



Flood Intelligence & Municipal Flood Emergency Plan Report

Apsley Flood Investigation

West Wimmera Shire Council

4 June 2026



Document Status

Version	Doc type	Reviewed by	Approved by	Date issued
01	Draft	Ben Hughes	Ben Hughes	24/11/2026
02	Final	Ben Hughes	Ben Hughes	04/06/2026

Project Details

Project Name	Apsley Flood Investigation
Client	West Wimmera Shire Council
Client Project Manager	Edwin Irvine
Water Technology Project Manager	Ben Hughes
Water Technology Project Director	Johanna Theilemann
Authors	Andrew Bezzina
Document Number	24010090 R03B_V02_Apsley_Flood_Intelligence



COPYRIGHT

Water Technology Pty Ltd has produced this document in accordance with instructions from West Wimmera Shire Council for their use only. The concepts and information contained in this document are the copyright of Water Technology Pty Ltd. Use or copying of this document in whole or in part without written permission of Water Technology Pty Ltd constitutes an infringement of copyright.

Water Technology Pty Ltd does not warrant this document is definitive nor free from error and does not accept liability for any loss caused, or arising from, reliance upon the information provided herein.

15 Business Park Drive
Notting Hill VIC 3168
Telephone (03) 8526 0800
ACN 093 377 283
ABN 60 093 377 283





ACKNOWLEDGEMENT OF COUNTRY

The Board and employees of Water Technology acknowledge and respect the Aboriginal and Torres Strait Islander Peoples as the Traditional Custodians of Country throughout Australia. We specifically acknowledge the Traditional Custodians of the land on which our offices reside and where we undertake our work.

We respect the knowledge, skills and lived experiences of Aboriginal and Torres Strait Islander Peoples, who we continue to learn from and collaborate with. We also extend our respect to all First Nations Peoples, their cultures and to their Elders, past and present.



Artwork by Maurice Goolagong 2023. This piece was commissioned by Water Technology and visualises the important connections we have to water, and the cultural significance of journeys taken by traditional custodians of our land to meeting places, where communities connect with each other around waterways.

The symbolism in the artwork includes:

- Seven circles representing each of the States and Territories in Australia where we do our work
- Blue dots between each circle representing the waterways that connect us
- The animals that rely on healthy waterways for their home
- Black and white dots representing all the different communities that we visit in our work
- Hands that are for the people we help on our journey



4 June 2026

Edwin Irvine
Project Manager Waterways and Floodplain
West Wimmera Shire Council
628-634 Midland Highway, Huntly VIC 3551

Via email: EdwinIrvine@westwimmera.vic.gov.au

Dear Edwin,

Apsley Flood Investigation

Please see the attached Apsley Flood Investigation Flood Intelligence Report and Municipal Flood Emergency Plan (MFEP) Documentation. The flood intelligence information within this report is presented in a format consistent with the Victoria State Emergency Service MFEP template and the information in this report should be used to update the West Wimmera Shire Council MFEP. The information within this report should be used prior to and during future floods events to inform emergency response actions.

If you have any questions regarding this report, please do not hesitate to contact me.

Yours sincerely

Ben Hughes
Senior Principal Engineer
Ben.hughes@watertech.com.au
WATER TECHNOLOGY PTY LTD



CONTENTS

1	INTRODUCTION	6
1.1	Study Area	6
2	GENERAL CATCHMENT AND FLOOD INFORMATION	9
2.1	Rainfall and Streamflow Gauge Monitoring Network	9
2.2	Historic Floods	11
2.3	Description of Major Waterways and Overland Flow Paths	11
3	TYPICAL FLOOD PEAK TRAVEL TIMES	13
4	MUNICIPAL FLOOD EMERGENCY PLAN APPENDIX INSERT	14
4.1	Flood Warning	14
4.1.1	Flood/No Flood Tool	14
4.2	Overview of Flooding Consequences	16
4.2.1	Warning Time	16
4.2.2	Areas Affected	16
4.2.3	Roads Affected	16
4.2.4	Isolated Areas	19
4.2.5	Essential Infrastructure	19
4.2.6	Property Inundation	19
4.2.7	Flood Intelligence Card	29
5	FLOOD DAMAGE ASSESSMENT	43
6	SUMMARY	47

LIST OF FIGURES

Figure 1-1	Apsley with respect to western Victoria	7
Figure 1-2	Apsley Study Area	8
Figure 2-1	Rainfall Gauges Relevant to Apsley	10
Figure 4-1	Apsley Flood/No Flood Tool	15
Figure 4-2	Roads overtopping – Apsley Township	21
Figure 4-3	Roads overtopping – West Apsley	22
Figure 4-4	Impassable roads – Apsley Township	23
Figure 4-5	Impassable roads – West Apsley	24
Figure 4-6	Properties Inundated – Apsley Township	25
Figure 4-7	Properties Inundated – West Apsley	26
Figure 5-1	Flood Damage Assessment based on AEP Event	46

LIST OF TABLES

Table 2-1	Daily rainfall station information	9
Table 2-2	Apsley Rainfall Records	11
Table 3-1	Timing of Peak Flow	13
Table 4-1	Road Inundation Depth for Each AEP (m)	16



Table 4-2	Impassable Roads Inundation Depth for Each AEP (m)	18
Table 5-1	Properties Flooded	44
Table 5-2	Direct Cost	44
Table 5-3	Indirect Cost	44



1 INTRODUCTION

Water Technology was commissioned by West Wimmera Shire Council to undertake the Apsley Flood Investigation. Apsley is within the West Wimmera Shire Council municipality, located in Victoria's Wimmera region approximately 100 km southwest of Horsham. Apsley is also within the Wimmera Catchment Management Authority (CMA) management area and the Millicent Coast basin. Apsley is located 20 km west of Edenhope and has around 300 residents.

Apsley is known to be prone to flooding, with events recorded in 2011, 2016 and 2022. Apsley is impacted by local waterways and drainage lines flowing towards Newlands Lake west of the township.

There was no current flood study for Apsley prior to the Apsley Flood Investigation, and flood risk information prior to its completion was based on compartmental information from council, SES and the Wimmera Wetland Hydrology Investigation completed by Water Technology in 2019.

The study has produced reliable flood intelligence for use in emergency management situations and, assessed the current township flood impact/exposure in terms of annual average damages caused by flooding. It has also investigated structural and non-structural mitigation options for Apsley. It also produced planning scheme overlays for inclusion in the West Wimmera Shire Council planning scheme.

This report is one of a series documenting the outcomes of the Apsley Flood Investigation. Each reporting stage is shown below:

- R01 – Data Collation, Model Development and Calibration Report.
- R02B – Design Modelling Report.
- **R03B – Flood Intelligence Report & Municipal Flood Emergency Plan (MFEP) Documentation – This Report.**
- R04B – Final Summary Report.

Note: Version A indicates Edenhope and version B indicates Apsley.

1.1 Study Area

Apsley is located within western Victoria. Its location with respect to western Victoria is shown in Figure 1-1, with the study area shown in Figure 1-2.

