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Goulburn River: Eildon to Seymour

Total Flood Warning System

29 June 2023



Flood

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Welcome



We respectfully acknowledge the Traditional Owners of the land and waters. We pay our respects to Elders past and present.

Our Values



We pride ourselves on our credibility



We are part of our community



Safety drives our decisions



Focused and adaptable



Together we are VICSES



Safer Communities - Together

Agenda

Item	
1	Welcome
2	Total Flood Warning System (TFWS) - Roles and Responsibilities
3	The Goulburn River: Eildon to Seymour Catchment 2022 Case Study
Lunch	
4	Current Flood Warning Service (FWS)
5	Works Identified and Works in Progress
6	Flood Risk Mitigation - Process for new / updates to FWS Community readiness and preparation



Total flood warning system (TFWS) – Roles and responsibilities

LGA, CMA & VICSES

CMA & LGA (Services)
VICSES (EM plans)

DEECA (RWMP), BoM (SLS)
and LGA

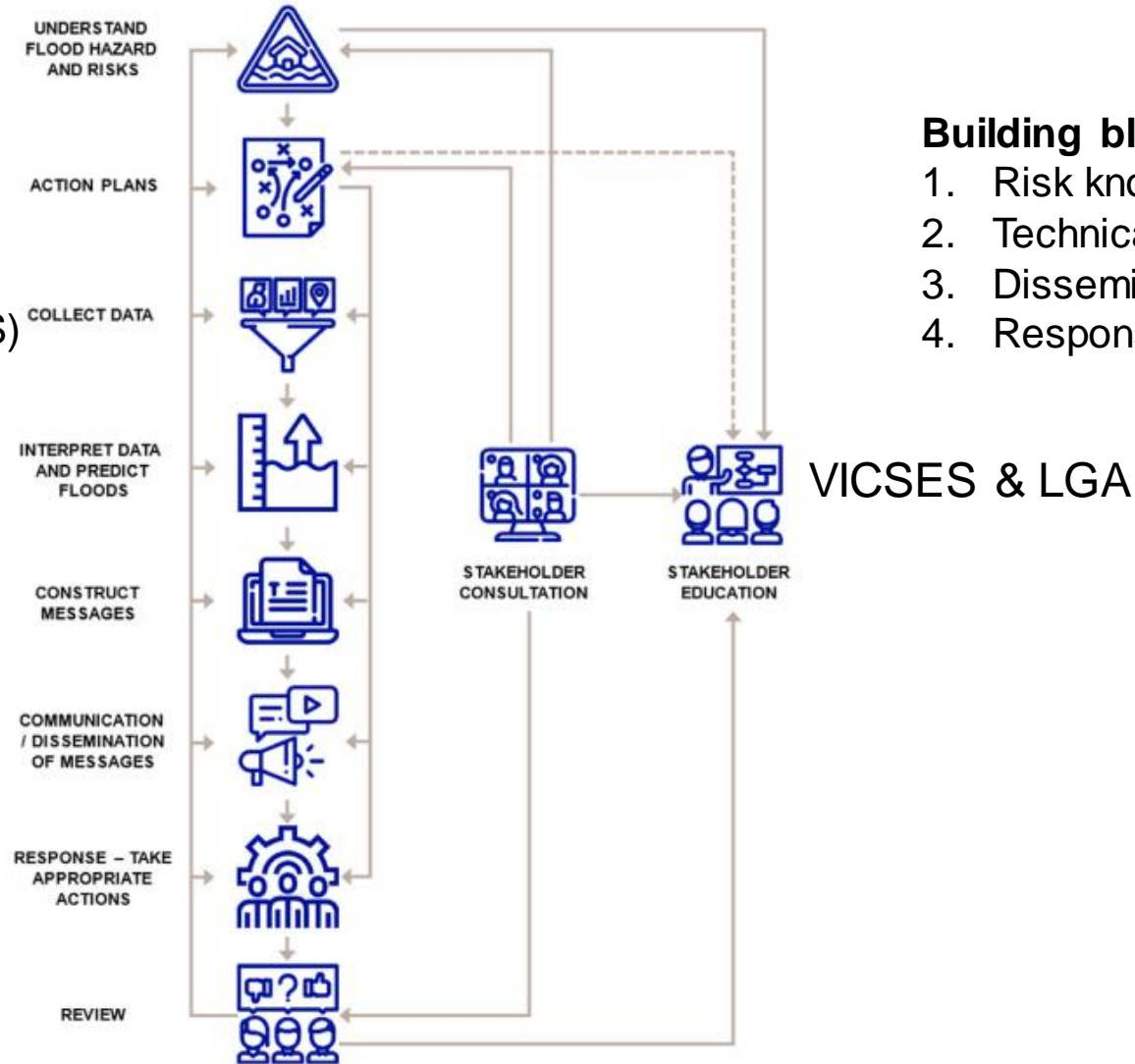
BoM (Predict), CMA
and Flood Analysts (Impact)

