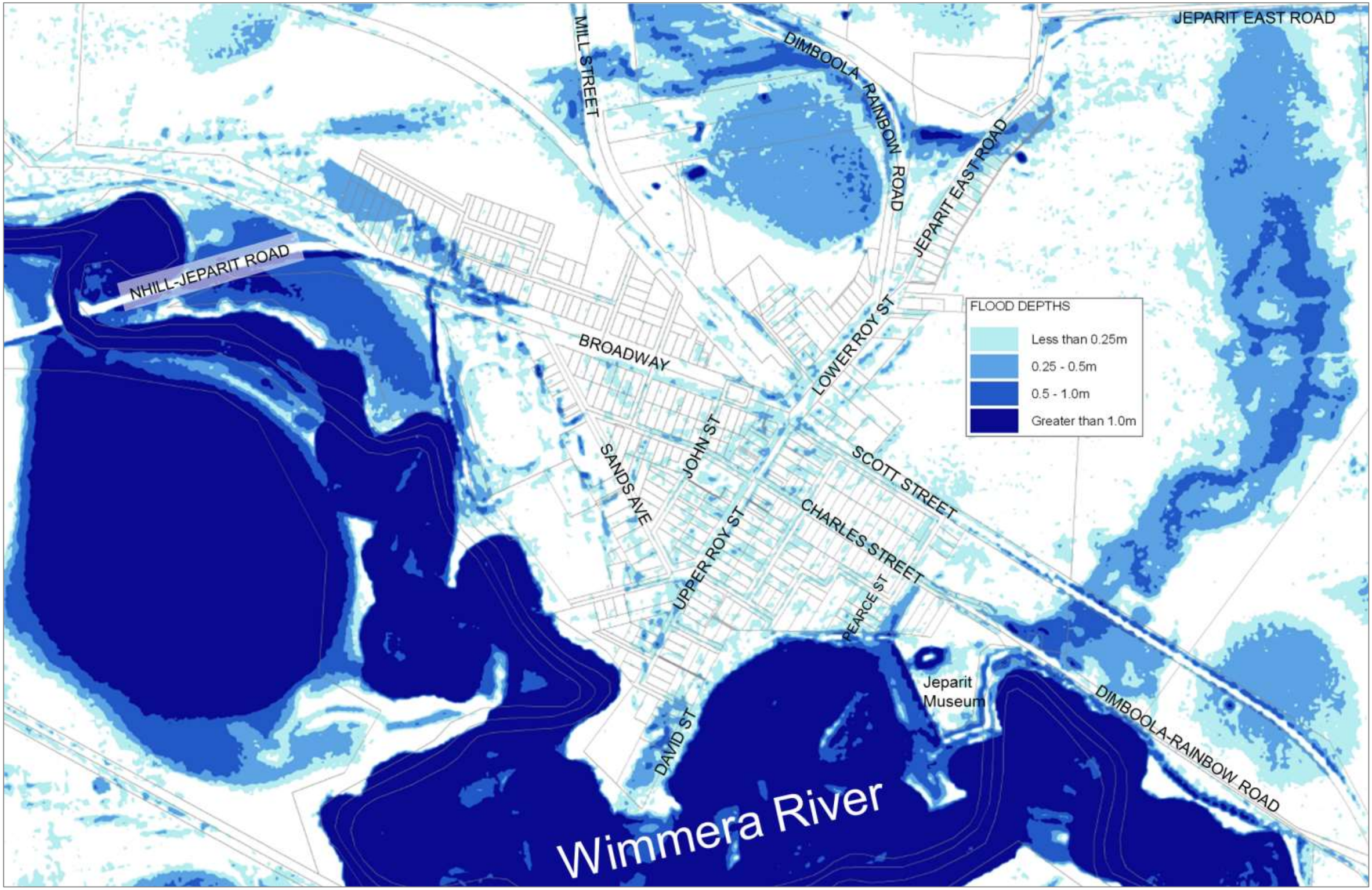


Figure 47. Jeparit 100 year ARI stormwater modelling (Water Technology 2008)

Jeparit Flood Impacts and Required Actions

Key assets at risk of flooding in Jeparit are listed in the table below.

Table 17. Jeparit key assets at risk of flooding.

Asset register				
Asset Name and location	**Average Recurrence Interval (ARI)**	**Consequence / Impact**	**Mitigation/ Action**	**Lead Agency**
Lake Road, Jeparit.	10 year flood	Flooding may cut access to Lake Road, depth 0.37m.	Deploy road closure signs as needed.	Council
Peterson Avenue, Jeparit.	10 year flood	Flooding may start to impact Peterson Avenue in a 10 year flood event, depth 0.04m. Flooding may cut access 20 year flood event, depth 0.56m.	Deploy road closure signs as needed.	Council
Jeparit Golf Course, Lake Road, north of Jeparit.	10 year flood	The Jeparit Golf Course may be impacted by flooding during a 10 year flood event.	Notify the Jeparit Golf Club Committee.	Council
Dimboola-Rainbow Road, Jeparit	50 year flood	Flooding may cut access to the Dimboola-Rainbow Road in a 50 year flood event, depth 0.39m.	Deploy road closure signs as needed.	Council
Tullyvea Bus Route Road, Jeparit	50 year flood	Flooding may start to overtop the Tullyvea Bus Route Road in a 50 year flood event, depth 0.23m. Access may be cut in a 100 year flood event, depth 0.42m.	Deploy road closure signs as needed.	Council
Two buildings are flooded over floor at the Jeparit Recreation Reserve.	50 year flood	Two buildings are flooded above floor at the Jeparit Recreation Reserve. Refer to the building damages map below for the locations.	Sandbag buildings as needed.	VICSES
Jeparit Recreation Reserve Oval, Jeparit.	50 year flood	Flooding may start to impact the Jeparit Recreation Reserve Oval during a 50 year flood event.	Notify the Jeparit Recreation Reserve Committee.	Council
Scott Street, Jeparit.	100 year flood	Flooding may cut access to the Dimboola-Rainbow Road in a 100 year flood event, depth 0.50m.	Deploy road closure signs as needed.	Council
Jeparit Museum, 5371 Dimboola-Rainbow Road, Jeparit.	100 year flood	Flooding may start to impact buildings over floor at the Jeparit Museum during a 100 year flood event.	Sandbag buildings as needed.	VICSES
Pfeifers Fuel and Rural Supplies, 2 Tullyvea Street, Jeparit.	100 year flood	Flooding may start to impact a building over floor at the Pfeifers Fuel and Rural Supplies during a 100 year flood event.	Sandbag building as needed.	VICSES
Jeparit East Road, Jeparit.	200 year flood	Flooding may cut access to the Flooding may cut access to the Jeparit East Road in a 200 year flood event, depth 0.56m.	Deploy road closure signs as needed.	Council

For more detailed information regarding buildings and roads impacted refer to the Jeparit Flood Intelligence Card and flood damages/impact maps below. Also refer to the Jeparit flood depth maps in **Appendix F**, a list of flood observers in **Appendix H** and community sandbag collection point in **Appendix I**.

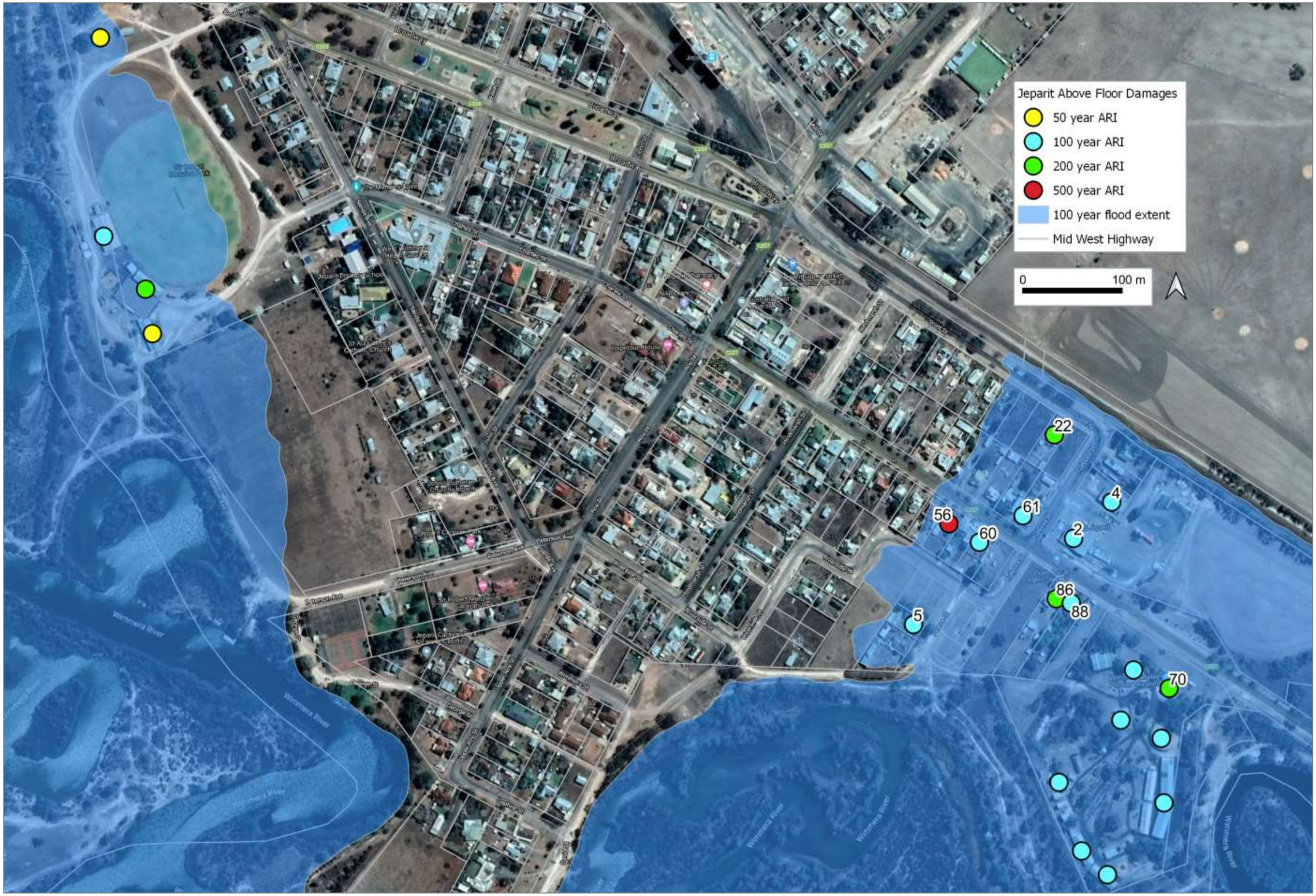


Figure 48.Jeparit buildings subject to above floor flooding (Water Technology 2017).

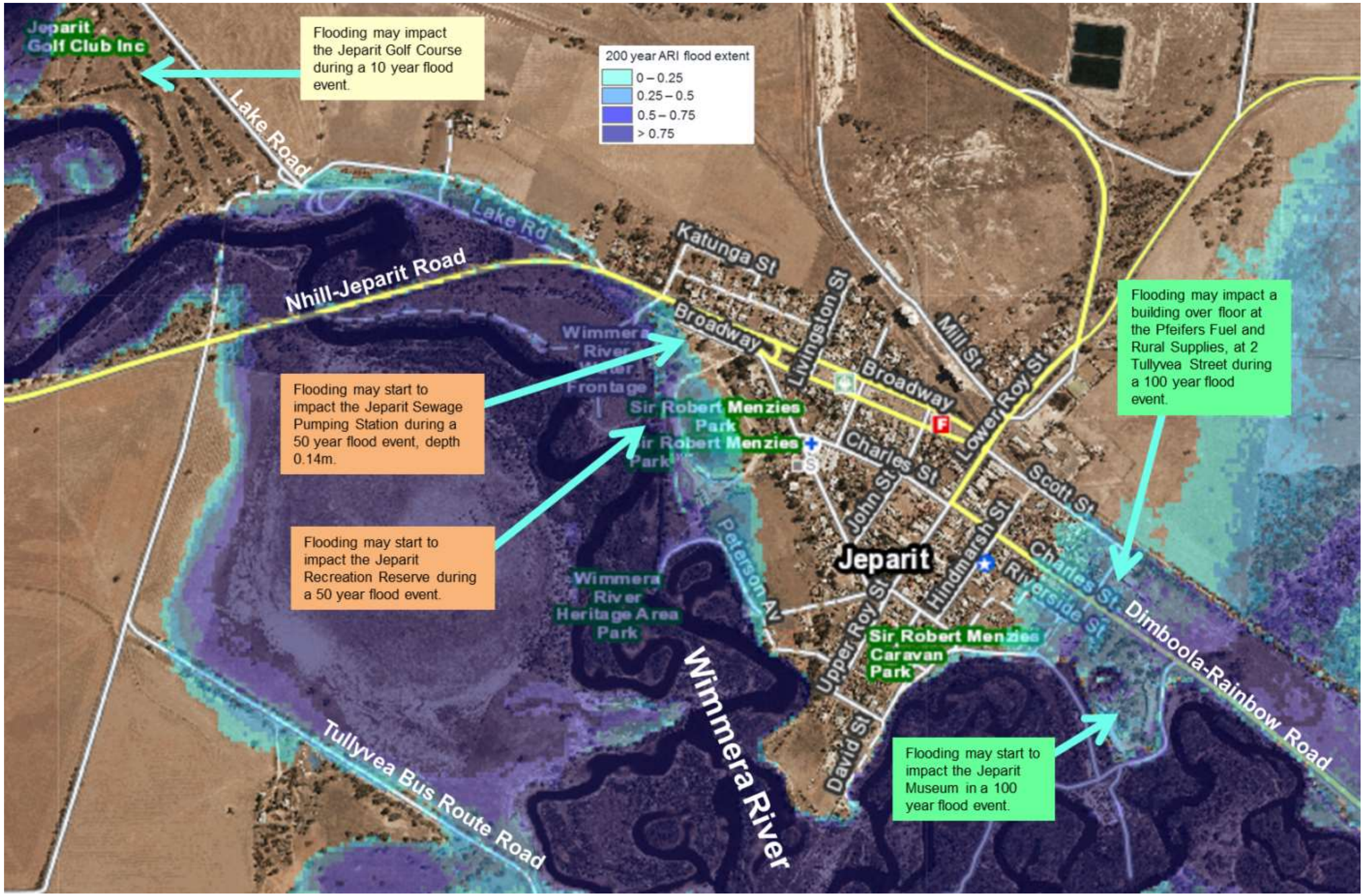


Figure 49. Jeparit assets impacted by flooding with the 200 year ARI flood extent (Water Technology 2017).