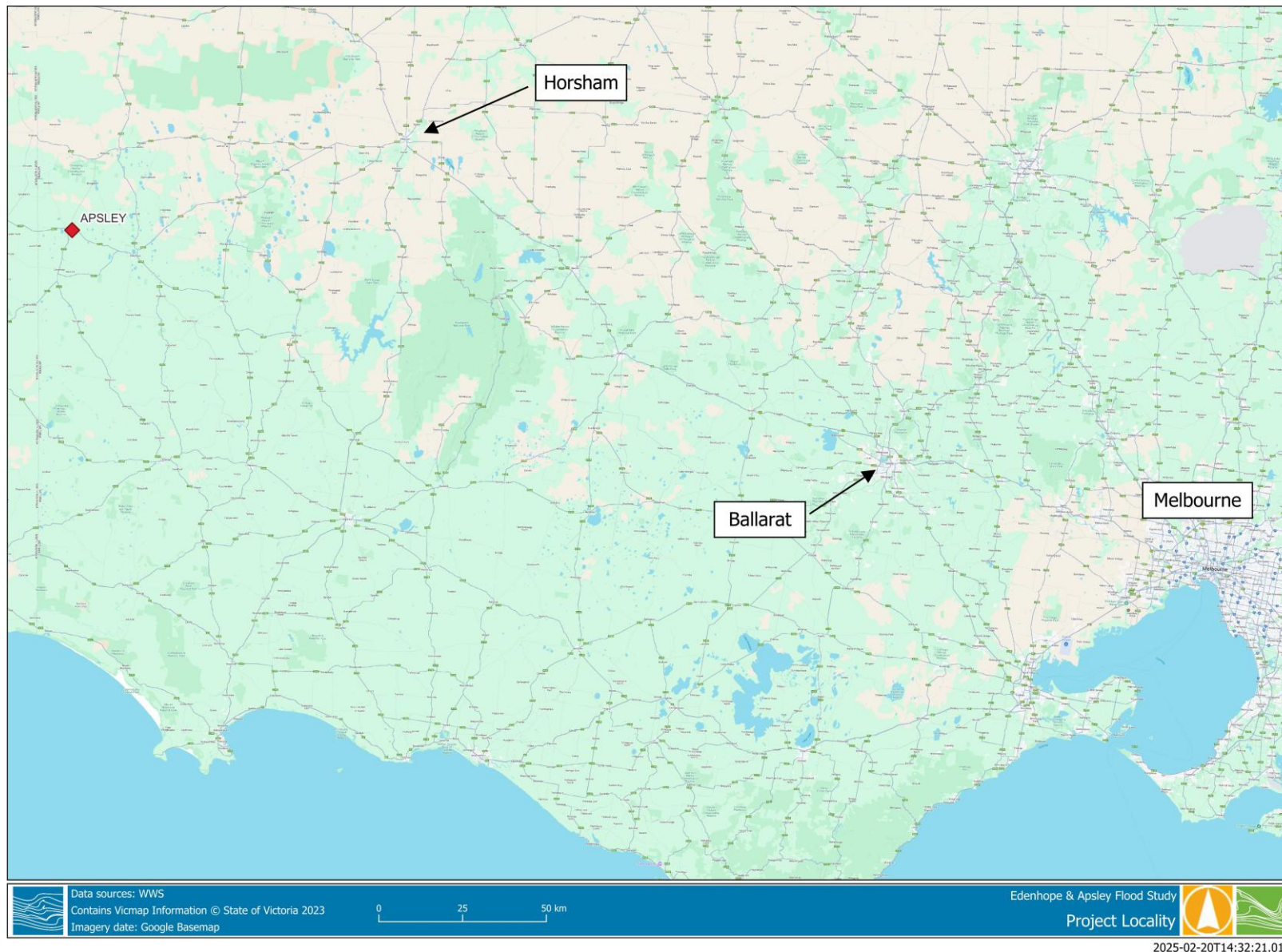


Figure 1-1 Apsley with respect to western Victoria

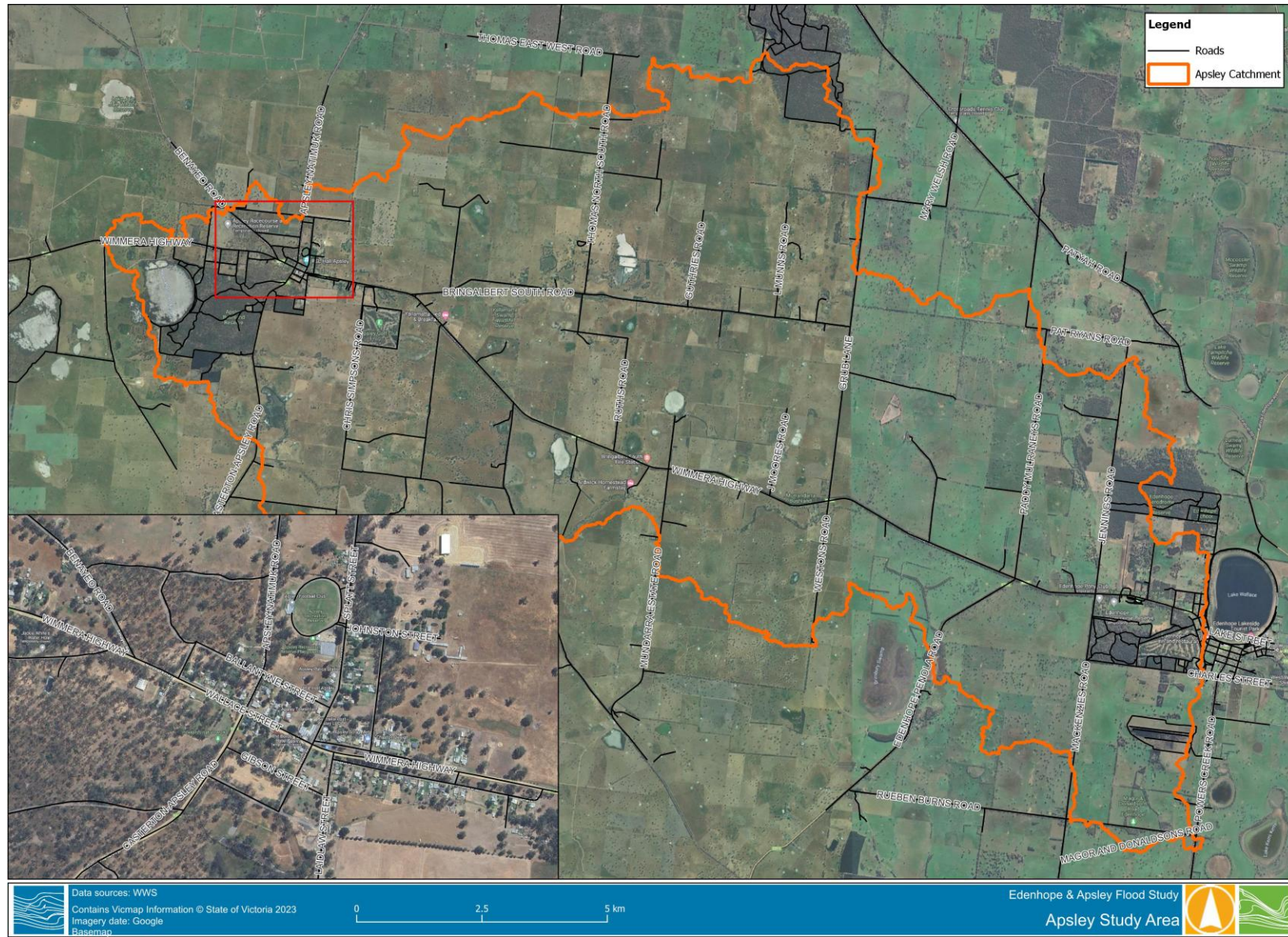


Figure 1-2 Apsley Study Area



2 GENERAL CATCHMENT AND FLOOD INFORMATION

2.1 Rainfall and Streamflow Gauge Monitoring Network

There are no streamflow gauges currently available within the study area or adjoining catchments. As such, in predicting the likely magnitude of flooding through the township, the real time rainfall gauge network and rainfall forecasts will be more useful than an upstream streamflow gauge. The nature of the flooding in Apsley is such that short duration storm events (e.g. 6-12 hrs) are the likely to cause flooding and are considered to be “flash flooding” type events. Therefore, the warning time is too short for monitoring of streamflow to be of any use as a means of issuing early flood warning.

Daily gauges used in this investigation are outlined in Table 2-1 and Figure 2-1, with only Edenhope Airport (**bolded**) recording sub-daily information. This means that the nearby Apsley gauges only record daily rainfall.

Table 2-1 Daily rainfall station information

Station Name & No.	Dist. From Apsley	Dist. From Edenhope	Start	End
Apsley Post Office, 079071	0.6 km	19.9 km	1953	Open
Apsley, 079001	3.4 km	17.3 km	1883	1947
Edenhope Airport, 079099	13.1 km	2.9 km	2005	Open
Edenhope Elizabeth Street, 079011	16.6 km	1.0 km	1890	Open
Benayeo, 079083	13.1 km	31.1 km	1972	Open
Patyah, 079107	22.9 km	25.3 km	1998	Open
Poolaijelo, 090164	23.5	24.8 km	1974	Open
Karnak (Rosedale), 079025	37.4	25.2 km	1890	2014
Harrow (Pine Hills), 079021	44.5	30.1 km	1884	2011

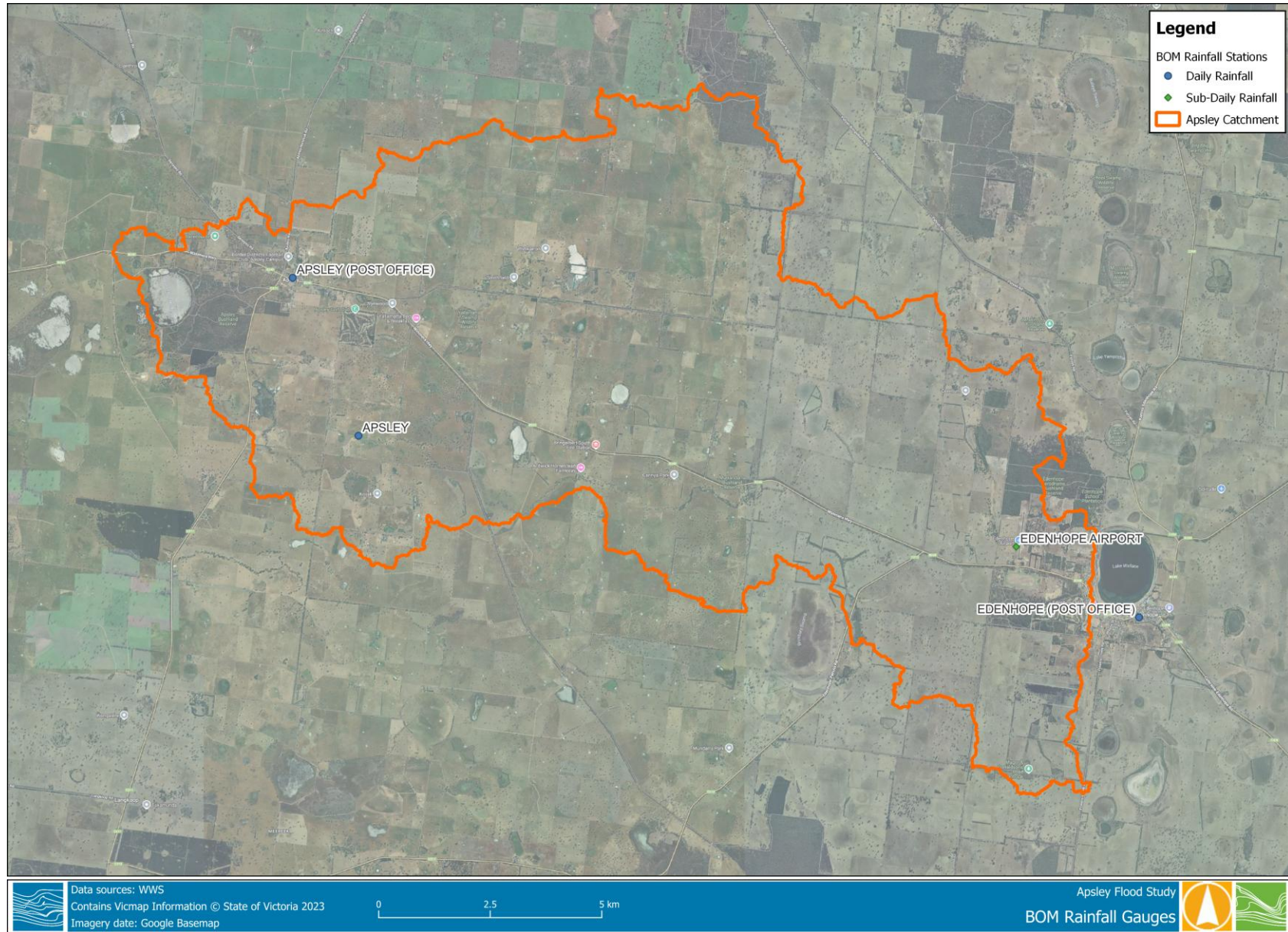


Figure 2-1 Rainfall Gauges Relevant to Apsley



2.2 Historic Floods

As mentioned in Section 2, there are no stream gauges located within the Apsley catchment, as such, historic flood events have been identified based upon local rainfall gauges and consultation with the community.

The community were able to provide outstanding historic flood information for Apsley, with the original school having to be moved, after it was impacted multiple times in the late 1800s. The local community explained that prolonged wet periods and rainfall events have a significant impact on the township.

The following recent flood events have also impacted the township of Apsley:

- September 2016.
- January 2011 – understood to be the largest flood in recent times.

Rainfall records for Apsley are provided in Table 2-2. This demonstrates that the January 2011 event was the largest event on record within Apsley, significant rainfall also fell in November 1970. However, it is noted that the impact of the 1970 event is unknown.

Table 2-2 Apsley Rainfall Records

Event Rank	Date of Rainfall	Gauge	Total (mm)
1	14/01/2011	Apsley Post Office, 079071	115
2	16/11/1970	Apsley Post Office, 079071	96.8
3	8/12/1986	Apsley Post Office, 079071	78
4	16/12/1930	Apsley, 079001	76.7
5	20/03/1941	Apsley, 079001	76.7
6	6/06/1988	Apsley Post Office, 079071	64.4
7	22/01/2007	Apsley Post Office, 079071	62
8	5/04/1907	Apsley, 079001	59.4
9	8/06/1889	Apsley, 079001	56.9
10	20/07/1906	Apsley, 079001	56.6
11	14/12/2008	Apsley Post Office, 079071	55.5
12	15/10/1889	Apsley, 079001	54.6
13	22/04/1896	Apsley, 079001	53.8
14	1/04/1789	Apsley, 079001	53.3
15	26/04/1971	Apsley Post Office, 079071	51.6

2.3 Description of Major Waterways and Overland Flow Paths

As detailed in Section 1.1 **Error! Reference source not found.**, Apsley is impacted by local waterways and drainage lines flowing towards Newlands Lake west of the township.

These overland flows originate in the western region of the catchment, traversing along local waterways and drainage lines and ultimately discharge into Newlands Lake, west of the Apsley township. The swamps, wetlands and lakes all provide significant catchment storage. These wetlands are part of the South West Wimmera Wetland System. The South West Wimmera Wetland System and adjacent Natimuk-Douglas Saline Wetland System and contains seventy-five percent of the Wimmera region's wetlands, comprising more than



2,000 individual wetlands. Many of these depressions are ephemeral, only experiencing pooling water in periods of prolonged rainfall. The complex connectivity and water levels within them at the beginning of a storm event influences flood behaviour within the township.



3 TYPICAL FLOOD PEAK TRAVEL TIMES

Definitive information on the time it takes flash flooding (i.e. resulting from heavy rainfall associated with severe weather or thunderstorm activity) to develop (i.e. to arrive at a location) following the start of heavy rain and the time it takes for the maximum water depth/extent to be reached is not available. **Timing is however likely to be short: approximately 120 minutes.**

The time it takes rainfall associated with severe weather or thunderstorm activity to develop into runoff and streamflow is highly dependent on catchment antecedent conditions (dryness). The lack of geographical spread of pluviographs within the catchment increase the difficulty in estimating rainfall-runoff response times. However, the sub-daily rainfall stations located close to the catchment as shown in Figure 2-1 should be monitored as an indicator to direct flood response activities.

The speed a flood travels along a waterway is largely dependent on antecedent conditions and the magnitude of the flood. A flood on a 'dry' watercourse will generally travel more slowly than a flood on a 'wet' watercourse (e.g. the first flood after a dry period will travel more slowly than the second flood in a series of floods).

In large floods, often water levels will rise reasonably quickly initially as it travels through the channel, with the peak coming later as the floodplain flow travels through the catchment a little slower. Hence a range of factors including recent flood history, soil moisture and forecast weather conditions all need to be considered when using the following information to direct flood response activities.

The reality that a community at risk can be inundated before the peak of the flood should not be overlooked. In the past, efforts have concentrated on estimating and forecasting the time of the peak, however this can sometimes be detrimental. Messaging should focus on the expected extent and timing of inundation with respect to upstream areas and the broader floodplain, warning can focus on rainfall monitoring and forecasting ensuring predicting the likelihood of a flood.

Table 3-1 shows the typical travel time along two contributing overland flow paths to the Apsley township (from the north and east) for the 1% AEP storm event. The rainfall temporal pattern and the storm duration or the combination of both can be the cause of varying flooding depths and timing at the Apsley township driven by overland flows.

Table 3-1 Timing of Peak Flow

From	To	Typical travel time	Comments	Duration of inundation
Northern Overland Flow Path				
Start of rainfall (catchment)	Start of overland flow towards Apsley	2 – 3 hours	Timing depends on rainfall pattern	Generally <40 hours
Eastern Overland Flow Path				
Start of rainfall (catchment)	Start of overland flow towards Apsley	2 – 4 hours	Timing depends on rainfall pattern	Generally <30 hours



4 MUNICIPAL FLOOD EMERGENCY PLAN

4.1 Flood Warning

A total flood warning system concept includes many elements, including: flood prediction; interpretation of the flood impact; messaging and communication of the flood risk; generating a timely response from the community and timely reviews of the system.

Inundation of dwellings and infrastructure in the Apsley township is mainly driven by overland flow; hence the major flood risk is considered to be flash flooding. There are no streamflow gauges in the catchment, which means the flood prediction element of the total flood warning system relies on rainfall forecasts and rainfall observations.

The Bureau of Meteorology (BoM) will provide Severe Weather Warnings and Flood Watches, forecasting likely conditions. Rainfall gauges available in the Apsley area are shown in Figure 2-1. Rainfall gauges are available in daily or hourly and sub hourly intervals within proximity of the township (Edenhope Airport only, approximately 13.1 km from Apsley).

The forecast rainfall made available via the BoM, and the above mentioned sub-daily rainfall gauges along with gridded radar rainfall could be used in combination with an early flood prediction tool to predict possible flash flooding.

4.1.1 Flood/No Flood Tool

The Intensity Frequency Duration (IFD) design rainfall data used in the development of the Apsley Flood Study can be utilised along with forecast and observed rainfall data as an early warning tool. The data can be used to identify the likely magnitude of flooding and resulting consequences based on the predicted rainfall depths of an event.

To use the table, plot the total rainfall depth obtained against elapsed time since the start of the event. Exclude very light rain or drizzle when determining the event start point. Plotting of rainfall data should occur periodically as the event progresses. The likelihood and potential severity of flooding can be estimated by checking the rainfall and adopting the nearest curve AEP event as being likely. The table displays intensity-frequency-duration data developed using statistical analysis of a large number of sub daily rainfall gauges, the closest to Apsley being Edenhope Airport (079099). The Flood/No Flood tool can be used in combination with these gauges and/or rainfall observed within the Edenhope catchment.

It may be appropriate to step up or down a level depending on catchment antecedent conditions, for example if the rainfall for a 12-hour duration indicates a 5% AEP event will occur, but the catchment is dry with most farm dams empty, it may be appropriate to “step down” to a 10% AEP event or even lower. Similarly, a very wet catchment will produce a greater response and may justify a “step up” in estimated AEP for response purposes.

The tool can provide a quick reference estimate as to whether there will be a flood and how severe that flood may be, however it must be stressed that the tool cannot provide accurate flood predictions and should not be relied upon entirely. Should life or property be in danger a cautious approach should be taken.

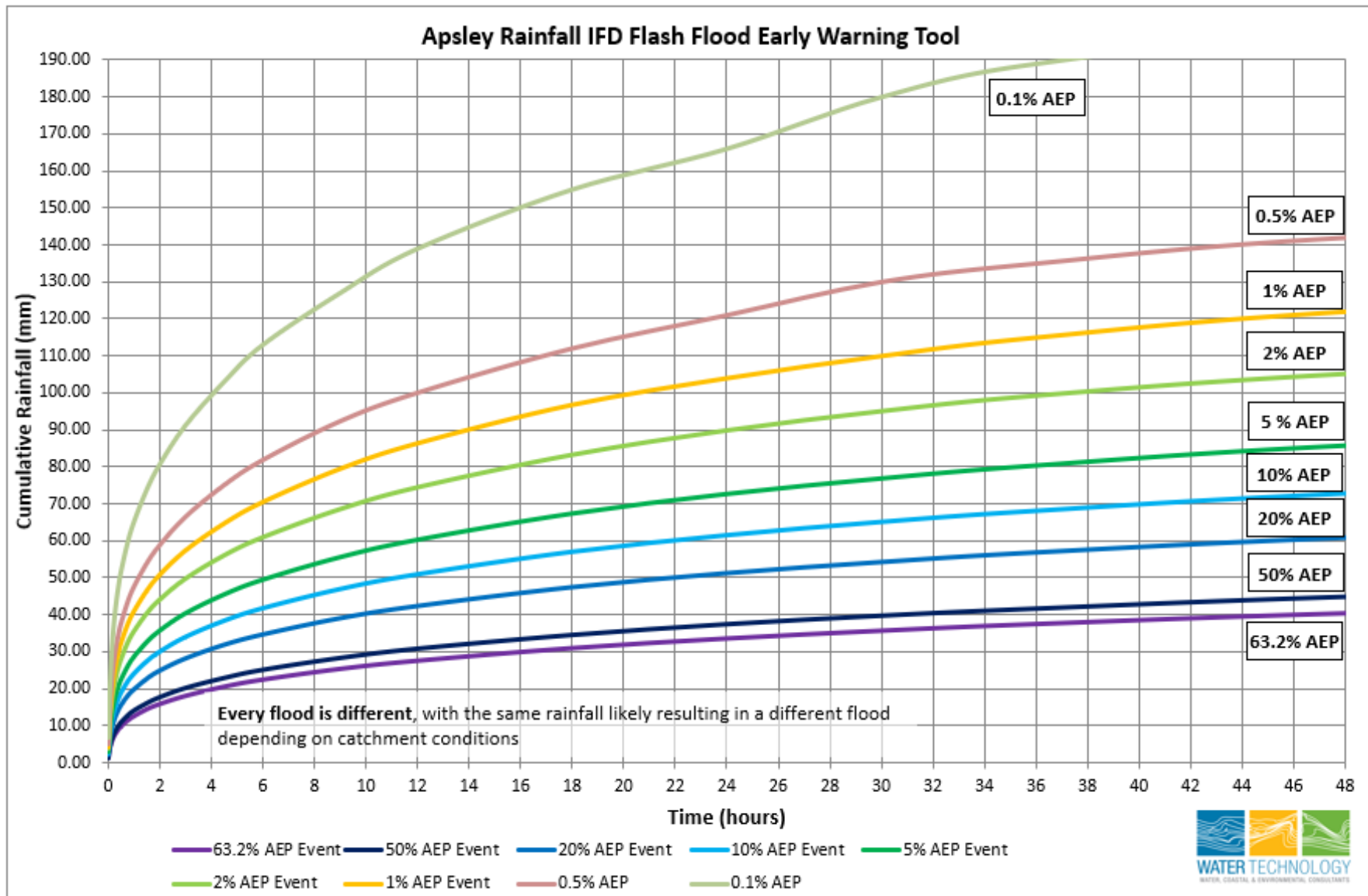


Figure 4-1 Apsley Flood/No Flood Tool



4.2 Overview of Flooding Consequences

4.2.1 Warning Time

Inundation in the Apsley township impacting properties and infrastructure is caused by overland flow from the eastern region of the catchment. Due to the nature of the critical storm within that catchment, the warning time of the flash flooding at Apsley is limited to less than an hour.

4.2.2 Areas Affected

The flood extent map at Apsley and the section of this appendix “Flood Impacts and Required Actions”, provide guidance on where flooding is likely to occur within the township of Apsley.

4.2.3 Roads Affected

The main access roads to and from the township of Apsley include the Wimmera Highway, Apsley-Langkoop Road, Apsley-Natimuk Road, Benayeo Road and Bringalbert South Road.

Table 4-1 outlines the roads which are inundated by flooding in events ranging from the 20% AEP up to the 0.1% AEP event, with the location of these roads shown in Figure 4-2 and Figure 4-3.

Table 4-2 outlines the impassable roads where maximum depths exceed 0.3 m and become unsafe for vehicles. These impassable roads are shown separately in Figure 4-4 and Figure 4-5 with the comparison to the 1% AEP flood extent.

Table 4-1 Road Inundation Depth for Each AEP (m)

Roads inundated	Design Flood Depths (m)					
	20% AEP	10% AEP	5% AEP	2% AEP	1% AEP	0.5% AEP
APSLEY-NATIMUK ROAD	0.00	0.17	0.22	1.12	1.47	1.50
BALLANTYNE STREET	0.18	0.23	0.26	0.29	0.43	0.47
BENAYEO ROAD	0.00	0.00	0.19	0.22	0.27	0.53
BRINGALBERT SOUTH ROAD	0.00	0.00	0.26	0.30	0.43	0.51
CASTERTON-APSLEY ROAD	0.24	0.38	0.67	0.86	1.05	1.12
CHARLES STREET	0.00	0.00	0.14	0.17	0.19	0.23
CHRIS SIMPSONS ROAD	0.12	0.48	0.80	1.12	1.38	1.55
CLOSES ROAD	0.00	0.00	0.00	0.00	0.00	0.08
CORMACKS ROAD	0.07	0.08	0.42	0.49	0.58	0.63
DIXON STREET	0.00	0.00	0.00	0.17	0.23	0.26
EDENHOPE-PENOLA ROAD	0.23	0.29	0.41	0.52	0.62	0.67
ELIZABETH STREET	0.17	0.23	0.25	0.26	0.27	0.27
GEORGE STREET	0.32	0.50	0.52	0.53	0.62	0.66
GIBSON STREET	0.66	0.72	0.86	1.07	1.32	1.39



	Design Flood Depths (m)					
GLENELG AVENUE	0.16	0.18	0.16	0.22	0.28	0.33
GRIFFINS ROAD	0.00	0.00	0.00	0.00	0.07	0.09
GRUB LANE	0.00	0.00	0.14	0.15	0.17	0.19
J MOORES ROAD	0.16	0.16	0.15	0.16	0.22	0.25
JENNINGS ROAD	0.00	0.00	0.19	0.21	0.21	0.22
JOHNSTON STREET	0.00	0.38	0.86	0.99	1.07	1.10
KADNOOK STREET	0.13	0.18	0.21	0.26	0.32	0.38
KOIJAK ROAD	0.00	0.00	0.31	0.47	0.63	0.70
L MUNNS ROAD	0.00	0.00	0.07	0.10	0.22	0.26
LAIDLAW AVENUE	0.12	0.14	0.16	0.17	0.18	0.19
LAIDLAW STREET	0.00	0.14	0.16	0.19	0.20	0.23
MACKENZIES ROAD	0.00	0.00	0.21	0.29	0.36	0.42
MAGOR AND DONALDSONS ROAD	0.00	0.00	0.28	0.34	0.41	0.43
MARY WELSH ROAD	0.00	0.00	0.00	0.00	0.00	0.06
MOSS STREET	0.00	0.00	0.16	0.18	0.20	0.22
MUNDARRA ESTATE ROAD	0.07	0.36	0.70	0.97	1.35	1.56
NEWLANDS LAKE ROAD	0.00	0.00	0.00	0.08	0.08	0.10
PADDY MULRANEYS ROAD	0.00	0.00	0.22	0.26	0.38	0.47
PAHL STREET	0.00	0.00	0.11	0.13	0.17	0.20
PAT RYANS ROAD	0.00	0.00	0.25	0.32	0.47	0.55
POWERS CREEK ROAD	0.00	0.00	0.24	0.26	0.27	0.29
RACECOURSE ROAD	0.00	0.00	0.22	0.27	0.32	0.34
RUTHS ROAD	0.00	0.00	0.10	0.14	0.17	0.19
SIMPSONS AND FOSTERS ROAD	0.00	0.00	0.23	0.29	0.40	0.46
SPLATT STREET	0.12	0.14	0.17	0.19	0.37	0.43
SYDNEY ROAD	0.00	0.00	0.00	0.00	0.08	0.08
T CRANAGE ROAD	0.00	0.00	0.13	0.18	0.26	0.30
THOMAS NORTH SOUTH ROAD	0.00	0.00	0.19	0.22	0.30	0.34
TOWNSEND STREET	0.00	0.00	0.00	0.00	0.30	0.34
WALLACE STREET	0.00	0.00	0.18	0.19	0.27	0.30
WANNON AVENUE	0.23	0.24	0.24	0.25	0.25	0.26
WESTONS ROAD	0.00	0.00	0.31	0.38	0.52	0.61