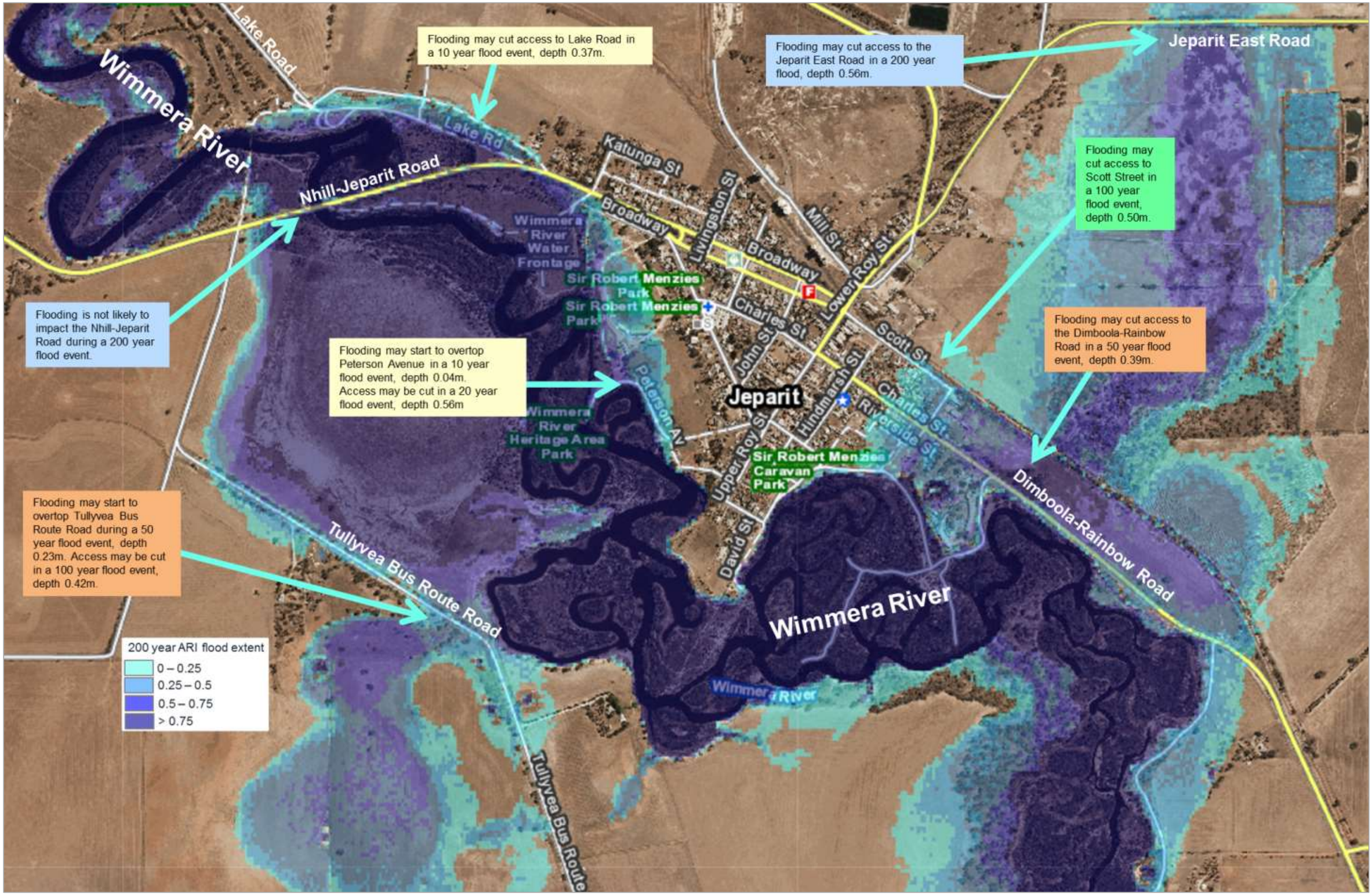


Figure 50. Jeparit roads impacted by flooding with the 200 year ARI flood extent (Water Technology 2017).

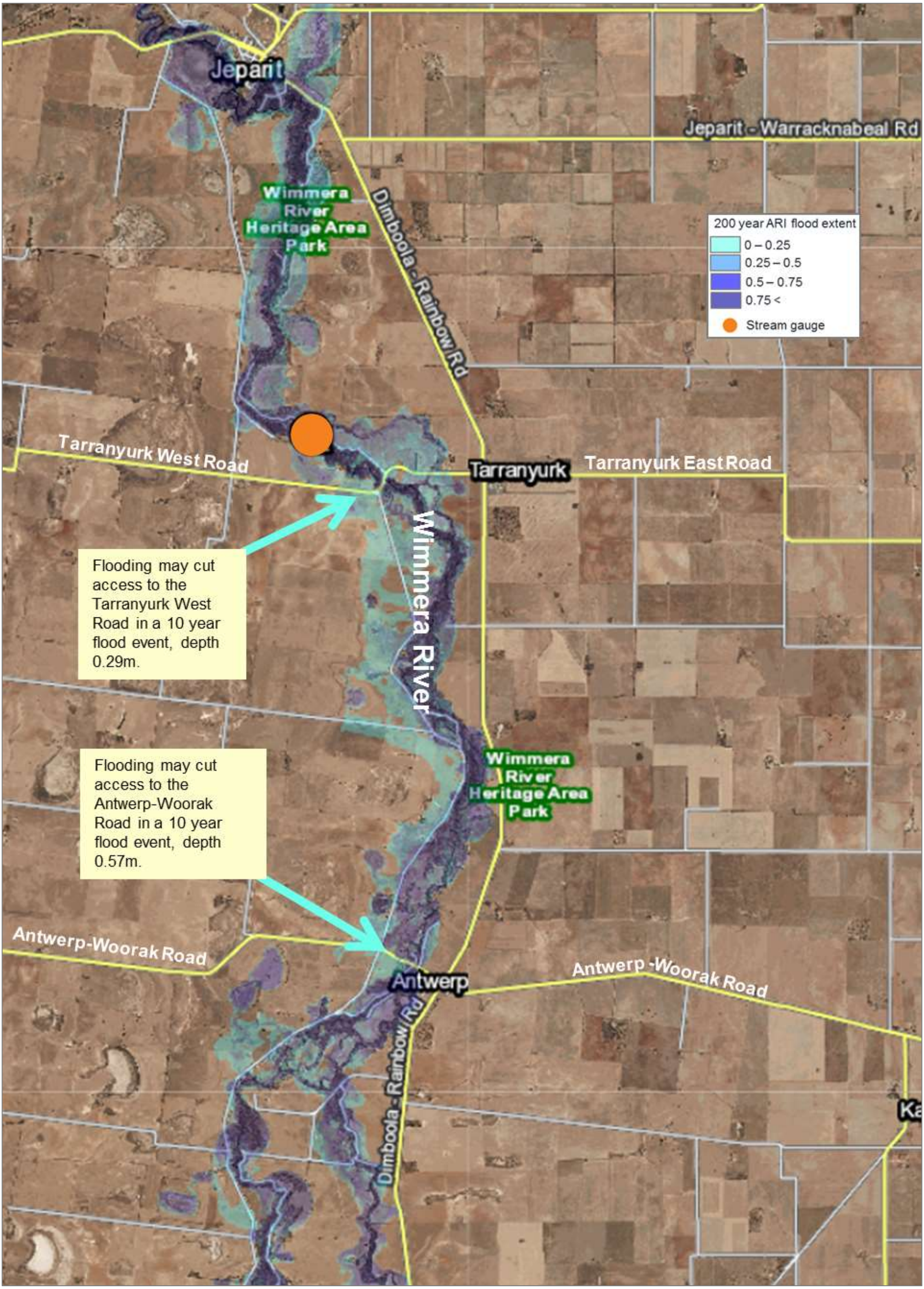


Figure 51. Roads between Arkona and Jeparit impacted by flooding with the 200 year ARI flood extent (Water Technology 2017).

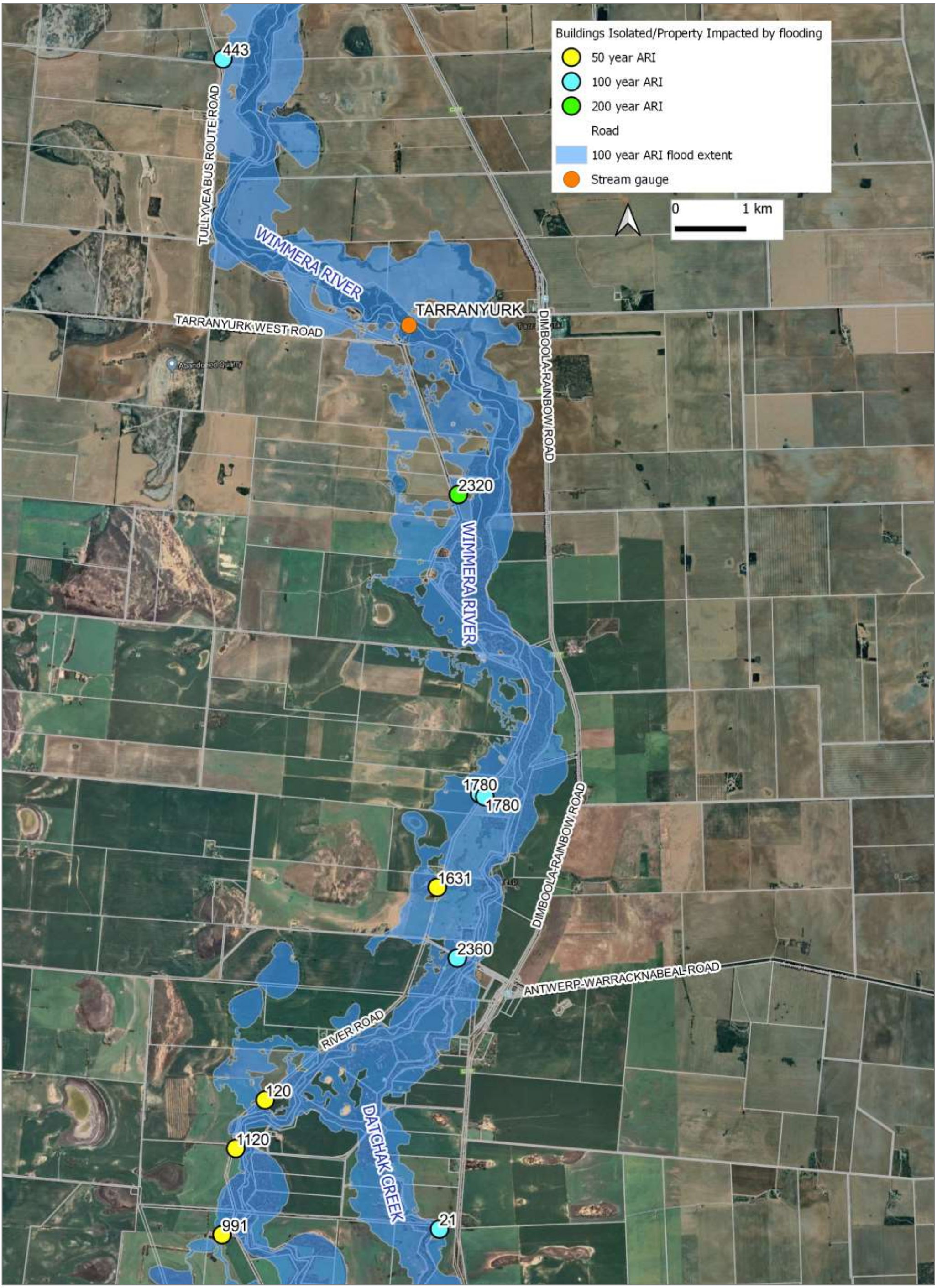


Figure 52. Buildings or properties impacted by flooding between Arkona and Jeparit with the 100 year ARI flood extent (Water Technology 2017).