	Design Flood Depths (m)					
WIMMERA HIGHWAY	0.20	0.33	0.41	0.48	0.66	0.76
YALLAKAR STREET	0.00	0.00	0.08	0.09	0.09	0.12

Table 4-2 Impassable Roads Inundation Depth for Each AEP (m)

	Design Flood Depths (m)					
Roads inundated	20% AEP	10% AEP	5% AEP	2% AEP	1% AEP	0.5% AEP
APSLEY-NATIMUK ROAD				1.12	1.47	1.50
BALLANTYNE STREET					0.43	0.47
BENAYEO ROAD						0.53
BRINGALBERT SOUTH ROAD					0.43	0.51
CASTERTON-APSLEY ROAD		0.38	0.67	0.86	1.05	1.12
CHRIS SIMPSONS ROAD		0.48	0.80	1.12	1.38	1.55
CORMACKS ROAD			0.42	0.49	0.58	0.63
EDENHOPE-PENOLA ROAD			0.41	0.52	0.62	0.67
GEORGE STREET	0.32	0.50	0.52	0.53	0.62	0.66
GIBSON STREET	0.66	0.72	0.86	1.07	1.32	1.39
GLENELG AVENUE						0.33
JOHNSTON STREET		0.38	0.86	0.99	1.07	1.10
KADNOOK STREET					0.32	0.38
KOIJAK ROAD			0.31	0.47	0.63	0.70
MACKENZIES ROAD					0.36	0.42
MAGOR AND DONALDSONS ROAD				0.34	0.41	0.43
MUNDARRA ESTATE ROAD		0.36	0.70	0.97	1.35	1.56
PADDY MULRANEYS ROAD					0.38	0.47
PAT RYANS ROAD				0.32	0.47	0.55
RACECOURSE ROAD					0.32	0.34
SIMPSONS AND FOSTERS ROAD					0.40	0.46
SPLATT STREET					0.37	0.43
THOMAS NORTH SOUTH ROAD						0.34
TOWNSEND STREET						0.34



	Design Flood Depths (m)					
WESTONS ROAD			0.31	0.38	0.52	0.61
WIMMERA HIGHWAY		0.33	0.41	0.48	0.66	0.76

4.2.4 Isolated Areas

Flooding across the Apsley township in all AEP events modelled (0.5% AEP down to the 20% AEP) is relatively shallow and/or slow moving (with the exception of local waterways and drainage lines). Therefore, the risk of isolation due to extended periods of road inundation at properties is relatively minimal.

Ingress/egress to and from these properties is possible along the main access roads as shown in the modelling completed in this assessment.

4.2.5 Essential Infrastructure

Apsley Primary School is the only essential infrastructure in Apsley, the primary school grounds are inundated in all AEP events (0.5% AEP down to the 20% AEP); however, the buildings are on high ground and do not become inundated.

4.2.6 Property Inundation

Property inundation has been assessed based on the maximum flooding across the entire property parcel for each AEP event. Properties that did not contain residences or building structures are not reported on in this assessment. Building floor levels with respect to flooding depths have not been considered in this assessment due to the nature of flooding all being below finished floor level as confirmed by survey of the Apsley township **This is because only one flood level was surveyed at one dwelling, the main building floor level. There are several cases where there is a split floor level, and the lower floor level will become inundated.**

Buildings with inundation at their location for the 5% AEP, 2% AEP, 1% AEP and 0.5% AEP events are shown in Figure 4-6, Figure 4-7, Figure 4-8 and Figure 4-9.

Table 4-3 outlines the properties which have been recorded as inundated below floor level, with the elevation distance to above floor flooding included in the table.

Table 4-3 Buildings flooded below flood and depth to above floor flooding (metres)

Properties inundated	Design Flood Depth (m)					
			5% AEP	2% AEP	1% AEP	0.5% AEP
56 WALLACE STREET APSLEY 3319			-0.20	-0.20	-0.19	-0.19
37 SPLATT STREET APSLEY 3319						-0.02
7 WALLACE STREET APSLEY 3319				-0.44	-0.42	-0.31
11 WALLACE STREET APSLEY 3319				-0.24	-0.22	-0.11
21 WALLACE STREET APSLEY 3319				-0.29	-0.27	-0.16
3 LAIDLAW STREET APSLEY 3319			-0.55	-0.54	-0.54	-0.53
7 LAIDLAW STREET APSLEY 3319						-0.31
1 PERCY CLARK STREET APSLEY 3319			-0.36	-0.34	-0.35	-0.26



Properties inundated	Design Flood Depth (m)					
			5% AEP	2% AEP	1% AEP	0.5% AEP
22-24 SPLATT STREET APSLEY 3319			-0.77	-0.66	-0.62	-0.57
22-24 SPLATT STREET APSLEY 3319				-0.36	-0.33	-0.27
32 SPLATT STREET APSLEY 3319						-0.24
88 WALLACE STREET APSLEY 3319						-0.17
80 WALLACE STREET APSLEY 3319						-0.33
58 WALLACE STREET APSLEY 3319			-0.21	-0.20	-0.20	-0.20
76 WALLACE STREET APSLEY 3319			-0.50	-0.50	-0.47	-0.38
72 WALLACE STREET APSLEY 3319					0.30	-0.27
23 WALLACE STREET APSLEY 3319						-0.30