Table 18. Jeparit Flood Intelligence Card (Wimmera River)

Flood travel time	Time from peak in Horsham to steep rise in Jeparit floodwater 3.4 days Time between Horsham and Jeparit peak 5.4 to 6.4 days Riverine flooding duration: 2 – 3 days									
Wimmera River at U/S Dimboola gauge height 415256 (m)	**Wimmera River at Lochiel gauge height 415246 (m)**	**Wimmera River at Tarranyurk gauge height 415247 (m))**	**Average Recurrence Interval (ARI)**	**Wimmera River flow at Lochiel gauge 415246 (ML/d)**	**Total number of properties isolated north of Dimboola, including Antwerp**	**Jeparit damages total number properties flooded (above floor)**	**Consequence / Impact**	**Houses/ buildings flooded / isolated**	**Roads Impacted**	**Actions**
2.88	3.22			3,054			Given the maximum flow rate of the Jeparit Weir is 3,054 ML/d, Hindmarsh Shire Council will open all the Jeparit Weir gates and pull out all drop boards before the flow of 3,054 ML/d is reached (2.88 m at the Upstream Dimboola gauge and 3.22 m at the Lochiel gauge).			
4.78 (11,900 ML/d)	4.10		5	10,500	0	0 (0)	The Jeparit Weir boards need to be removed by Hindmarsh Shire council (if they haven't already). Minor break out of floodwater on low lying areas of the floodplain and rural roads.		Jeparit East Road depth 0m Lake Road depth 0m Scott Street depth 0m Peterson Ave 0m Charles Street depth 0m Tullyvea Street depth 0m Dimboola-Rainbow Road depth 0m Tarranyurk West Road 0m Antwerp-Woorak Road 0m	
	4.15		September 2016							
5.19 (18,000 ML/d)	4.26		10	15,800	0	0 (0)	Minor breakouts in low lying areas and rural roads. Properties between Antwerp and Jeparit are isolated. Flooding starts to impact Peterson Avenue, south of the Jeparit Recreation Reserve. Flooding cuts access to key roads: Lake Road (Jeparit), Antwerp-Woorak Road (Antwerp), Tarranyurk West Road and River Road (Antwerp).		Jeparit East Road depth 0m Lake Road depth 0.37m Scott Street depth 0m Peterson Ave 0.04m Charles Street depth 0m Tullyvea Street depth 0m Dimboola-Rainbow Road depth 0m Tarranyurk West Road 0.29m Antwerp-Woorak Road 0.57m	Council clear debris from waterway crossings, drains and culvers as needed.
5.3			Minor flood level							
5.49 (23,600 ML/d)	4.39		20	21,200	0	0 (0)			Jeparit East Road depth 0m Lake Road depth 0.97m Scott Street depth 0m Peterson Ave 0.56m Charles Street depth 0m Tullyvea Street depth 0m Dimboola-Rainbow Road depth 0m Tarranyurk West Road 0.44m Antwerp-Woorak Road 0.75m	VICSES activate ground observers to take photos and record flood levels at key crossings. Council to deploy road closure signs and undertake traffic management as needed.
5.7			Moderate flood level							
5.77 (29,500 ML/d)	4.5		50	26,800	0	3 (2)	In Jeparit two sheds in the Sir Robert Menzies Park are flooded over floor. The Nhill-Jeparit Road is impacted by flooding. The Jeparit levee provides protection up to a 50 year flood event.	X2 buildings are flooded over floor in Jeparit; X2 sheds at the Sir Robert Menzies Park.	Jeparit East Road depth 0m Lake Road depth 1.30m Scott Street depth 0m Peterson Ave 1.01m Charles Street depth 0m Tullyvea Street depth 0m Dimboola-Rainbow Road depth 0.39m Tarranyurk West Road 0.53m Antwerp-Woorak Road 0.91m	VICSES sandbag buildings as needed.
5.93 (33,400 ML/d)	4.56	5.88	100	30,200	0	32 (16)	Floodwaters overtop the Jeparit levee and inundate land between Dimboola-Rainbow Rd and Jeparit East Rd. 14 additional buildings are flooded above floor in Jeparit, these include the Football Club Shed at Show Grounds Street and seven buildings at the Jeparit Museum (70 Charles Street).	X14 additional buildings are flooded over floor in Jeparit; X10 CHARLES STREET (60, 61, 70, 88), 5 RIVERSIDE STREET,	Jeparit East Road depth 0m Lake Road depth 1.48m Scott Street depth 0.5m Peterson Ave 1.20m Charles Street depth 0m Tullyvea Street depth 0.71m	VICSES sandbag additional buildings as needed.

								x1 SHOW GROUNDS STREET (Football Clubrooms Shed), x2 TULLYVEA STREET (2, 4).	Dimboola-Rainbow Road depth 1.0m Tarranyurk West Road 0.58m Antwerp-Woorak Road 1.05m	
6.0			Major flood level							
6.07 (36,800 ML/d)	4.61		200	32,800	2	34 (20)	Four additional buildings are flooded above floor, these include an additional building at the Jeparit Museum (70 Charles Street).	X4 additional buildings are flooded over floor in Jeparit; 86 CHARLES STREET, 70 CHARLES STREET (Jeparit Museum), 22 SCOTT STREET, a shed the SIR ROBERT MENZIES PARK.	Jeparit East Road depth 0.56m Lake Road depth 1.57m Scott Street depth 0.57m Peterson Ave 1.30m Charles Street depth 0m Tullyvea Street depth 0.78m Dimboola-Rainbow Road depth 1.23m Tarranyurk West Road 0.61m Antwerp-Woorak Road 1.05m	Refer to actions listed above.
	4.62	5.75	January 2011		1	0 (0) due to sandbagging	Flooding caused damage to the railway line at Arkona and the Jeparit Weir. Within Jeparit 6,000 sandbags were distributed, mainly to protect buildings at the Jeparit Museum. No houses were flooded above floor. Lake Road was closed after flooding overtopped the road. Lake Hindmarsh heavily influences the flood behaviour of Jeparit when full. In January 2011 Lake Hindmarsh was relatively empty, and therefore had no impact on flooding. Jeparit Weir was damaged by flooding, with sections of the walkway washed away. A diversion was put in place allowing greater volumes of floodwater past the weir.			
6.21 (40,600 ML/d)	4.65		500	35,500	2	35 (21)	One additional building is flooded above floor in Charles Street.	X1 additional building is flooded over floor in Jeparit; 56 CHARLES STREET.		Refer to actions listed above.

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Table 15. Jeparit Property Inundation Table (Water Technology 2017).

No	Address	Within 100 mm of flooding over floor				Building type	
		Depth of building over floor flooding for each ARI event (m)					
		50	100	200	500		
1	SIR ROBERT MENZIES PARK, JEPARIT	0.47	0.66	0.76	0.85	IRON SHED	SLAB
2	SIR ROBERT MENZIES PARK, JEPARIT	0.10	0.28	0.39	0.47	IRON SHED	SLAB
3	4 TULLYVEA STREET, JEPARIT		0.74	0.82	0.88	IRON SHED	DIRT
4	70 CHARLES STREET, JEPARIT (MUSEUM)		0.55	0.62	0.69	BRICK SHED	SLAB
5	70 CHARLES STREET, JEPARIT		0.54	0.61	0.68	IRON SHED	SLAB
6	70 CHARLES STREET, JEPARIT		0.53	0.60	0.67	MUD HUT	STUMPS
7	70 CHARLES STREET, JEPARIT		0.47	0.54	0.61	IRON SHED	SLAB
8	2 TULLYVEA STREET, JEPARIT		0.42	0.50	0.56	BRICK	SLAB
9	70 CHARLES STREET, JEPARIT		0.41	0.48	0.55	IRON SHED	SLAB
10	88 CHARLES STREET, JEPARIT		0.37	0.44	0.51	RENDERED	STUMPS
11	70 CHARLES STREET, JEPARIT		0.25	0.32	0.39	WEATHERBOARD	STUMPS
12	60 CHARLES STREET, JEPARIT		0.20	0.27	0.34	WEATHERBOARD	STUMPS
13	61 CHARLES STREET, JEPARIT		0.09	0.16	0.23	IRON	STUMPS
14	70 CHARLES STREET, JEPARIT		0.07	0.14	0.21	IRON HALL	STUMPS
15	5 RIVERSIDE STREET, JEPARIT		0.04	0.11	0.18	WEATHERBOARD	STUMPS
16	FOOTY SHED, SHOW GROUNDS STREET, JEPARIT		0.02	0.12	0.20	BRICK	SLAB

No	Address		Within 100 mm of flooding over floor			Building type	
		Depth of building over floor flooding for each ARI event (m)					
		50	100	200	500		
17	86 CHARLES STREET, JEPARIT			0.07	0.14	CLADDING	STUMPS
18	70 CHARLES STREET, JEPARIT			0.06	0.13	CLADDING	STUMPS
19	22 SCOTT STREET, JEPARIT			0.05	0.11	CLADDING	STUMPS
20	SIR ROBERT MENZIES PARK, JEPARIT			0.02	0.10	IRON	GRAVEL
21	56 CHARLES STREET, JEPARIT				0.06	IRON	

Appendix C3: Nhill Flood Emergency Plan

Within Nhill, low lying land adjacent to Nhill Swamp subject to flooding. Nhill Swamp has a small catchment area of approximately 120 km^2. An open concrete drain transfers stormwater from the northern section of Nhill, through the centre of town to Nhill Swamp. When Nhill Swamp is full, inflows from the stormwater drainage network and the surrounding catchment contributes to Nhill Swamp flooding adjacent buildings, properties and roads.

Flooding can develop quickly from heavy localized rainfall, within 4 to 8 hours depending on the rainfall intensity. Refer to maps and photos below.



Figure 53. Nhill's lakes and swamps.

Historic Flood Events

Flooding in Nhill has occurred in during 1942, 1957, 1964, 1973, 1974, 1976, 1977 and 1999. The largest flood event recorded was in 1974. Refer to flood photos below of this flood event.

Prior to the 1974 flood event the catchment was already saturated from a wet winter and spring. An extreme storm event occurred on the 13th of January 1974 where 133.2 mm of rainfall fell in less than 24 hours. The magnitude of this flood event is estimated to be a 500 year ARI storm event (SRWSC 1978).

This flood event caused considerable damages to buildings, roads and other infrastructure. Six houses were flooded along the Western Highway and in Pine Street. The Nhill Sewage Pumping Station was impacted by flooding to a depth of 1.3m (SRWSC 1978). Sandbagging around the Pumping Station provided partial protection. Protective works undertaken by the Water Authority included; sealing various vents and ducts, raised manholes and constructed steps to access the Station. The council constructed levees to protect the Caravan Park and the low-lying buildings along the main drain susceptible to floodwater backing up from Nhill Swamp. The flood caused damage to the Adelaide-Melbourne railway bridge. Flooding also cut access to the Western Highway (SRWSC 1978).



Figure 54. Houses in Nhill impacted by flooding during the 1974 flood event (source: Hindmarsh Shire).



Figure 55. Nhill's Sewage Pumping Station impacted by flooding during the 1974 flood event (source: Hindmarsh Shire).



Figure 56. A historic cottage in Nhill along the Wester Highway impacted by flooding during the 1974 flood event (source: Hindmarsh Shire).

Nhill Flood Impacts and Required Actions

The 1974 flood extent has been adopted as the 100 year flood extent for Nhill. This 100 year flood extent was developed as part of the Nhill Flood Study (SRWSC 1978). The maps and tables below only indicate buildings that may be at risk of above floor flooding using the results from the Nhill Flood Study. No floor level survey was undertaken as part of this Study. It's important to note this information has a low level of accuracy and should be used as a guide only.

Key assets at risk of flooding in Nhill are listed in the table below.

Table 17. Nhill key assets at risk of flooding.

Asset register				
Asset Name and location	**Average Recurrence Interval (ARI)**	**Consequence / Impact**	**Mitigation/ Action**	**Lead Agency**
Western Highway, west of Nhill Swamp, Nhill.	100 year flood	Flooding overtops the Western Highway adjacent to Nhill Swamp during a 100 year flood event. Flooding may cut access to the Western Highway.	Deploy road closure signs and undertake traffic management as needed.	Regional Roads Victoria
13 buildings may be impacted by above floor flooding in Nhill. Refer to map below for the locations of the buildings.	100 year flood	13 buildings may be impacted by above floor flooding in Nhill during a 100 year flood event. Refer to map below for the locations of the buildings	Sandbag buildings as needed.	VICSES
Nhill Caravan Park, 93 Victoria Street, Nhill.	100 year flood	Low lying sections of the Nhill Caravan Park are impacted by flooding during a 100 year flood event.	Sandbag buildings and undertake evacuations as needed.	VICSES Victoria Police
Nhill Sewage Pumping Station, north west of Nhill Swamp. Refer to map and flood photos below.	100 year flood	The Nhill Sewage Pumping Station, north west of Nhill Swamp is impacted by flooding during a 100 year flood event.	Sandbag the Pumping Station as needed.	VICSES

For more detailed information regarding buildings and roads impacted refer to the Nhill Flood Intelligence Card and flood damages/impact maps below.



Figure 57. Nhill assets impacted by flooding with the 100 year ARI flood extent (SRWSC 1978).

Table 18. Nhill Flood Intelligence Card (Nhill Swamp)

Flood travel time	Time from start of rain to steep rise in floodwater 4- 6 hours Time from start of rain to Nhill flood peak 6- 12 hours Flooding duration: 1 to 3 days

Rainfall Intensity Triggers	Average Recurrence Interval (ARI)	^Nhill estimated damages (SRWSC 1978)	Consequence / Impact	Houses/ buildings flooded / isolated	Roads Impacted	Action
~37.6 mm in 6 hours to ~46.6 mm in 12 hour to	5					
~46.8 mm in 6 hours to ~58.4 mm in 12 hour	10					Refer to actions listed above.
~56.7 mm in 6 hours to ~71.4 mm in 12 hour	20					Refer to actions listed above.
~71.6 mm in 6 hours to ~91.4 mm in 12 hour	50					VICSES activate ground observers to take photos and record flood levels at key crossings. Council clear debris from waterway crossings, drains and culvers as needed.
~84.4 mm in 6 hours to ~109 mm in 12 hour	100	29 (13)	The 1974 flood was adopted as the 100 year flood extent. This flood event caused significant damage to buildings, roads and bridges. 13 buildings were impacted by flooding. Flooding cut access to the Western Highway. Flooding impacted southern section of the Nhill Caravan Park. The Nhill Sewage Pumping Station was significantly impacted by flooding.	13 buildings were impacted by flooding; X5 Pine Street (1A, 7, 11, 15, 17), 65 Victoria Street (GE Mackenzie Motors), x3 Campbell Street (21, 23, 26), x2 Clarence Street (19, 1/22), Historic Cottage (Western Highway, adjacent to the Nhill Playground), Nhill Sewage Pumping Station (north west of the Nhill Swamp).	Roads that may be impacted by flooding, access could also be cut; Western Highway, Clarence Street, Campbell Street, Victoria Street, Pine Street, Green Street, Farmers Street, Brougham Street.	VICSES sandbag as needed. Victoria Police evacuate buildings as needed. Council and Regional Roads Victoria to deploy road closure signs along the Western Highway as needed.
133.2 mm in less than 24 hours	January 1974	29 (13)	This flood event caused significant damage to buildings, roads and bridges. Due to the catchment being very wet as a result of flooding a sequence of flood events prior to this event. 13 buildings were impacted by flooding. Flooding cut access to the Western Highway. Flooding impacted southern section of the Nhill Caravan Park. The Nhill Sewage Pumping Station was significantly impacted by flooding.	13 buildings were impacted by flooding; X5 Pine Street (1A, 7, 11, 15, 17), 65 Victoria Street (GE Mackenzie Motors), x3 Campbell Street (21, 23, 26), x2 Clarence Street (19, 1/22), Historic Cottage (Western Highway, adjacent to the Nhill Playground), Nhill Sewage Pumping Station (north west of the Nhill Swamp).	Roads impacted by flooding; Western Highway, Clarence Street, Campbell Street, Victoria Street, Pine Street, Green Street, Farmers Street, Brougham Street.	

^ Buildings estimated to be impacted by flooding using flood mapping generated from the 1973 State Rivers and Water Supply Commission Nhill Flood Investigation. There is uncertainty regarding these estimates, they should be used as a guide only.

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Appendix C3: Rainbow Flood Emergency Plan

Anecdotal information indicates that Rainbow is impacted by stormwater flooding. There are no defined waterways surrounding Rainbow. Flooding occurs in Rainbow when heavy local rainfall exceeds the capacity of pipes, drains and culverts that convey stormwater, causing overland flooding. Culvert and drainage capacity constraints significantly influence on the depth and extent of flooding. Due to the small size of culverts and drains, flooding can be exacerbated by blockages and obstructions to overland flow. No stormwater flood mapping has been undertaken for Rainbow. A number of buildings have been reported to be impacted by stormwater flooding during the 1999, 2003 and 2011 flood events. Buildings that may be impacted by stormwater flooding include 102 Taverner Street and 4583 Hopetoun-Rainbow Road. Refer to the map below.

A low lying area to the north west of Rainbow is also subject to riverine flooding along Outlet Creek. Refer to the Riverine Flooding section below.



Figure 58. Area at risk of stormwater flooding to the north east of Rainbow (source Hindmarsh Shire Council).

Historic Stormwater Flood Events

Rainbow has been subject to irregular flood events. Significant flood events are known to have occurred in 1999, 2003 and 2011.

The January 2011 flood event was the largest recent flood event. Rainfall records indicate 172 mm fell over three days, with 131 mm falling on the 12th of January. This flood event caused considerable damages to buildings, roads and other infrastructure. Little detail is available regarding damages. Refer to the flood photos below.



Figure 59. Flooding impacting low lying land north east of Rainbow during the January 2011 flood event (source: Ron Ismay).



Figure 60. Flooding impacting low lying land north east of Rainbow during the January 2011 flood event (source: Ron Ismay).

Rainfall records for the February 1999 flood event indicate 67.4 mm fell over two days, with 62.2 mm falling on the 12th of February. This flood event caused considerable damages to buildings, roads and other infrastructure. Little detail is available regarding damages. Refer to the flood photos below.



Figure 61. Sandbagging a house at 102 Taverner Street in Rainbow during the 1999 flood event (source: Roger Smith).

Stormwater Flooding Warning Time

Stormwater flooding can develop quickly in Rainbow from heavy localised rainfall. Rapid rises in stormwater flooding may occur in a relatively short time after onset of rain. Rapid rises in floodwater can occur within 2 to 6 hours after rainfall. The floodwater peak may occur 3 to 12 hours from rainfall. It is important to note that all floods are different, and different rainfall patterns falling on dry or wet catchments may respond differently. This information should be used as a guide only. The time it takes rainfall associated with severe thunderstorm activity to develop into runoff is highly dependent on antecedent conditions, the saturation of the catchment. A flood on a 'dry' catchment travels more slowly than a flood on a 'wet' catchment. Hence, the size of the flood, recent flood history, soil moisture and forecast weather conditions all need to be considered when using the following information to direct flood response activities.

Historic Riverine Flood Events

Rainbow has been subject to irregular riverine flood events. Flood mapping (DNRE 1999) shows that floodwater that overflows from Lake Hindmarsh into Outlet Creek impacts low lying land to the north west of Rainbow. Refer to flood maps below.



Figure 62. Roads surrounding Rainbow impacted by riverine flooding (DNRE 1999).



Figure 63. Roads surrounding Rainbow impacted by riverine flooding (DNRE 1999).

Rainbow Flood Impacts and Required Actions

Given that no flood study has been undertaken for stormwater flooding in Rainbow, flood risk information provided below was sourced from historic flood information provided by the Hindmarsh Shire Council. Assets at risk of riverine flooding were estimated using the Hindmarsh Shire Flood Study (DNRE 1999). It's important to note the information used to estimate assets at risk of flooding below has a low level of accuracy and should be used as a guide only.

For additional flood risk information refer to the Rainbow Flood Intelligence Card, tables and maps below.

Key assets at risk of flooding in Rainbow are listed in the table below.

Table 17. Rainbow key assets at risk of flooding.

Asset register				
Asset Name and location	**Average Recurrence Interval (ARI)**	**Consequence / Impact**	**Mitigation/ Action**	**Lead Agency**
A house at 4583 Hopetoun-Rainbow Road, north east of Rainbow.	100 year flood (stormwater)	A house at 4583 Hopetoun-Rainbow Road may be impacted above floor during a 100 year flood event.	Sandbag building as needed.	VICSES
A house at 102 Taverner Street, north east of Rainbow.	100 year flood (stormwater)	A house at 102 Taverner Street may be impacted above floor during a 100 year flood event. This house was flooded over floor during the 1999 flood event.	Sandbag building as needed.	VICSES
Hopetoun-Rainbow Road, north east of Rainbow.	100 year flood (stormwater)	Floodwater may overtop the Hopetoun-Rainbow Road, north east of Rainbow.	Deploy road closure signs as needed.	Council
Wheatlands Road, north east of Rainbow.	100 year flood (stormwater)	Floodwater may overtop the Wheatlands Road, north east of Rainbow.	Deploy road closure signs as needed.	Council
Rainbow Rise Road, west of Rainbow.	100 year flood (riverine)	Floodwater may overtop the Rainbow Rise Road, west of Rainbow.	Deploy road closure signs as needed.	Council
Albacutya Road, north of Rainbow.	100 year flood (riverine)	Floodwater may overtop Albacutya Road, north of Rainbow.	Deploy road closure signs as needed.	Council

For more detailed information regarding buildings and roads impacted refer to the Rainbow Flood Intelligence Card below. Also refer to the list of flood observers in **Appendix H** and community sandbag collection point in **Appendix I**.

Table 18. Rainbow Flood Intelligence Card

Flood travel time	Time from start of rain to steep rise in floodwater 2 - 6 hours Time from start of rain to Raglan peak 3 - 12 hours Riverine flooding duration: 1 day

Rainfall Intensity Triggers (BOM)	Average Recurrence Interval (ARI)	^Rainbow estimated damages	Consequence / Impact	Houses/ buildings flooded / isolated	Roads Impacted	Action
~17.9 mm in 1 hour to ~47.8 mm in 12 hours	5					
~22.5 mm in 1 hour to ~60.2 mm in 12 hours	10					
~27.3 mm in 1 hour to ~73.6 mm in 12 hours	20					
~34.4 mm in 1 hour to ~94.4 mm in 12 hours	50					VICSES activate ground observers to take photos and record flood levels at key locations. Council clear debris from drains and culvers as needed.
~40.4 mm in 1 hour to 112 mm in 12 hours	100	5 (2)	2 houses may be flooded over floor. Flooding may cut access to the Hopetoun-Rainbow Road and Wheatlands Road.	2 buildings may be impacted by flooding; 102 Taverner Street and 4583 Hopetoun-Rainbow Road.	Access may be cut to; Wheatlands Road and Hopetoun-Rainbow Road.	VICSES sandbag as needed. Council to deploy road closure signs as needed.
172 mm fell over 3 days, with 131 mm falling on the 12th of January.	January 2011	?				
67.4 mm fell over two days, with 62.2 mm falling on the 12th of February.	1999	5 (2)	2 houses may be flooded over floor. Flooding may cut access to the Hopetoun-Rainbow Road and Wheatlands Road.	2 buildings may be impacted by flooding; 102 Taverner Street and 4583 Hopetoun-Rainbow Road.	Access may be cut to; Wheatlands Road and Hopetoun-Rainbow Road.	

^ Estimated property and building damages using flood photos and anecdotal information provided by the Hindmarsh Shire Council.

Appendix D: Flood evacuation arrangements

Phase 1 - Decision to Evacuate

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

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 as a consequence of flooding and evacuation is considered the most effective risk treatment. This is the role of the Health Commander of the incident to assess and manage. Refer to the State Health Emergency Response Plan (SHERP) for details);
- Essential services have been damaged and are not available to a community and evacuation is considered 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 etc.;
- Vulnerable people and facilities;
- Transportation;
- Registration
- People of CALD background and transient populations;
- Safety of emergency service personnel;
- Different stages of an evacuation process.

Phase 2 – Warning

Warnings may include a warning to 'prepare to evacuate' and a warning to 'evacuate now'. Once the decision to evacuate has been made, the at-risk community will be warned to evacuate. Evacuation warnings should be disseminated via methods listed in section 3.3 of this plan.

Phase 3 – Withdrawal

VICPOL is the responsible agency for evacuation. VICSES will provide advice regarding most appropriate evacuation routes and locations for at-risk communities to evacuate to.

VICSES, CFA, AV and Local Government will provide resources where available to support VICPOL/ REGIONAL ROADS 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 will be arranged.

Landing zones for helicopters are located at:

- Horsham Airport
- Horsham ICC, 110 Natimuk Road, Horsham

Special needs groups will be/are identified in Council's 'vulnerable persons register'. This can be done through community network organisations.

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.

VICPOL in consultation with VICSES will liaise with Local Government and DHHS (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 through the Emergency Management Team (EMT).

Animal Shelter

Animal shelter compounds will be established for domestic pets and companion animals of evacuees.

Phase 5 – Return

The Incident Controller in consultation with VICPOL will determine when it is safe for evacuees to return to their properties and will arrange for the notification of the community.

VicPol will manage the return of evacuated people with the assistance of other agencies as required.

Considerations for deciding whether to evacuate include:

- Current flood situation;
- Status of flood mitigation systems;
- Size and location of the community;
- Access and egress routes available and their status;
- Resources required to coordinate the return;
- Special needs groups;
- Forecast weather;
- Transportation particularly for people without access to transport

Disruption to Services

Disruption to a range of services can occur in the event of a flood. This may include road closures affecting school bus routes, truck routes, water treatment plant affecting potable water supplies etc.

Appendix E: Public Information and Warnings

VICSES uses EM-COP Public Publishing to distribute riverine and flash flood warnings in Victoria. The platform enables automatic publishing to the VicEmergency app, website and hotline (1800 226 226). Communities can also access this information through VICSES social media channels (Victoria State Emergency Service on Facebook and VICSES News on Twitter) and emergency broadcasters, such as Sky News TV and various radio stations (current list available via the EMV website).

VICSES Regions (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 standard VICSES communication channels (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, 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 EM-COP.

EM-COP 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.

EMERGENCY ALERT. BE WARNED. BE INFORMED.	**EMERGENCY ALERT** As required, subject to individual circumstances, weather conditions, potential impacts and duration. Refer VICSES SOP057.	As required, based on conditions, changed conditions or impacts of the flood event. Circumstances which warrant the use of EA include: • EA is likely to contribute to saving lives and property • EA is likely to be the most effective way to warn the community in an actual or likely emergency • Alternative channels have been considered and alone may not achieve objectives • Time is of the essence and specific action following the receipt of the warning is required The message is of critical importance and needs to be delivered to a specific geographic area
Pre-populated Hindmarsh Shire Emergency Alert key messages for a severe flash flood event High velocity floodwater may cause risk to life for pedestrians and motorist. Access to main roads may be cut. Advise to shelter in place if it is safe to do so. The flood peak is likely to pass within 6 to 48 hours.		