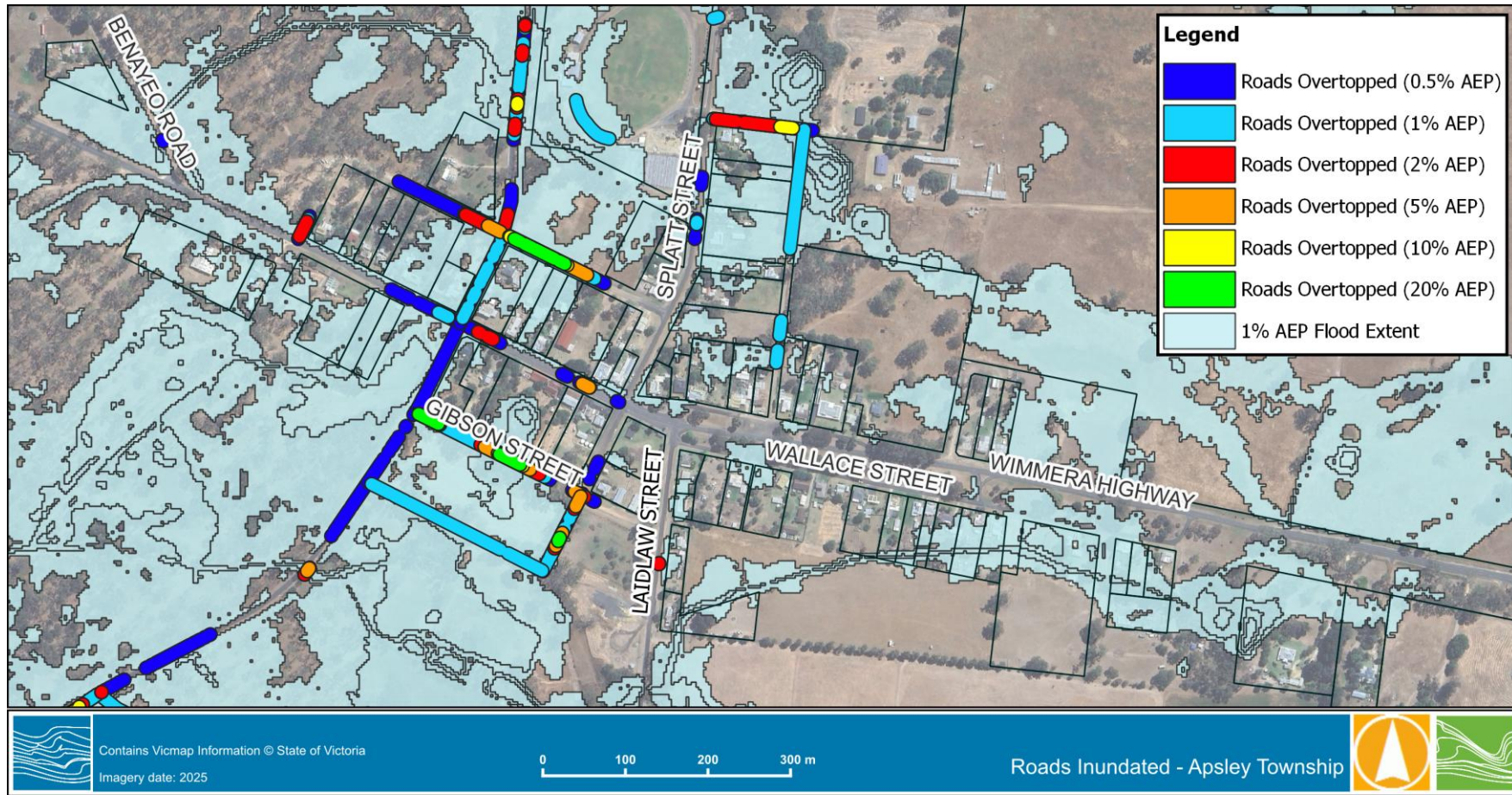


Figure 4-2 Roads overtopping – Apsley Township

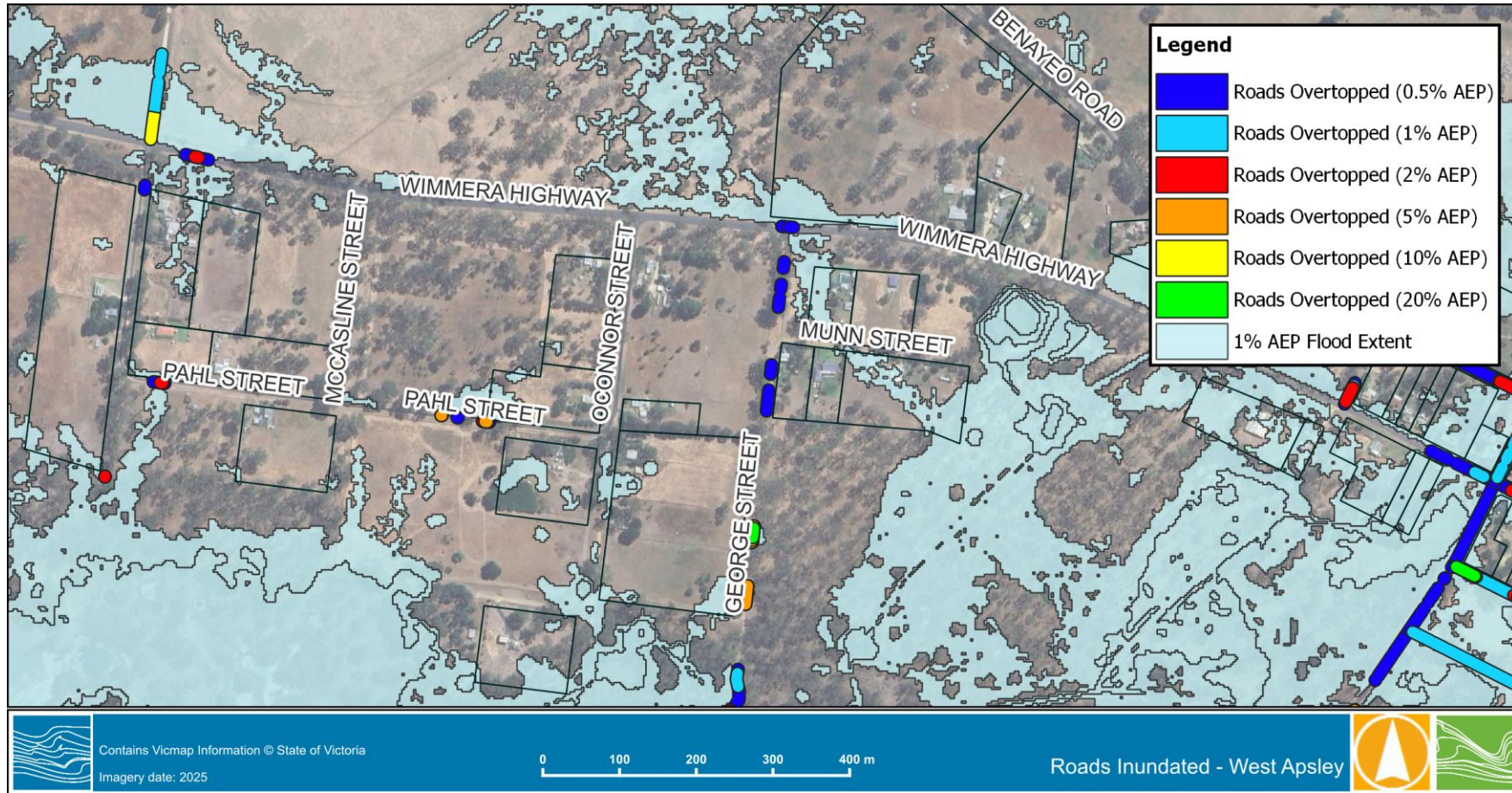


Figure 4-3 Roads overtopping – West Apsley

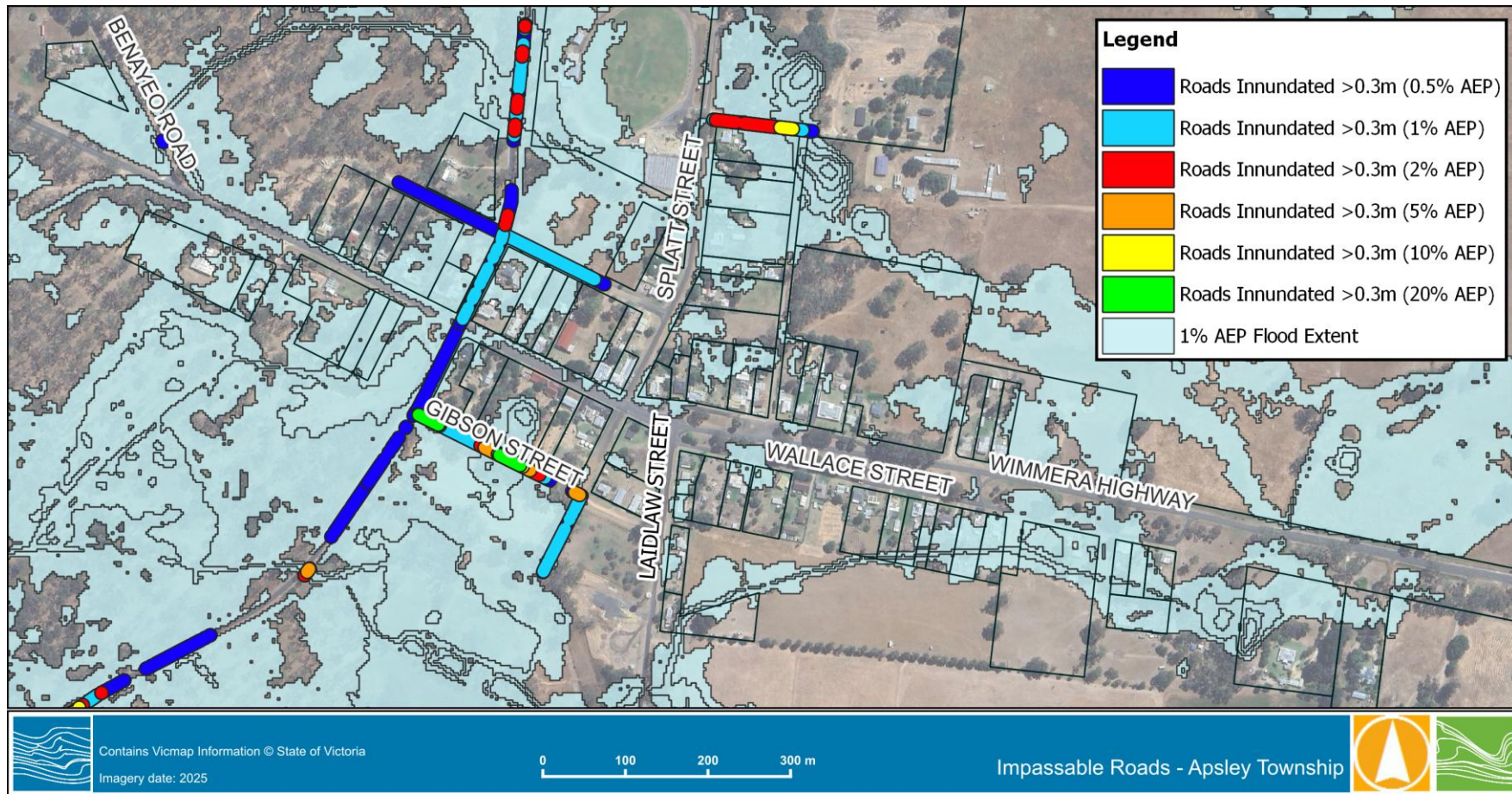


Figure 4-4 Impassable roads – Apsley Township

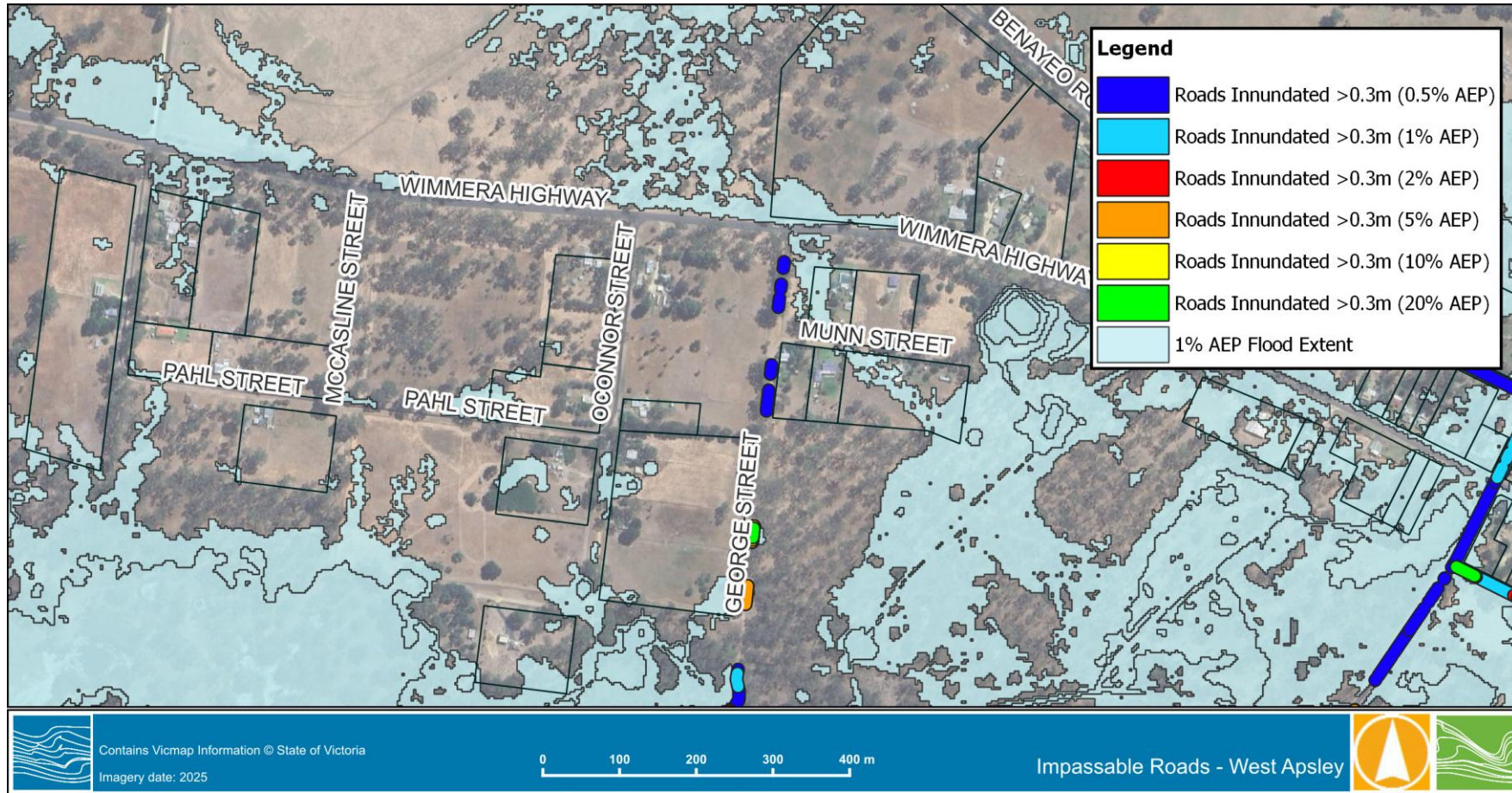


Figure 4-5 Impassable roads – West Apsley



Figure 4-6 5% AEP - buildings inundated below floor



Figure 4-7 2% AEP - buildings inundated below floor



Figure 4-8 1% AEP - buildings inundated below floor



Figure 4-9 0.5% AEP - buildings inundated below floor



4.2.7 Flood Intelligence Card

The flood mapping was produced to identify the consequences of flooding for various design flood events. Combined with the flash flood forecasting procedure describes in Section 4.1 the flood consequence table allows emergency services and council to quickly understand the likely impacts of flooding and plan accordingly. The flood intelligence card describes the key flooding consequences across the study area for each design event.

The table was developed to be read from top to bottom, with each subsequent larger magnitude event reporting on the incremental changes in consequences. For example, if the reader wants to understand the consequences of a 1% AEP event, then the flood characteristics should be read for the 50%, 20%, 10%, 5% and 1% AEP events in succession (as a combined list of likely impacts). It is also recommended that the reader refer to the standard PDF maps provided with this study. There is a separate map for each modelled design event, providing peak flood depths, extents and water surface elevations for each flood event.

While flood intelligence cards provide guidance on the relationship between flood magnitude and flood consequences, flood intelligence records are approximations. This is because no two floods at a location, even if they peak at the same height, will have identical impacts. Further, the hydrologic and hydraulic modelling that underpins much of the intelligence detailed below is informed by several assumptions and approximations that are unlikely to be replicated exactly during a flood event. Actual impacts under similar rainfall conditions are therefore expected to be similar but may not be exactly the same: there are likely to be some differences. More details about flood intelligence and its use can be found in the Australian Emergency Management Manuals flood series at <https://knowledge.aidr.org.au/resources/manual-series/> and in particular in Manual 21 “Flood Warning”.

As a result of the nature of flash flooding at Apsley, residents will have very limited time to respond after the start of rain. It is recommended that each commercial property that is prone to flooding should have sandbags prepared to act immediately after the flood warning or severe weather warning is issued. Residents are likely to want access to sandbags as soon as possible after it becomes apparent that flooding is likely. Residents using sandbags need to be aware of the correct way to lay sandbags and also be aware that due to the length of inundation some water will pass through the bags. Flood Response Plans should be prepared for properties at risk of inundation to inform the community on appropriate actions before, during and after the flood.