	**EMERGENCY ALERT** As required, subject to individual circumstances, weather conditions, potential impacts and duration. Refer VICSES SOP057.	As required, based on conditions, changed conditions or impacts of the flood event. Circumstances which warrant the use of EA include: • EA is likely to contribute to saving lives and property • EA is likely to be the most effective way to warn the community in an actual or likely emergency • Alternative channels have been considered and alone may not achieve objectives • Time is of the essence and specific action following the receipt of the warning is required The message is of critical importance and needs to be delivered to a specific geographic area

Pre-populated Hindmarsh Shire Emergency Alert key messages for a severe flash flood event
The BOM have issued a Severe Weather Waring: Heavy Rain

Heavy rainfall forecast by the BOM may lead to Flash Flooding ???. Falls are expected to be between ???mm and ???mm. Locally heavier falls are possible due to embedded thunderstorms that could cause severe flooding.

Locations which may be affected include: Dimboola, Jeparit, Nhill and Rainbow.

Widespread flooding may occur.
Keep clear of creeks and storm drains
Stay clear of fast moving floodwater. Floodwater is expected to rise quickly and will cause risk to life for pedestrians and motorist.
Flooding may cause extensive inundation of buildings.
Properties are likely to be isolated. If your property is impacted by flooding, we advise you to shelter in place if it is safe to do so.
The flood peak is likely to pass within 6 to 48 hours.
Floodwater may cut access to main roads, avoid driving until the storm and floodwater has subsided.

Waterways likely to be affected include:

- Wimmera River
- Datchak Creek
- Mackenzie River
- Norton Creek
- Darragan Creek
- Sandy Creek

SES advises that all community members should:
Never walk, ride or drive through floodwater, Never allow children to play in floodwater, Stay away from waterways and stormwater drains during and after heavy rain, Keep well clear of fallen power lines Be aware that in fire affected areas, rainfall run-off into waterways may contain debris such as ash, soil, trees and rocks, and heavy rainfall increases the potential for landslides and debris across roads.

For emergency assistance contact the SES on 132 500.

Current Road and Traffic Information is available at the VicRoads website: http://traffic.vicroads.vic.gov.au

Weather Forecast:

For the latest weather forecast see http://www.bom.gov.au/vic/forecasts/

Appendix F: Flood Maps

Figure 64. Dimboola 5 year ARI flood depth map (Water Technology 2017).

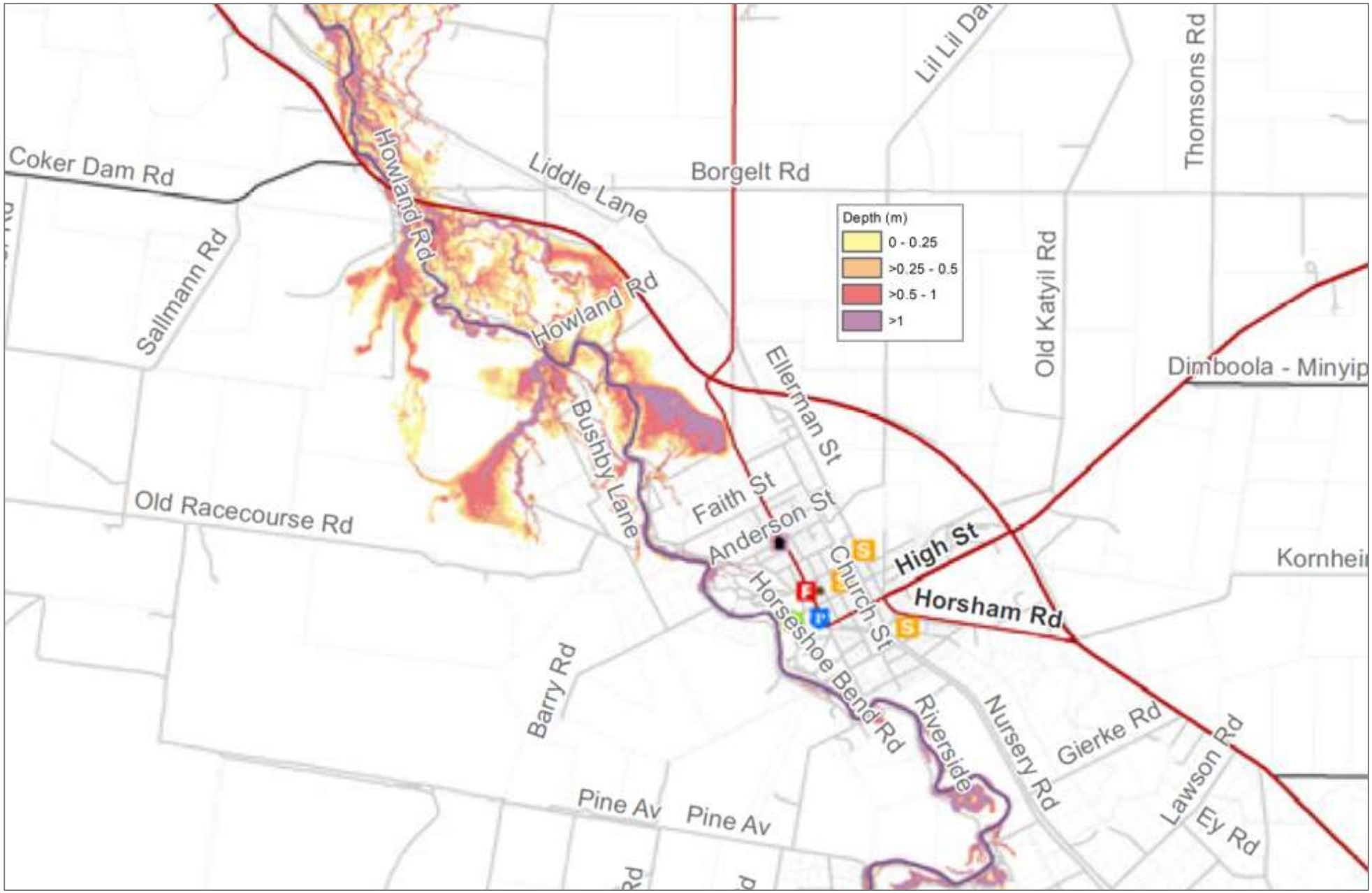


Figure 65. Dimboola 10 year ARI flood depth map (Water Technology 2017).

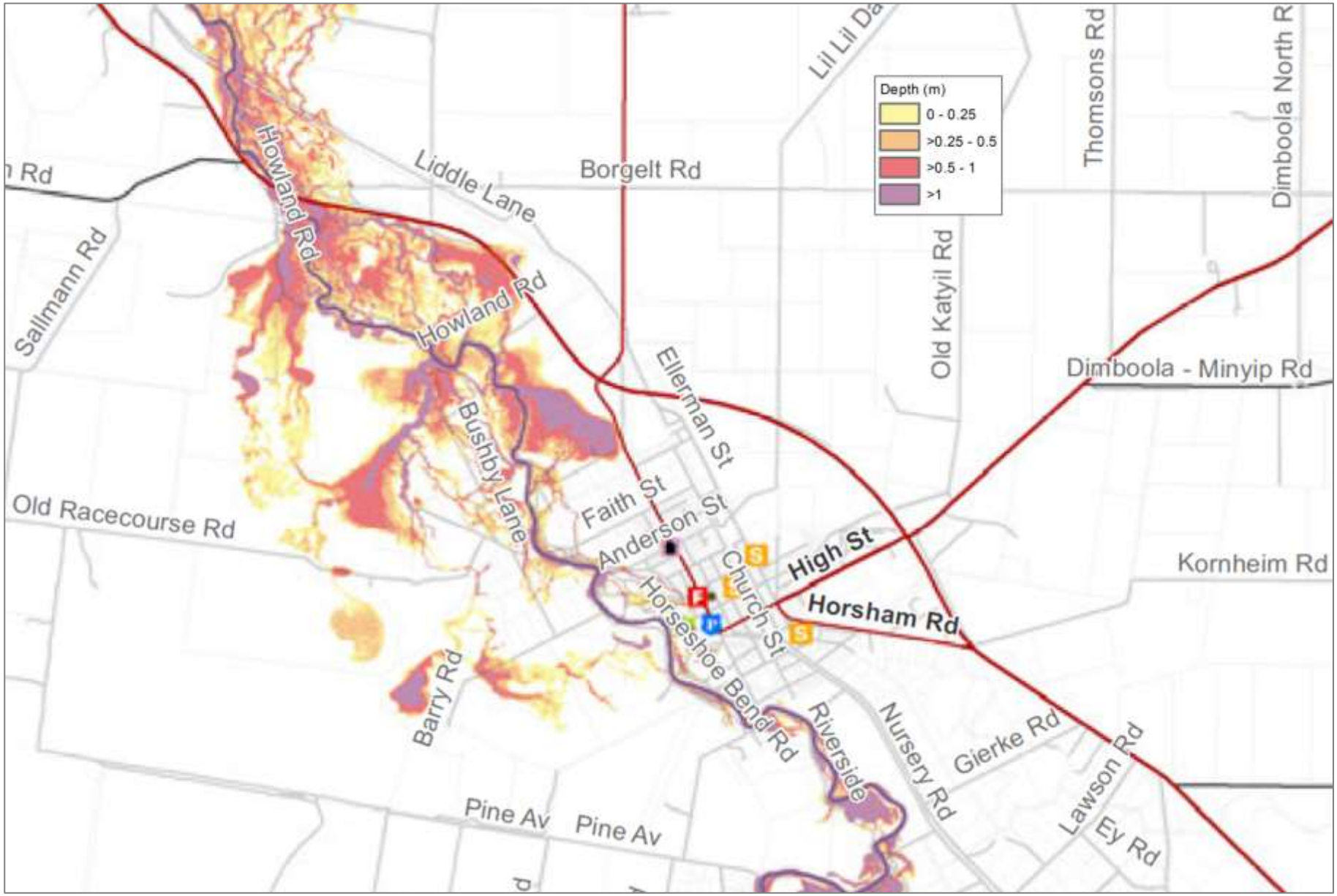


Figure 66. Dimboola 50 year ARI flood depth map (Water Technology 2017).

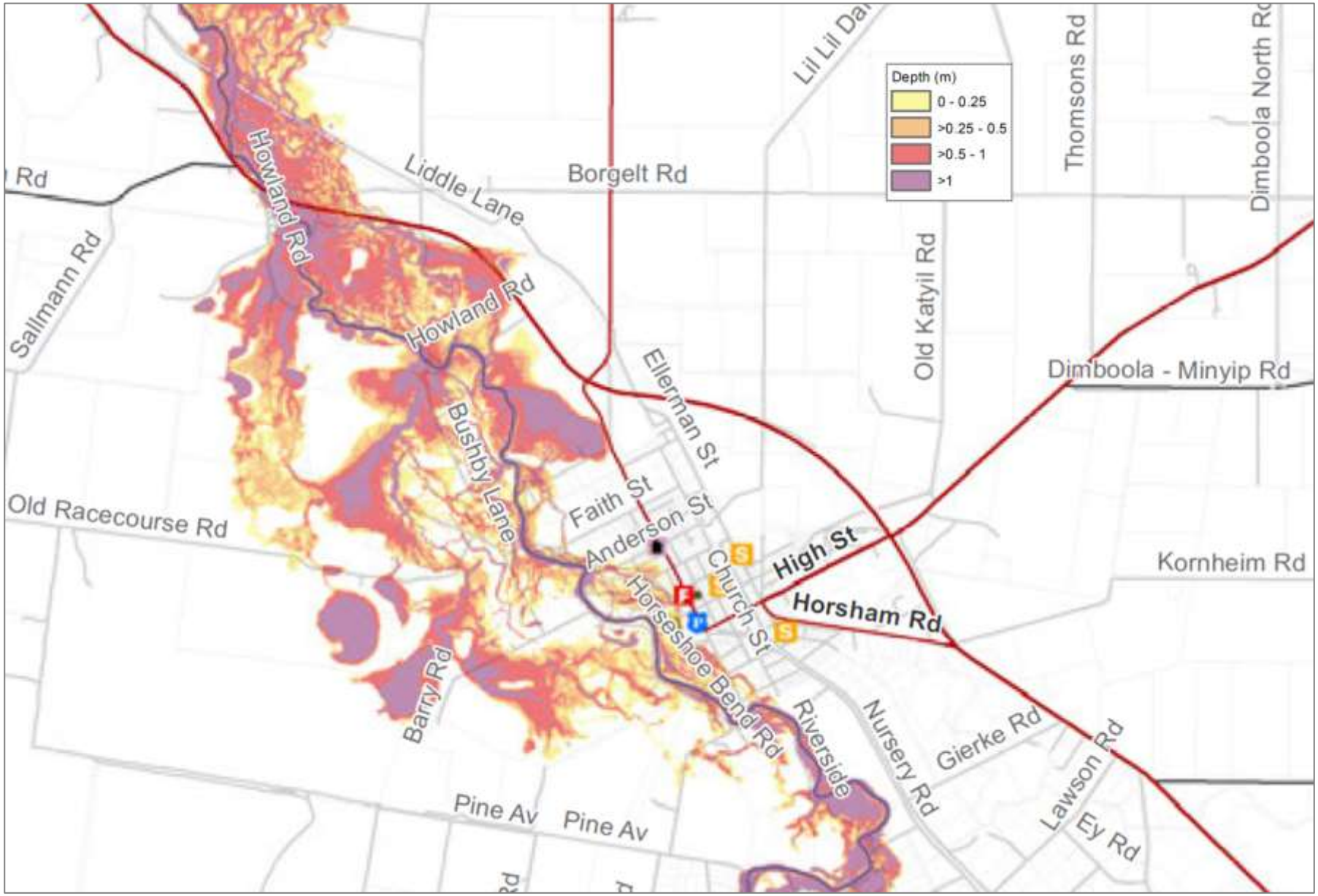


Figure 67. Dimboola 100 year ARI flood depth map (Water Technology 2017).

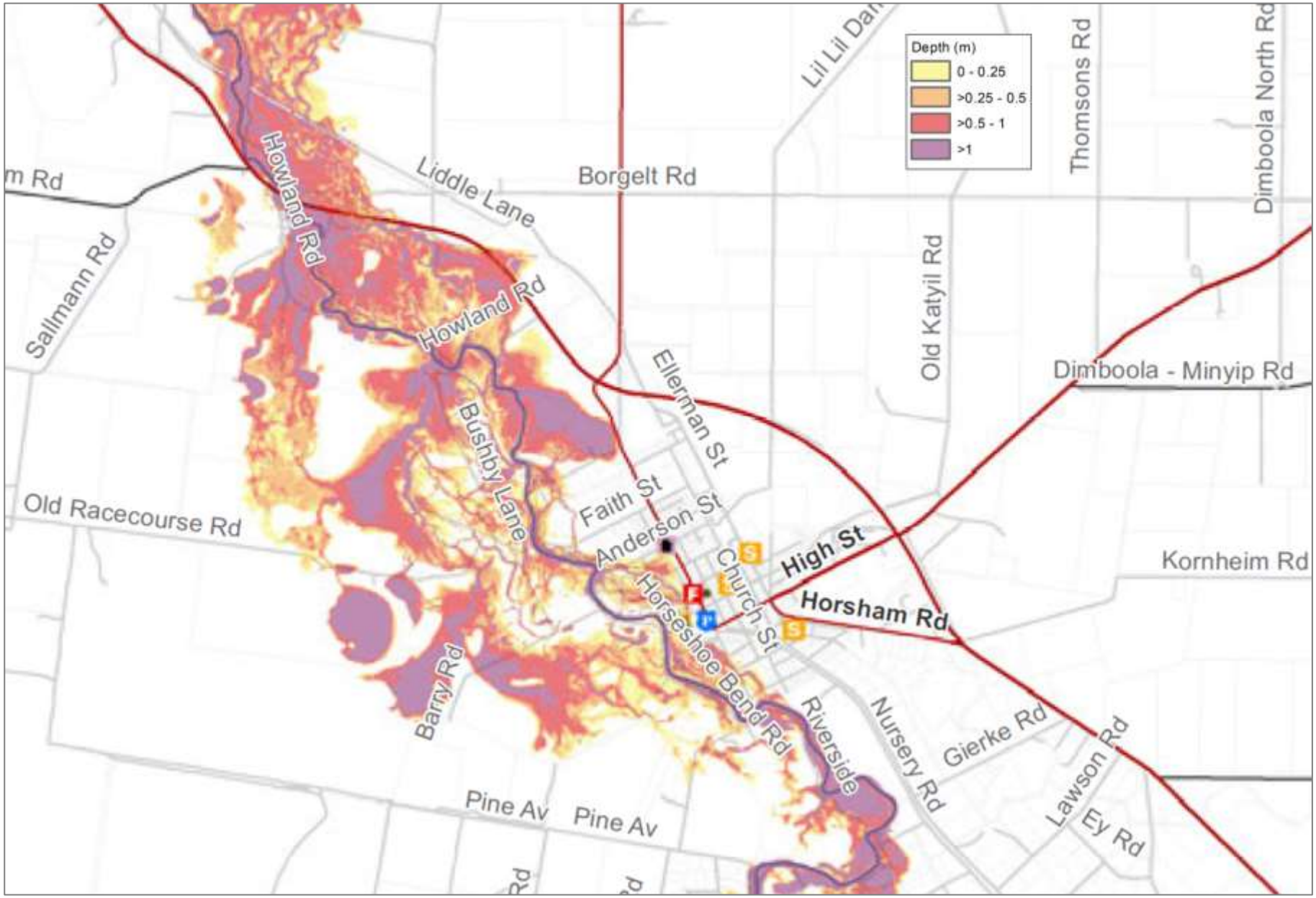


Figure 68. Dimboola 200 year ARI flood depth map (Water Technology 2017).

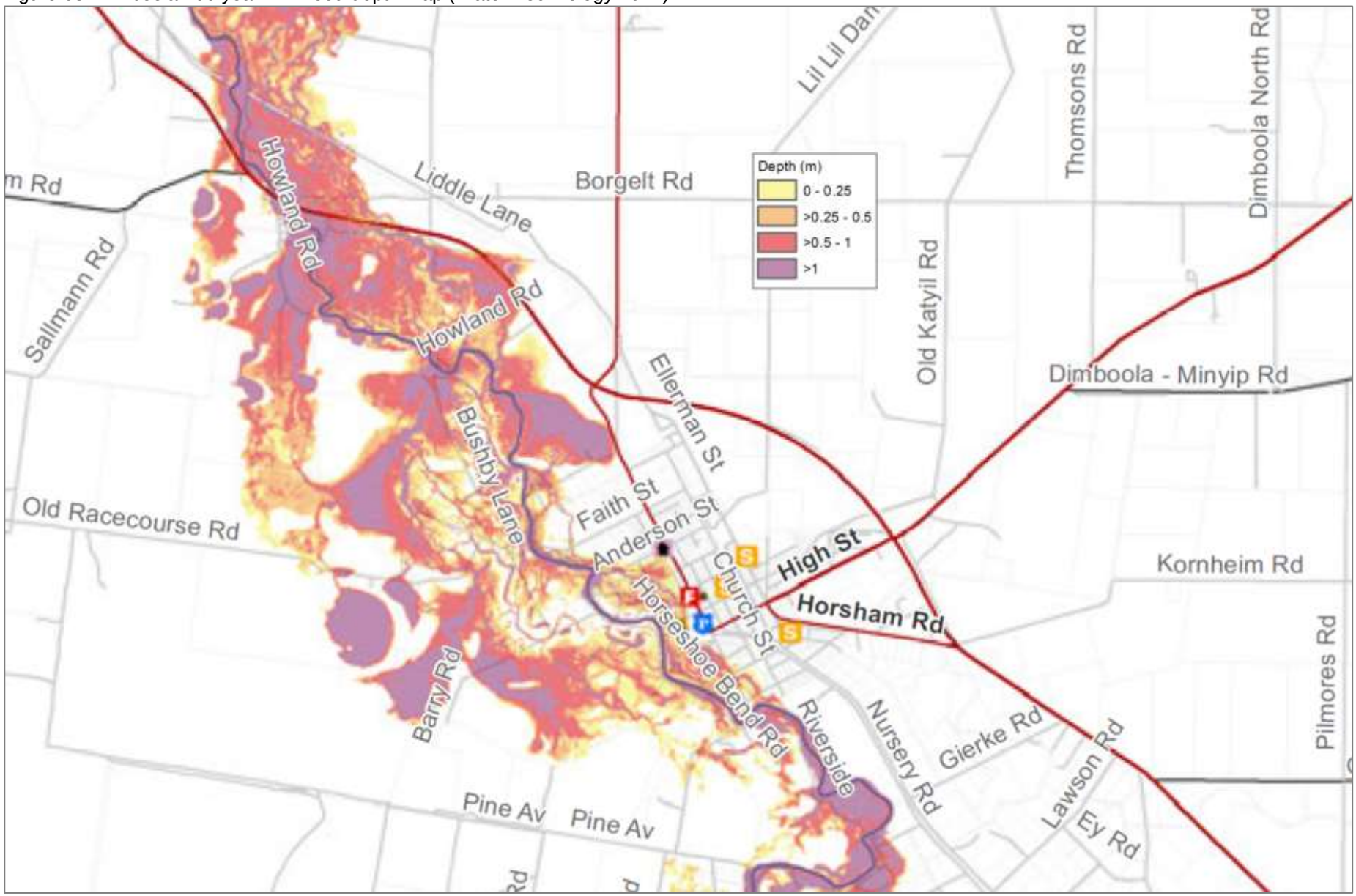


Figure 69. Jeparit 5 year ARI flood depth map (Water Technology 2017).

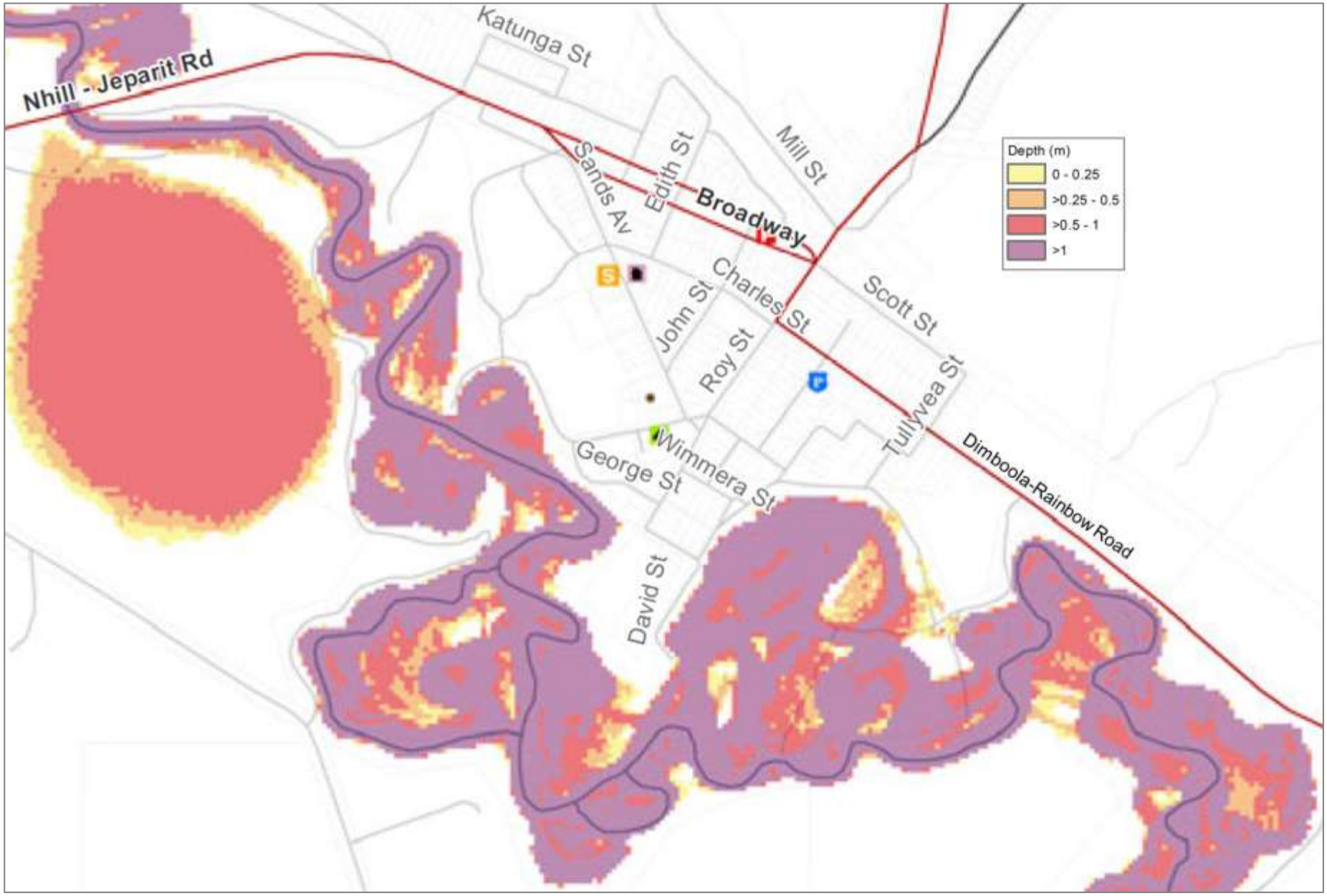


Figure 70. Jeparit 50 year ARI flood depth map (Water Technology 2017).

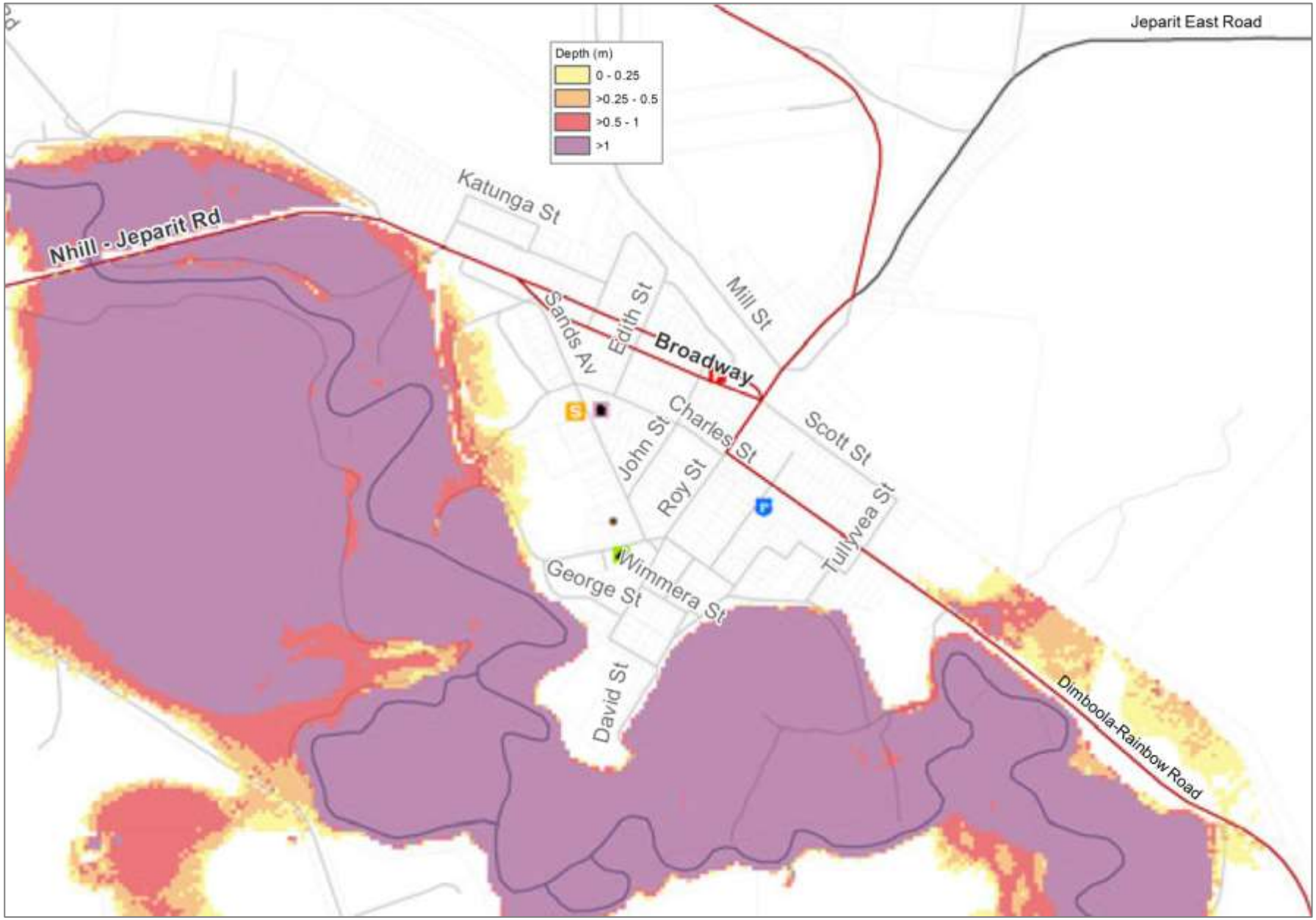


Figure 71. Jeparit 100 year ARI flood depth map (Water Technology 2017).