A guidance on sandbagging published by VICSES is available in the SES sandbagging guide here detailed in Appendix A.



Observed Rainfall (see graph)	AEP of flood / year of peak	Consequence / Impact	Action Actions may include (but not limited to) evacuation, closure of roads, sandbagging, issue of warnings and who is responsible
It is important that the decision to mobilise to remove furniture etc from buildings is made early and that, in general, sandbagging is reserved for non-weatherboard buildings.			
USING THIS INTELLIGENCE CARD. Obtain rainfall data and use the flood guidance tool to determine the approximate flood severity. Consider the appropriate flood inundation tables and map. Review all consequences and actions in this table, from the first row down to the approximate expected severity of flooding. Initiate all actions in a logical sequence. Note that that some actions may need to be initiated in an order that is different from their relative placement in this table.			
If response has been initiated locally, the first action should be a call to VICSES, followed by a call to the MERO at the West Wimmera Shire Council. Note time available – see below.			
~35 mm of rainfall in 6 hours ~42 mm of rainfall in 12 hours ~51 mm of rainfall in 24 hours	20% AEP (5-year ARI)	Overland flow path from the northern catchment non-existent. Overland flow path from the eastern catchment does not reach the Apsley township. Relatively minor ponding across the Apsley township. Impassable roads (depth above 0.3m) Gibson Street (between its intersection with Casterton-Apsley Road and Splatt Street)	- Continue to monitor rainfall and water levels. - If further inundation likely, implement evacuation plan and / or removal of furniture etc from buildings likely to be flooded over-floor in the 10% AEP event and / or sandbagging buildings. “Water over road” signs should be in place on Ballantyne Road, east of Townsend Street. - Close Gibson Street between Casterton-Apsley Road and Splatt Street.
~42 mm of rainfall in 6 hours ~51 mm of rainfall in 12 hours ~62 mm of rainfall in 24 hours	10% AEP (10-year ARI)	Overland flow path from the northern catchment is relatively insignificant and largely contained within waterway, however, experiencing breakout flows at Benayeo Road. Overland flow path from the eastern catchment largely contained within waterway. The drainage reserve through/at the rear of the properties located along Wallace Street now fully utilised, conveying flows from the eastern catchment. Intensification of ponding in the Apsley township. Additional, impassable roads (depth above 0.3m) - Casterton-Apsley Road (west of Apsley Primary School) - Johnston Street (east of Splatt Street)	- Continue to monitor rainfall and water levels. - Check inundation tables and implement associated actions. “Water over road” signs should be in place on Racecourse Road, north of its intersection with the Wimmera Highway. “Water over road” signs should be in place on Casterton-Apsley Road, south of the Apsley township. - Close Johnston Street east of Splatt Street.
~50 mm of rainfall in 6 hours ~60 mm of rainfall in 12 hours ~73 mm of rainfall in 24 hours	5% AEP (20-year ARI)	Overland flow path from the northern catchment largely contained within waterway, however, experiencing breakout flows at Apsley-Natimuk Road and Benayeo Road. Overland flow path from the eastern catchment largely contained within waterway, however, experiencing breakout flows along Wimmera Highway, Laidlaw Street and Casterton-Apsley Road.	- Continue to monitor rainfall and water levels. - Consider evacuation of vulnerable properties along Wimmera Highway. - Consider evacuation of vulnerable properties along Wallace Street. - Consider evacuation of vulnerable properties along Benayeo Road.



		Intensification of ponding in the Apsley township. Additional, impassable roads (depth above 0.3m) • Casterton-Apsley Road (above the eastern waterway) • George Street (north of the eastern waterway)	• “Water over road” signs should be in place on Casterton-Apsley Road, as required, south of Wimmera Highway. • “Water over road” signs should be in place on Racecourse Road between its intersection with Benayeo Road and Apsley-Natimuk Road. • “Water over road” signs should be in place on Johnson Street, immediately east of Splatt Street. • “Water over road” signs should be in place on George Street, south of Munn Street. • Close Gibson Street between Laidlaw Street and Townsend Street. • Warn residents at the below addresses of potential inundation • 22-24 SPLATT STREET APSLEY 3319 • 3 LAIDLAW STREET APSLEY 3319 • 76 WALLACE STREET APSLEY 3319 • 1 PERCY CLARK STREET APSLEY 3319 • 58 WALLACE STREET APSLEY 3319 • 56 WALLACE STREET APSLEY 3319
~61 mm of rainfall in 6 hours ~74 mm of rainfall in 12 hours ~90 mm of rainfall in 24 hours	2% AEP (50-year ARI)	Overland flow path from the northern catchment largely contained within waterway, however, experiencing breakout flows at Apsley-Natimuk Road and Benayeo Road. Overland flow path from the eastern catchment largely contained within waterway, however, experiencing breakout flows along Wimmera Highway, Laidlaw Street and Casterton-Apsley Road. Slight intensification of ponding in the Apsley township and an increase in breakout flows from both waterways. Additional, impassable roads (depth above 0.3m) • Apsley-Natimuk Road • George Street (above the eastern waterway)	• Continue to monitor rainfall and water levels. • Consider evacuation of vulnerable properties along Wimmera Highway. • Consider evacuation of vulnerable properties along Splatt Street. • “Water over road” signs should be in place on George Street near the eastern catchment overland flow path. • “Water over road” signs should be in place on Apsley-Natimuk Road near Apsley Recreation Reserve. • “Water over road” signs should be in place on Apsley-Natimuk Road near its intersection with Ballantyne Street.



			• Close Johnson Street, immediately east of Splatt Street. • Close George Street within proximity of the eastern waterway. • Warn residents at the below addresses of potential inundation • 22-24 SPLATT STREET APSLEY 3319 • 3 LAIDLAW STREET APSLEY 3319 • 76 WALLACE STREET APSLEY 3319 • 58 WALLACE STREET APSLEY 3319 • 56 WALLACE STREET APSLEY 3319
~71 mm of rainfall in 6 hours ~86 mm of rainfall in 12 hours ~104 mm of rainfall in 24 hours	1% AEP (100-year ARI)	Overland flow path from the northern catchment largely contained within waterway, however, experiencing breakout flows at Apsley-Natimuk Road and Benayeo Road. Overland flow path from the eastern catchment largely contained within waterway, however, experiencing breakout flows along Wimmera Highway, Laidlaw Street and Casterton-Apsley Road. Slight increase in breakout flows from both waterways. Significant increase in ponding south-west of the Apsley township. Additional, impassable roads (depth above 0.3m) • Ballantyne Street • Racecourse Road	• Continue to monitor rainfall and water levels. • Consider evacuation of vulnerable properties along Wimmera Highway. • Consider evacuation of vulnerable properties along Munn Street. • "Water over road" signs should be in place on Wimmera Highway near its intersection with Townsend Street. • Water over road" signs should be in place on Pahl Street near its intersection with Newlands Lake Road. • Close Ballantyne Street between its intersection with Dixon Street and Splatt Street. • Close Racecourse Road between its intersection with Benayeo Road and Apsley-Natimuk Road. • Warn residents at the below addresses of potential inundation: • 72 WALLACE STREET APSLEY 3319



~82 mm of rainfall in 6 hours ~100 mm of rainfall in 12 hours ~121 mm of rainfall in 24 hours	0.5% AEP (200-year ARI)	Overland flow path from the northern catchment largely contained within waterway, however, experiencing breakout flows at Apsley-Natimuk Road and Benayeo Road. Overland flow path from the eastern catchment largely contained within waterway, however, experiencing breakout flows along Wimmera Highway, Laidlaw Street and Casterton-Apsley Road. Increase in breakout flows from both waterways. Significant increase in ponding across the entire Apsley township. Additional, impassable roads (depth above 0.3m) • Benayeo Road • George Street (between Wimmera Highway and Munn Street) • Splatt Street • Townsend Street	• Continue to monitor rainfall and water levels. • Consider evacuation of vulnerable properties along Munn Street. • Consider evacuation of vulnerable properties along Newlands Lake Road. • Consider evacuation of vulnerable properties along Apsley-Natimuk Road. • “Water over road” signs should be in place on Splatt Street near Apsley Recreation Reserve. • “Water over road” signs should be in place on Wimmera Highway near Newlands Lake Road. • “Water over road” signs should be in place on Benayeo Road, immediately north of Wimmera Highway. • Close George Street between Wimmera Highway and Munn Street. • Close Casterton-Apsley Road near the eastern catchment overland flow path. • Close Apsley-Natimuk Road near the northern catchment overland flow path. • Close Townsend Street between its intersection with Ballantyne Street and immediately south of its intersection with Gibson Street. • Close Splatt Street south of Gibson Street. • Warn residents at the below addresses of potential inundation: • 37 SPLATT STREET APSLEY 3319 • 7 LAIDLAW STREET APSLEY 3319 • 32 SPLATT STREET APSLEY 3319 • 88 WALLACE STREET APSLEY 3319 • 80 WALLACE STREET APSLEY 3319 • 72 WALLACE STREET APSLEY 3319 • 23 WALLACE STREET APSLEY 3319
--	------------------------------------	---	---



Notes:											
Historical events should be linked to observed rainfall where possible.											
This card to be used with the inundation tables. Any actions necessary that are NOT in the inundation tables will be included here. This may include sandbagging infrastructure (e.g. pump stations), evacuating areas etc.											
There should be an action to notify the downstream municipalities.											
It is intended that this table be easily edited (i.e. it will be generated in word, not excel). Observed data and qualitative road closure information can be included here without depth of flooding.											

USING THE INUNDATION TABLES: the % AEP Flood (Annual Exceedance Probability) depends on a variety of factors such as catchment saturation, antecedent stream levels and rainfall intensity/duration. The "flood/no Flood Calculator can provide a rough estimate of the flood magnitude. The CMA or a competent flood analyst should be consulted to assist in estimating the likely event magnitude.

AEP of Flood	Properties Impacted by Overfloor Flooding [Note 1, 2, 7]	Depth over floor (m)	Type of Building	Sandbag? (Yes/No) [Note 3]	Properties whose access is impacted by flooding [Note 4,5]	Depth over access (m)	Time of isolation	Type of Building	Roads impacted by flooding and approximate location [Note 6]	Maximum Depth over road (m)	Action [Note 8]
20% AEP											
					2067 Wimmera Highway	1.20m	<20h	Residential	Gibson Street between Splatt Street and Casterton-Apsley Road	0.65m	Road Closed Sign
					26 Splatt Street	0.34m	<20h	Residential – Greenfield			
					27 Oconnor Street	0.56m	<20h	Rural-Residential			
					32 Wallace Street	0.54m	<20h	Rural-Residential			
					46 Laidlaw Street	0.10m	<20h	Apsley Primary School			
					53 Wallace Street	0.43m	<20h	Residential			
					6 Johnson Street	0.95m	<20h	Rural-Residential			

10% AEP											
					11 Wallace Street	0.34m	<20h	Residential	Casterton-Apsley Road above the waterway from the east	<0.5m	Road Closed Sign
					2067 Wimmera Highway	2.86m	<20h	Residential	Casterton-Apsley Road west of Apsley Primary School	<0.5m	Road Closed Sign



					23 Wallace Street	0.32m	<20h	Residential	Gibson Street between Splatt Street and Casterton-Apsley Road	0.72m	Road Closed Sign
					26 Splatt Street	0.35m	<20h	Residential – Greenfield	Johnston Street near its intersection with Splatt Street	<0.5m	Road Closed Sign
					27 Oconnor Street	0.75m	<20h	Rural-Residential			
					32 Wallace Street	0.59m	<20h	Rural-Residential			
					46 Laidlaw Street	0.17m	<20h	Apsley Primary School			
					53 Wallace Street	0.45m	<20h	Residential			
					6 Johnson Street	1.87m	<20h	Rural-Residential			