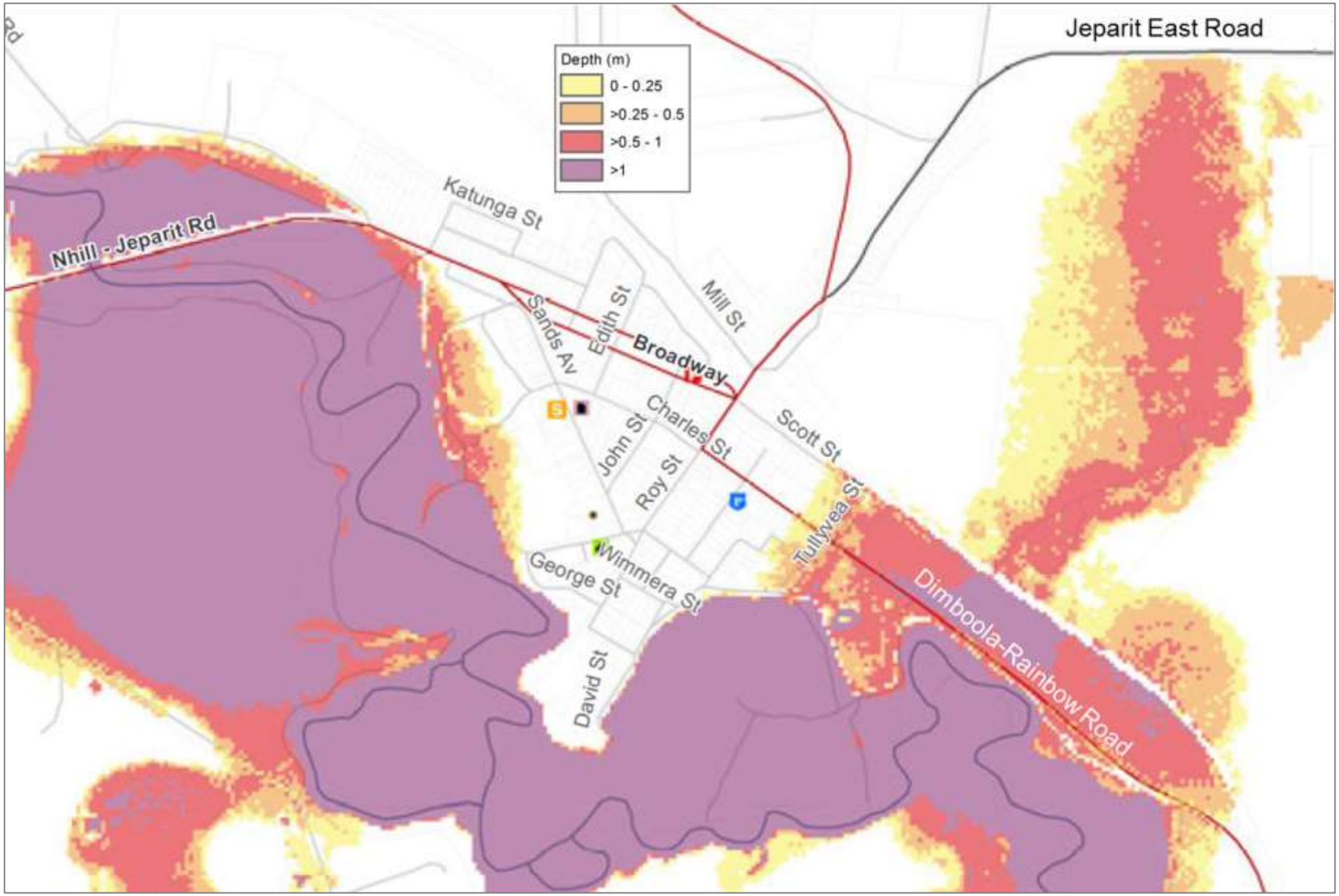
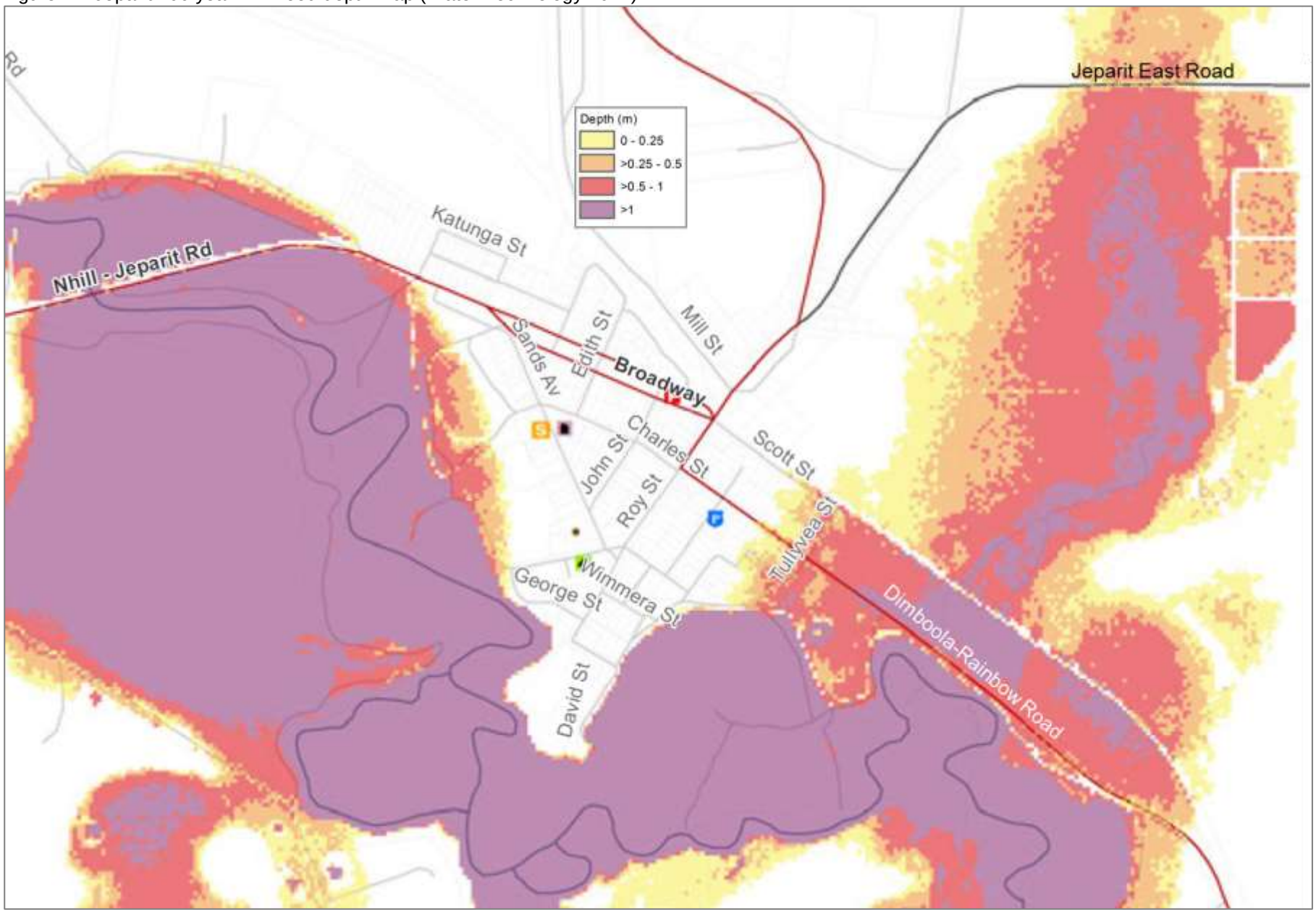


Figure 72. Jeparit 200 year ARI flood depth map (Water Technology 2017).



Appendix H: Local knowledge arrangements

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.

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. Community observers and agency staff will help support this process.

Refer to table 19 below for the Hindmarsh region community flood observers.

Table 19. Hindmarsh community flood observers.

Town	Observer Details	Community Observer Name	Contact Details
Dimboola	VICSES Dimboola Unit	Caleb Baldock	0458 891 979
Dimboola	VICSES Dimboola Unit	Daniel Howard	0424 003 465
Dimboola	VICSES Dimboola Unit	Melissa Howard	0437 148 003
Dimboola	VICSES Dimboola Unit	John Horan	0403 334 499
Jeparit	CFA Jeparit Brigade	Paul Schulze	0409 609 585
Jeparit	CFA Jeparit Brigade	Adrian King	0488 972 017
Jeparit	CFA Jeparit Brigade	Brenton McKenzie	0429 706 156
Jeparit	CFA Jeparit Brigade	Alicia Rosewall	0427 972 258
Nhill	VICSES Nhill Unit	Des Smith	0427 923 290
Nhill	VICSES Nhill Unit	Steve Carter	0428 504 927
Nhill	VICSES Nhill Unit	John Dunbar	0467 254 294
Nhill	VICSES Nhill Unit	Julie Woolcock	0428 911 740
Rainbow	CFA Rainbow Brigade	Adrian Bennett	0412 309 528
Rainbow	CFA Rainbow Brigade	Scott Keller	0427 951 512
Rainbow	CFA Rainbow Brigade	Daniel Gebert	0427 829 335
Rainbow	CFA Rainbow Brigade	Don Pedder	0499 034 780
Rainbow	CFA Rainbow Brigade	Matt Keller	0427 543 512

Appendix I: Hindmarsh Community Sandbag Collection Points

Triggers to start prefilling sandbags and setting up community sandbag collection points;

- BOM flood watch has been issued for the town/catchment area
- Significant rainfall is predicted for the town/catchment area (greater than 50mm)
- BOM has high certainty the rainfall event will impact a town/catchment area listed below.
- Flooding is immanent

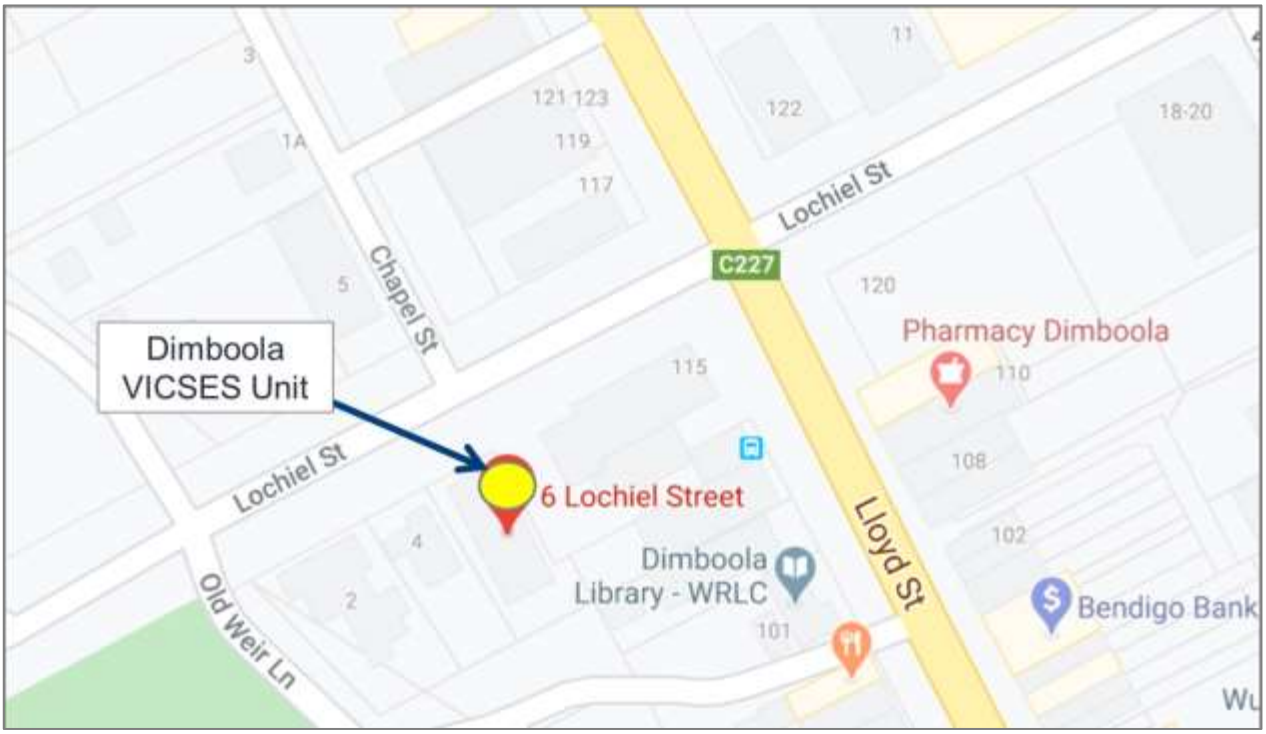
When needed community sandbag collection points will be set up at;