5% AEP											
					1 Wallace Street	0.42m	<20h	Residential	Casterton-Apsley Road above the waterway from the east	0.67m	Road Closed Sign
					11 Wallace Street	0.61m	<20h	Residential	Casterton-Apsley Road west of Apsley Primary School	<0.5m	Road Closed Sign
					130 Wallace Street	0.34m	<20h	Residential	Gibson Street between Splatt Street and Casterton-Apsley Road	0.86m	Road Closed Sign
					14 Munn Street	0.31m	<20h	Residential	Johnston Street near its intersection with Splatt Street	0.86m	Road Closed Sign
					19 Benayeo Road	0.35m	<20h	Residential			
					2067 Wimmera Highway	3.05m	<20h	Residential			
					21 Wallace Street	0.52m	<20h	Residential			
					23 Wallace Street	0.54m	<20h	Residential			
					2353 Wimmera Highway	0.70m	<20h	Residential			
					2398 Wimmera Highway	0.33m	<20h	Residential			
					26 Splatt Street	0.36m	<20h	Residential – Greenfield			
					27 Oconnor Street	0.78m	<20h	Rural-Residential			



					29 Wallace Street	0.48m	<20h	Residential			
					32 Splatt Street	0.41m	<20h	Residential			
					32 Wallace Street	0.62m	<20h	Rural-Residential			
					33 Wallace Street	0.36m	<20h	Residential			
					35 Wallace Street	0.35m	<20h	Residential			
					36 Splatt Street	1.10m	<20h	Residential			
					37 Splatt Street	0.41m	<20h	Apsley Recreation Reserve			
					46 Laidlaw Street	0.21m	<20h	Apsley Primary School			
					5 Wallace Street	0.36m	<20h	Residential - Greenfield			
					53 Wallace Street	0.49m	<20h	Residential			
					6 Johnson Street	4.09m	<20h	Rural-Residential			
					69 Wallace Street	1.56m	<20h	Rural-Residential			
					7 Wallace Street	0.46m	<20h	Residential			
					71 Apsley-Natimuk Road	0.48m	<20h	Rural-Residential			

2% AEP											
					1 Percy Clark Street	0.34m	<20h	Residential	Apsley-Natimuk Road above the waterway from the north, immediately west of Apsley Recreation Reserve	1.12m	Road Closed Sign
					1 Wallace Street	0.51m	<20h	Residential	Casterton-Apsley Road above the waterway from the east	0.86m	Road Closed Sign
					11 Wallace Street	0.77m	<20h	Residential	Casterton-Apsley Road west of Apsley Primary School	<0.5m	Road Closed Sign
					130 Wallace Street	0.38m	<20h	Residential	George Street above the waterway from the east	<0.5m	Road Closed Sign
					14 Munn Street	0.43m	<20h	Residential	Gibson Street between Splatt Street	1.07m	Road Closed Sign



										and Casterton- Apsley Road		
						15 Laidlaw Street	0.42m	<20h	Residential	Johnston Street near its intersection with Splatt Street	1.0m	Road Closed Sign
						19 Benayeo Road	0.42m	<20h	Residential			
						2053 Wimmera Highway	0.51m	<20h	Residential			
						2067 Wimmera Highway	3.13m	<20h	Residential			
						21 Wallace Street	0.69m	<20h	Residential			
						22-24 Splatt Street	0.31m	<20h	Residential			
						23 Wallace Street	0.71m	<20h	Residential			
						2353 Wimmera Highway	0.75m	<20h	Residential			
						2398 Wimmera Highway	0.40m	<20h	Residential			
						26 Splatt Street	0.56m	<20h	Residential – Greenfield			
						27 Oconnor Street	0.82m	<20h	Rural- Residential			
						29 Wallace Street	0.64m	<20h	Residential			
						31 Wallace Street	0.46m	<20h	Residential			
						32 Splatt Street	0.51m	<20h	Residential			
						32 Wallace Street	0.65m	<20h	Rural- Residential			
						33 Wallace Street	0.53m	<20h	Residential			
						35 Wallace Street	0.53m	<20h	Residential			
						36 Splatt Street	1.19m	<20h	Residential			
						37 Splatt Street	0.62m	<20h	Apsley Recreation Reserve			
						41 Wallace Street	0.42m	<20h	Residential			
						46 Laidlaw Street	0.25m	<20h	Apsley Primary School			
						5 Pahl Street	0.3m	<20h	Rural- Residential			
						5 Wallace Street	0.47m	<20h	Residential - Greenfield			
						53 Wallace Street	0.54m	<20h	Residential			



					6 Johnson Street	4.19m	<20h	Rural-Residential			
					69 Wallace Street	1.77m	<20h	Rural-Residential			
					7 Wallace Street	0.58m	<20h	Residential			
					71 Apsley-Natimuk Road	0.54m	<20h	Rural-Residential			

1% AEP											
					1 Percy Clark Street	0.41m	<20h	Residential	Apsley-Natimuk Road above the waterway from the north, immediately west of Apsley Recreation Reserve	1.47m	Road Closed Sign
					1 Wallace Street	0.58m	<20h	Residential	Ballantyne Street near its intersection with Townsend Street and Apsley-Natimuk Road	<0.5m	Road Closed Sign
					11 Wallace Street	0.86m	<20h	Residential	Casterton-Apsley Road above the waterway from the east	1.05m	Road Closed Sign
					130 Wallace Street	0.43m	<20h	Residential	Casterton-Apsley Road west of Apsley Primary School	0.60m	Road Closed Sign
					14 Munn Street	0.57m	<20h	Residential	George Street above the waterway from the east	0.62m	Road Closed Sign
					15 Laidlaw Street	0.66m	<20h	Residential	Gibson Street between Splatt Street and Casterton-Apsley Road	1.32m	Road Closed Sign
					19 Benayeo Road	0.54m	<20h	Residential	Johnston Street near its intersection with Splatt Street	1.07m	Road Closed Sign
					2053 Wimmera Highway	0.51m	<20h	Residential	Racecourse Road between Benayeo Road and Apsley-Natimuk Road	<0.5m	Road Closed Sign
					2067 Wimmera Highway	3.18m	<20h	Residential	Splatt Street near its intersection with Gibson Street	<0.5m	Road Closed Sign
					21 Wallace Street	0.78m	<20h	Residential	Townsend Street between Ballantyne Street and Wimmera Highway	<0.5m	Road Closed Sign



					22-24 Splatt Street	0.41m	<20h	Residential			
					23 Wallace Street	0.80m	<20h	Residential			
					2353 Wimmera Highway	0.78m	<20h	Residential			
					2398 Wimmera Highway	0.43m	<20h	Residential			
					26 Splatt Street	0.63m	<20h	Residential – Greenfield			
					27 Oconnor Street	0.85m	<20h	Rural-Residential			
					29 Wallace Street	0.76m	<20h	Residential			
					31 Wallace Street	0.57m	<20h	Residential			
					32 Splatt Street	0.61m	<20h	Residential			
					32 Wallace Street	0.77m	<20h	Rural-Residential			
					33 Wallace Street	0.66m	<20h	Residential			
					35 Wallace Street	0.66m	<20h	Residential			
					36 Splatt Street	1.30m	<20h	Residential			
					37 Splatt Street	0.82m	<20h	Apsley Recreation Reserve			
					41 Oconnor Street	0.35m	<20h	Rural-Residential			
					41 Wallace Street	0.54m	<20h	Residential			
					46 Laidlaw Street	0.26m	<20h	Apsley Primary School			
					5 Pahl Street	0.33m	<20h	Rural-Residential			
					5 Wallace Street	0.54m	<20h	Residential - Greenfield			
					53 Wallace Street	0.58m	<20h	Residential			
					6 Johnson Street	4.29m	<20h	Rural-Residential			
					65 Wallace Street	0.31m	<20h	Residential			
					66 Wallace Street	0.35m	<20h	Residential			
					66 Wallace Street	0.35m	<20h	Residential			
					69 Wallace Street	2.03m	<20h	Rural-Residential			
					7 Wallace Street	0.66m	<20h	Residential			



					71 Apsley-Natimuk Road	0.56m	<20h	Rural-Residential			
					72 Wallace Street	0.33m	<20h	Residential			
					91 Wallace Street	0.57m	<20h	Rural-Residential			
					93 Wallace Street	0.54m	<20h	Rural-Residential			
					95 Wallace Street	0.58m	<20h	Rural-Residential			
					Ballantyne Street	0.42m	<20h	Rural-Residential			

0.5% AEP											
					1 Percy Clark Street	0.45m	<20h	Residential	Apsley-Natimuk Road above the waterway from the north, immediately west of Apsley Recreation Reserve	1.5m	Road Closed Sign
					1 Wallace Street	0.62m	<20h	Residential	Ballantyne Street near its intersection with Townsend Street and Apsley-Natimuk Road	<0.5m	Road Closed Sign
					11 Wallace Street	0.90m	<20h	Residential	Benayeo Road near its intersection with Wimmera Highway and near the waterway from the north	0.53m	Road Closed Sign
					130 Wallace Street	0.44m	<20h	Residential	Casterton-Apsley Road near its intersection with Gibson Street	0.53m	Road Closed Sign
					14 Munn Street	0.62m	<20h	Residential	Casterton-Apsley Road above the waterway from the east	1.11m	Road Closed Sign
					14 Townsend Street	0.34m	<20h	Residential	Casterton-Apsley Road west of Apsley Primary School	0.75m	Road Closed Sign
					15 Laidlaw Street	0.77m	<20h	Residential	George Street above the waterway from the east	0.66m	Road Closed Sign
					19 Benayeo Road	0.57m	<20h	Residential	George Street between Wimmera Highway and Munn Street	0.61m	Road Closed Sign



					2053 Wimmera Highway	0.52m	<20h	Residential	Gibson Street between Splatt Street and Casterton-Apsley Road	1.39m	Road Closed Sign
					2067 Wimmera Highway	3.21m	<20h	Residential	Johnston Street near its intersection with Splatt Street	1.1m	Road Closed Sign
					21 Wallace Street	0.83m	<20h	Residential	Racecourse Road between Benayeo Road and Apsley-Natimuk Road	<0.5m	Road Closed Sign
					22-24 Splatt Street	0.44m	<20h	Residential	Splatt Street near its intersection with Gibson Street	<0.5m	Road Closed Sign
					23 Wallace Street	0.85m	<20h	Residential	Townsend Street between Ballantyne Street and Wimmera Highway	<0.5m	Road Closed Sign
					2353 Wimmera Highway	0.79m	<20h	Residential			
					2398 Wimmera Highway	0.44m	<20h	Residential			
					26 Splatt Street	0.66m	<20h	Residential – Greenfield			
					27 Oconnor Street	0.86m	<20h	Rural-Residential			
					29 Wallace Street	0.8m	<20h	Residential			
					31 Wallace Street	0.62m	<20h	Residential			
					32 Splatt Street	0.65m	<20h	Residential			
					32 Wallace Street	0.85m	<20h	Rural-Residential			
					33 Wallace Street	0.72m	<20h	Residential			
					35 Wallace Street	0.71m	<20h	Residential			
					36 Splatt Street	1.33m	<20h	Residential			
					37 Splatt Street	0.85m	<20h	Apsley Recreation Reserve			
					41 Oconnor Street	0.43	<20h	Rural-Residential			
					41 Wallace Street	0.59m	<20h	Residential			
					46 Laidlaw Street	0.3m	<20h	Apsley Primary School			
					5 Pahl Street	0.34m	<20h	Rural-Residential			



					5 Wallace Street	0.58m	<20h	Residential - Greenfield				
					53 Wallace Street	0.62m	<20h	Residential				
					6 Johnson Street	4.32m	<20h	Rural-Residential				
					65 Wallace Street	0.37m	<20h	The Border Inn Hotel Apsley				
					66 Wallace Street	0.39m	<20h	Residential				
					68 Wallace Street	0.39m	<20h	Residential				
					69 Wallace Street	2.09m	<20h	Rural-Residential				
					7 Wallace Street	0.7m	<20h	Residential				
					71 Apsley-Natimuk Road	0.57m	<20h	Rural-Residential				
					72 Wallace Street	0.36m	<20h	Residential				
					76 Wallace Street	0.32m	<20h	Residential				
					91 Wallace Street	0.64m	<20h	Rural-Residential				
					93 Wallace Street	0.62m	<20h	Rural-Residential				
					95 Wallace Street	0.65m	<20h	Rural-Residential				
					Ballantyne Street	0.46m	<20h	Rural-Residential				

NOTES:

[1]	Ordered alphabetically by street name - emergency response will likely be street by street. Properties that come within an appropriate model accuracy (e.g. 100mm) should be included.
[2]	Properties will be listed at every AEP they are affected. i.e. if a property floods at all AEPs, it will be included in every table. Intention is for a single inundation table to be printed without having to reference actions from smaller events. Note this is in contrast to the flood intelligence card.
[3]	This will depend on the building type, perimeter etc. Can also include indicative number of sandbags required
[4]	Can group similar properties (i.e. dwellings) together. See example
[5]	Isolated properties. If large numbers of properties in a single area are isolated (i.e. by one or two roads flooding, blocking the entire area) it may be more appropriate to list them as 'Area A', 'Area B' etc. with further detail provided in a separate section/map
[6]	For roads with long stretches of inundation/patchy inundation, will need to specify where signs will go
[7]	Public infrastructure and high risk facilities (e.g. aged care) should be highlighted.
[8]	Actions to be decided in consultation with SES through the PCG.