- Dimboola VICSES Unit: 6 Lochiel Street, Dimboola.
- Jeparit Hindmarsh Shire Council Depot: 58 Lower Roy Street, Jeparit.
- Nhill Hindmarsh Shire Council Depot:
- Rainbow Hindmarsh Shire Council Depot:

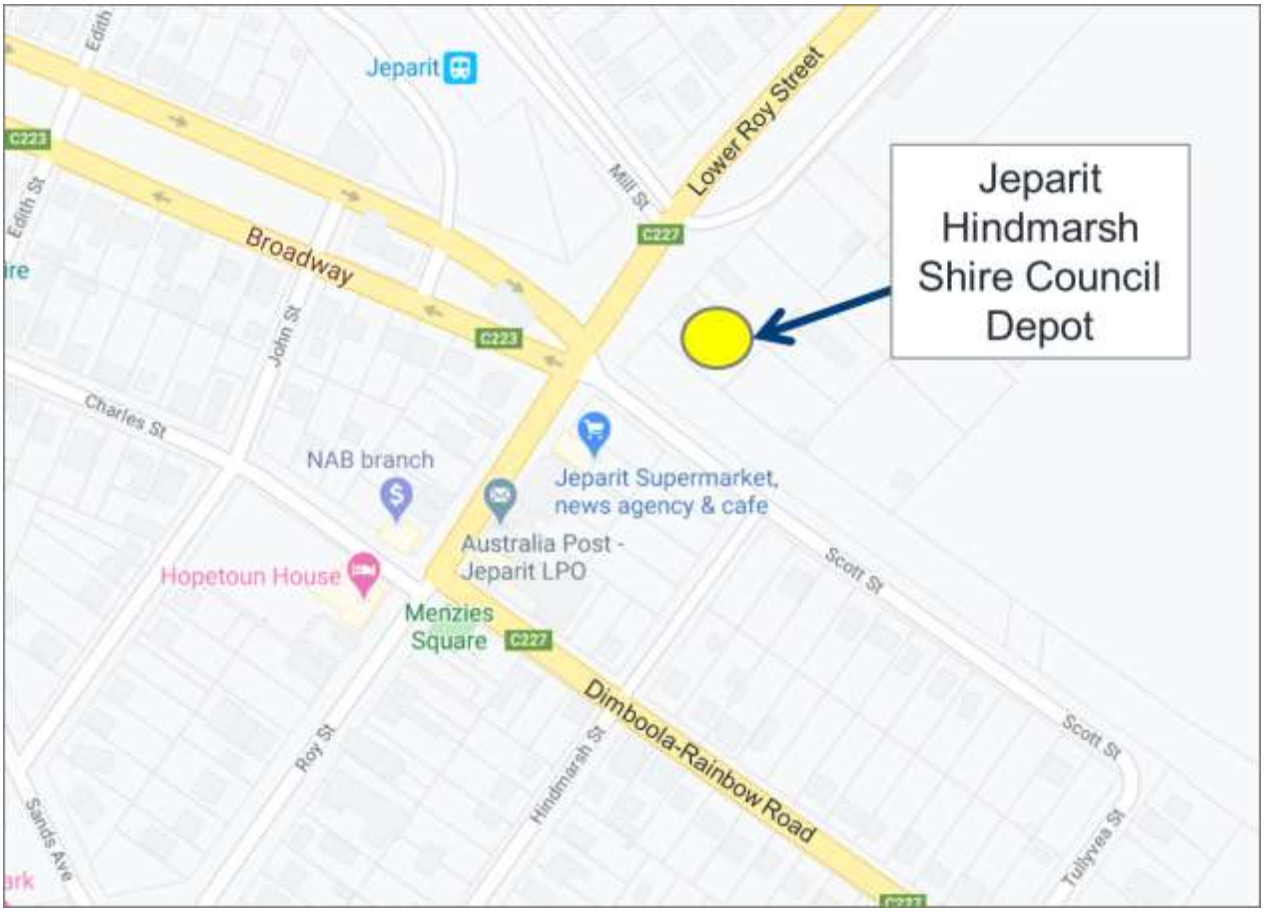
Refer to the list below of key tasks that may be undertaken to prepare sandbag filling and community sandbag collection points.

Agency	Task Description
VICSES	Deliver sandbags to the council depot or other nominated sandbag filling point to prefill the sandbags.
Hindmarsh Shire	Deliver sand to sandbag filling points documented below.
Hindmarsh Shire / VICSES / CFA	Deliver prefilled sandbags either directly to buildings that need to be sandbagged or to the nominated community Sandbag collection point. Provide staff/volunteers to set up the community sandbag point. Provide staff/volunteers to distribute prefilled sandbags to the community.
Hindmarsh Shire / VICSES	Notify the community of the location of the community sandbag collection point via local radio and social media channels.

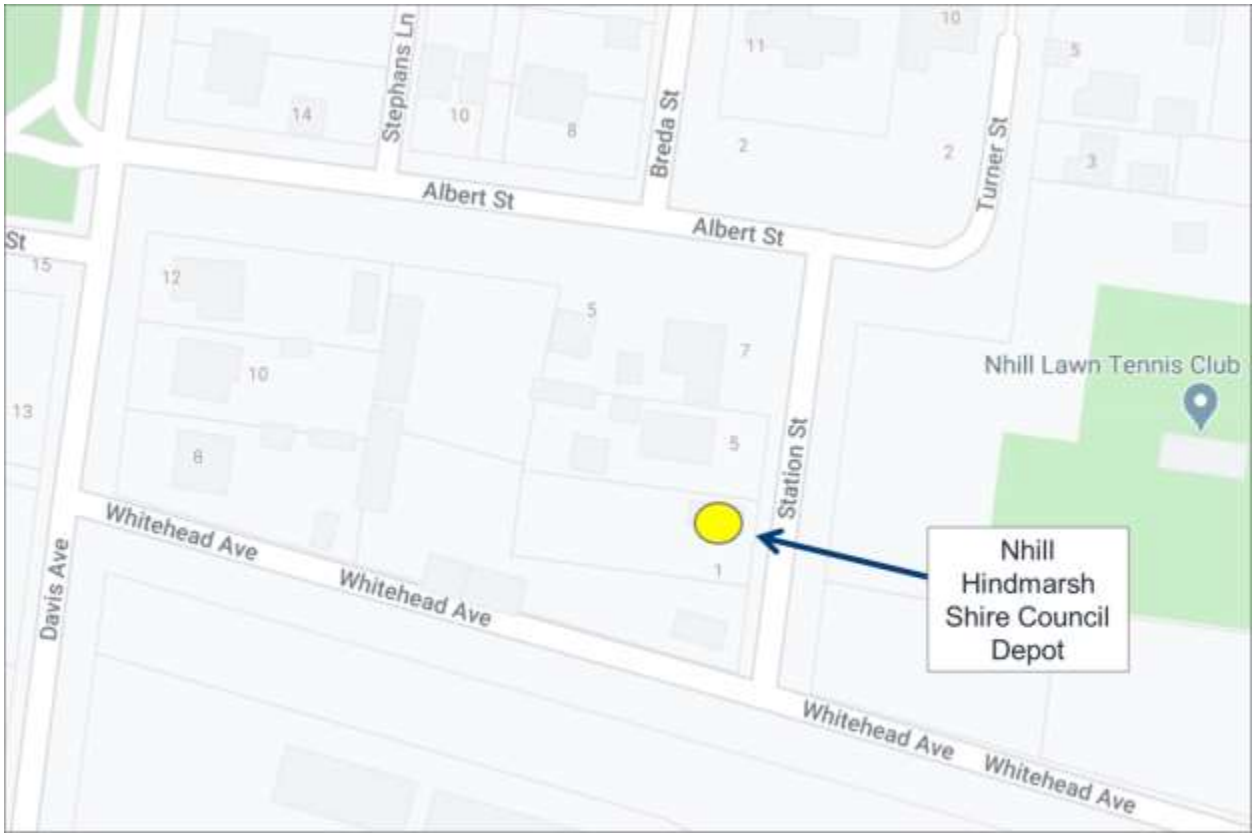
Dimboola sandbag filling and community collection point: the Dimboola VICSES Unit: 6 Lochiel Street, Dimboola (refer to map below).



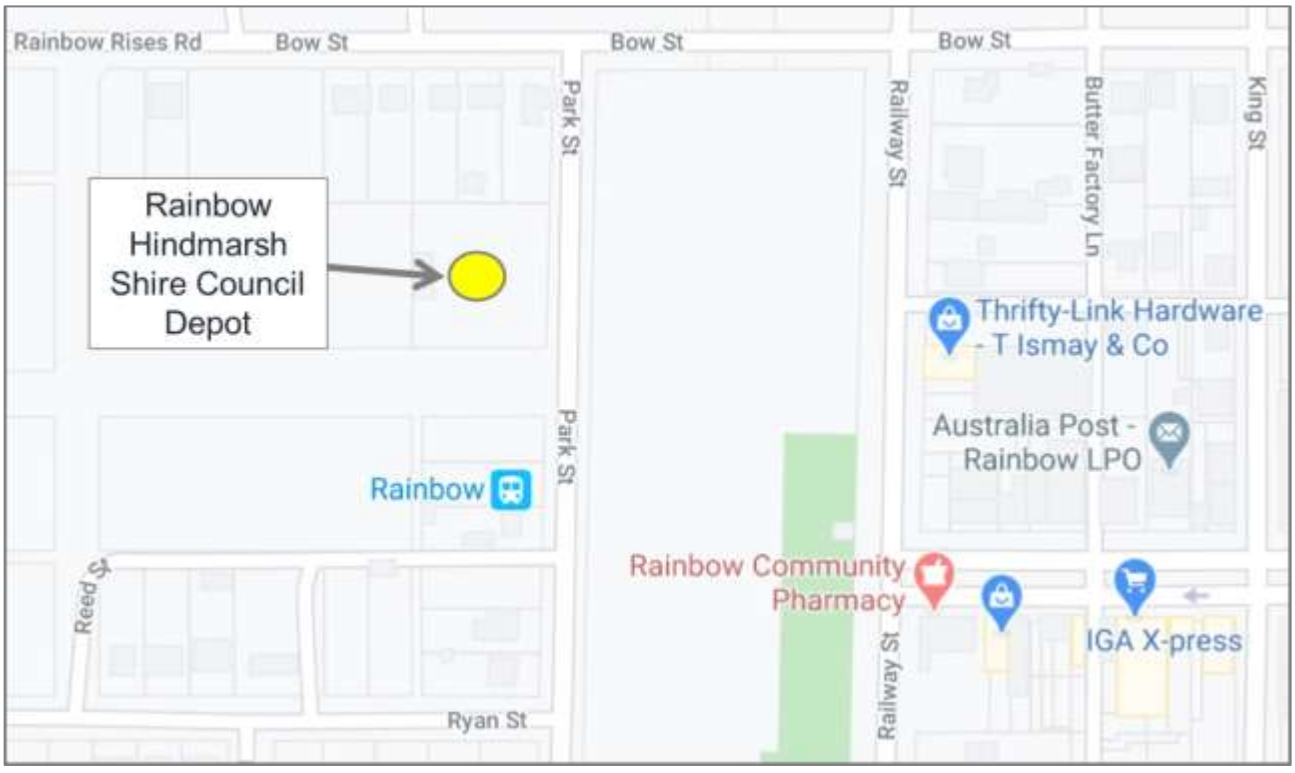
Jeparit sandbag filling and community collection point: the Jeparit Hindmarsh Shire Council Depot, 58 Lower Roy Street, Jeparit (refer to map below).



Nhill sandbag filling and community collection point: the Nhill Hindmarsh Shire Council Depot, 1 Station Street, Nhill (refer to map below).



Rainbow sandbag filling and community collection point: the Rainbow Hindmarsh Shire Council Depot, 21 Park Street, Rainbow (refer to map below).



References

Ecological Associates (2004): The Environmental Water Needs of the Wimmera Terminal Lakes, Final Report.

Department of Natural Resources and Environment (1999): Hindmarsh Shire Council Flood Data Transfer Project Flood Mapping Report.

State Rivers and Water Supply Commission (1978): A report on the flooding experienced at Nhill 1973-1974.

Water Technology (2017): Regional Flood Mapping Lower Wimmera – Flood Intelligence.

Water Technology (2017): Regional Flood Mapping Lower Wimmera – Hydrology.

Water Technology (2017): Lower Wimmera Site Visit and Data Collation Report.

Water Technology (2017): Regional Flood Mapping Lower Wimmera – Hydraulics.