5 FLOOD DAMAGE ASSESSMENT

A summary of the flood damages with respect to each AEP event has been assessed with respect the number of properties flooded; direct damage cost; and indirect damage cost. A summary of this information is summarised in Table 5-1, Table 5-2 and Table 5-3 respectively.

Based on this information, the Average Annual Damage has been calculated to be **\$53,927**.

Furthermore, the total cost with respect to each AEP event is presented in Figure 5-1.



Table 5-1 Properties Flooded

AEP	0.5% (200-year ARI)	1% (100-year ARI)	2% (50-year ARI)	5% (20-year ARI)	10% (10-year ARI)	20% (5-year ARI)
Residential Buildings Flooded Above Floor	0	0	0	0	0	0
Commercial Buildings Flooded Above Floor	0	0	0	0	0	0
Properties Flooded Below Floor	44	39	38	33	22	16
Total Properties Flooded	44	39	38	33	22	16

Table 5-2 Direct Cost

AEP	0.5% (200-year ARI)	1% (100-year ARI)	2% (50-year ARI)	5% (20-year ARI)	10% (10-year ARI)	20% (5-year ARI)
Direct Potential External Damage Cost	\$187,133	\$102,035	\$79,285	\$32,263	\$2,913	\$1,801
Direct Potential Residential Damage Cost	\$0	\$0	\$0	\$0	\$0	\$0
Direct Potential Commercial Damage Cost	\$0	\$0	\$0	\$0	\$0	\$0
Total Direct Potential Damage Cost	\$187,133	\$102,035	\$79,285	\$32,263	\$2,913	\$1,801
Total Actual Damage Cost (0.8*Potential)	\$149,706	\$81,628	\$63,428	\$25,810	\$2,330	\$1,441
Infrastructure Damage Cost	\$867,345	\$529,654	\$389,239	\$244,539	\$31,534	\$31,714

Table 5-3 Indirect Cost

AEP	0.5% (200-year ARI)	1% (100-year ARI)	2% (50-year ARI)	5% (20-year ARI)	10% (10-year ARI)	20% (5-year ARI)
Indirect Clean Up Cost	\$0	\$0	\$0	\$0	\$0	\$0
Indirect Residential Relocation Cost	\$0	\$0	\$0	\$0	\$0	\$0
Indirect Emergency Response Cost	\$0	\$0	\$0	\$0	\$0	\$0
Total Indirect Cost	\$0	\$0	\$0	\$0	\$0	\$0
Rural Cost	\$387,574	\$304,782	\$242,149	\$172,888	\$61,776	\$61,776



AEP	0.5% (200-year ARI)	1% (100-year ARI)	2% (50-year ARI)	5% (20-year ARI)	10% (10-year ARI)	20% (5-year ARI)
Total Cost (Total Actual Damage Cost, Infrastructure Damage Cost, Total Indirect Cost & Rural Cost)	\$1,404,625	\$916,064	\$694,816	\$443,237	\$95,640	\$94,930

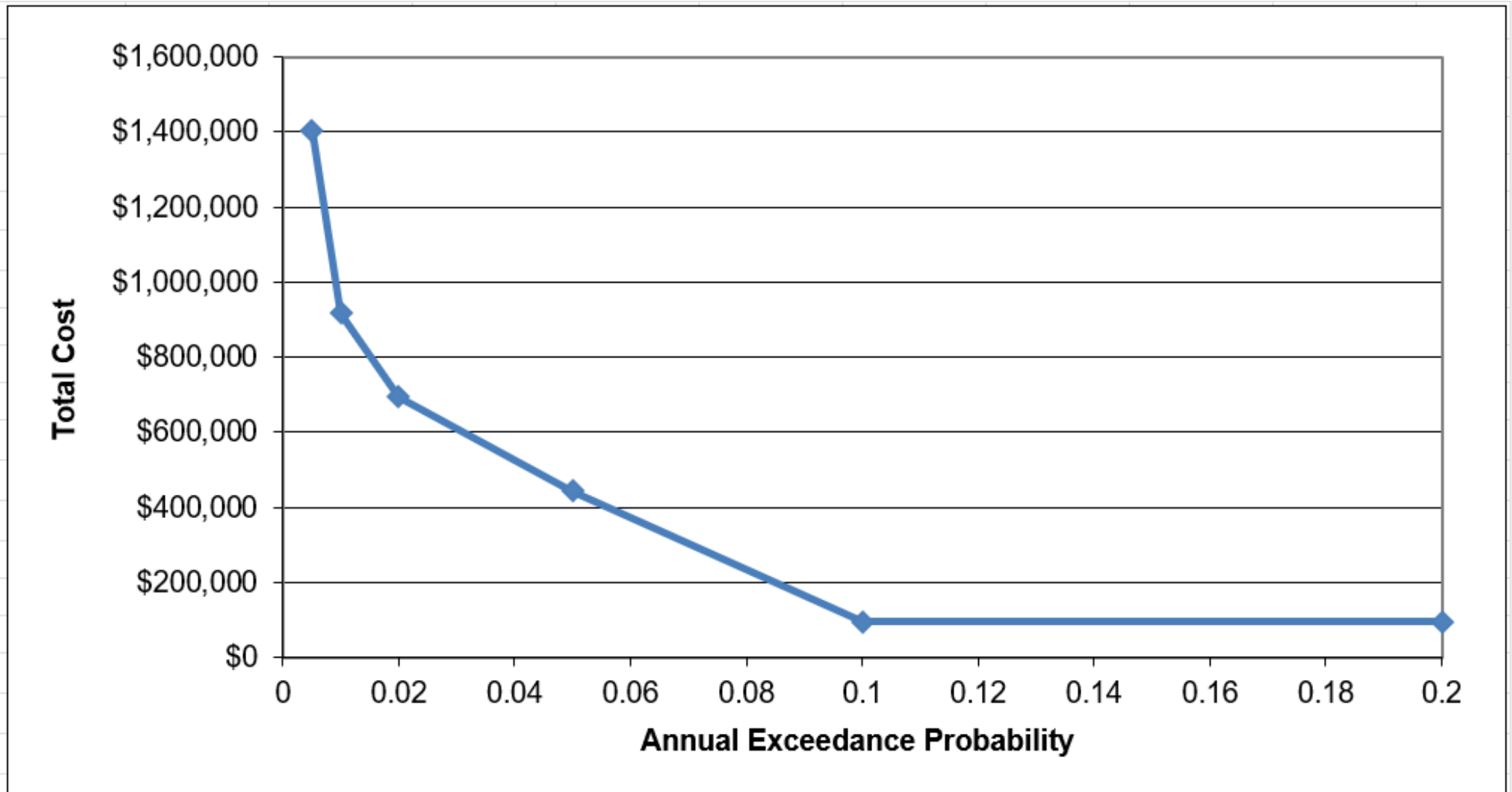


Figure 5-1 Flood Damage Assessment based on AEP Event



6 SUMMARY

This report details the background information used to produce flood intelligence for inclusion in the West Wimmera Shire Council Municipal Flood Emergency Plan (MFEP). The report should be used as a reference document during flood events to confirm flood response actions required.

An early flood warning tool was developed using design rainfall IFD at Apsley; however, the community have very limited time to respond to the event due to the nature of flash flooding.

The typical warning time is likely to be less than an hour. The isolated road and flooded properties were outlined in this report based on each modelled event. Flood intelligence card was developed to help council understand the potential impact for a range of design event.



APPENDIX A VICSES SANDBAGGING GUIDE

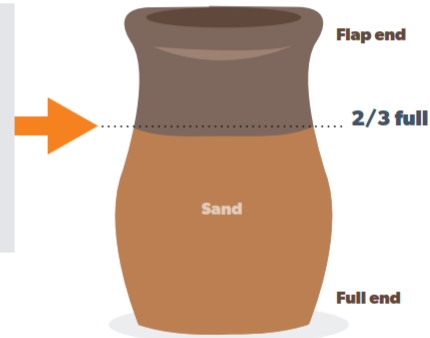


Sandbagging

Sandbags won't stop the water completely, but can reduce the amount of water entering your home.

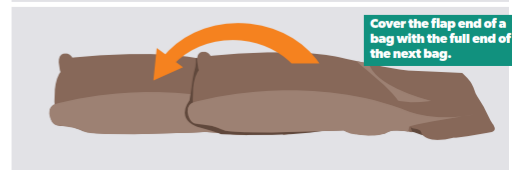
How do I fill a sandbag?

- Only use sand to fill hessian bags. Do not use dirt.
- Only fill sandbag two-thirds full.
- Do not over fill the sandbag as it will be too heavy to carry.
- Do not tie the top of the sandbag.
- Take care when filling and lifting the sandbag, to avoid injury.



How do I lay sandbags?

- Lay sandbags like brickwork. Stagger rows so that the joins do not line up.
- Start at one end and work to the other end.
- Ensure the unfilled part of the bag is covered by the next bag.
- Tuck flap under the bag at the end of the row.
- If the sandbag wall is going to be more than five (5) bags high, you will need to lay two (2) rows wide.



Where do I place the sandbags?

- Place sandbags in plastic bags to cover drainage holes in home (e.g. showers, toilets, sinks) to stop back flow of water.
- Place a small wall across doorways, at least the height of the expected water level. Be careful not to trap yourself inside.
- If available, plastic sheeting may be used under sandbags to reduce the seepage.

Block it

Toilets, bath and all drain holes



What do I do once I have finished with the sandbags?

- Sturdy gloves should be worn when handling wet sandbags as they can contain chemicals, waste and diseases.
- Sandbags that have been in contact with floodwater need to be thrown away.
- Contact your local council to find out how to dispose of your sandbags safely.

Melbourne

15 Business Park Drive
Notting Hill VIC 3168
Telephone (03) 8526 0800

Sydney

Suite 3, Level 1, 20 Wentworth Street
Parramatta NSW 2150
Telephone (02) 9354 0300

Brisbane

Level 5, 43 Peel Street
South Brisbane QLD 4101
Telephone (07) 3105 1460

Adelaide

1/198 Greenhill Road
Eastwood SA 5063
Telephone (08) 8378 8000

Perth

Ground Floor, 430 Roberts Road
Subiaco WA 6008
Telephone (08) 6555 0105

New Zealand

7/3 Empire Street
Cambridge New Zealand 3434
Telephone +64 27 777 0989

Wangaratta

First Floor, 40 Rowan Street
Wangaratta VIC 3677
Telephone (03) 5721 2650

Geelong

51 Little Fyans Street
Geelong VIC 3220
Telephone (03) 8526 0800

Wimmera

597 Joel South Road
Stawell VIC 3380
Telephone 0438 510 240

Gold Coast

Suite 37, Level 4, 194 Varsity Parade
Varsity Lakes QLD 4227
Telephone (07) 5676 7602

watertech.com.au