BoM (Forecast / Warning
VICSES (Warning/Actions)

BoM (Forecast / Warning
VICSES (Warning/Actions)

VICSES, LGA
& Community

LGA, BoM, CMA & VICSES



Building blocks

1. Risk knowledge
2. Technical monitoring and warning service
3. Dissemination and communication
4. Response capability

VICSES & LGA





Case Study

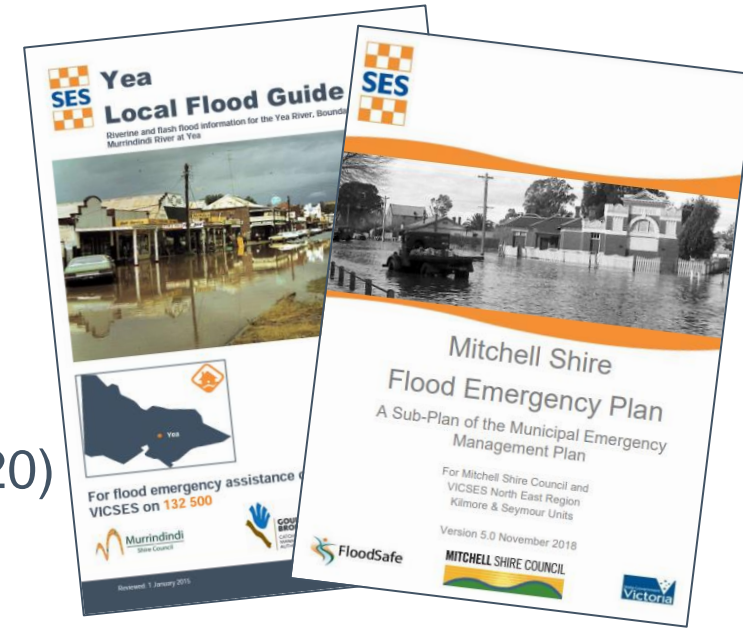
October 2022



Goulburn River at Seymour

Preparedness – Spring 2022

- Mitchell Shire
 - Seymour Local Flood Guide (January 2015)
 - Mitchell Shire Municipal Flood Emergency Plan (November 2018)
- Murrindindi Shire
 - Yea Local Guide (September 2019)
 - Murrindindi Shire Municipal Flood Emergency Plan (December 2020)
- Community Engagement – Flood Risk
- 17/09/2022 – Yea Town Hall
 - Focus on Yea River and Mid Goulburn for communities downstream of Lake Eildon including Yea and Seymour
 - 77 community members attended with reps from agencies, GMW, CMA
- Other planned activities were cancelled due to floods already impacting



Readiness – October 2022

Issued Monday 10/10/22

DISTRICT	Tuesday	Wednesday	Thursday	Friday	Saturday
Mallee					
Wimmera					
South West					
Northern Country					
North Central					
Central					
North East					
W & S Gippsland					
East Gippsland					
Alpine Region					

Issued Wednesday 12/10/22

DISTRICT	Thursday	Friday	Saturday	Sunday	Monday
Mallee					
Wimmera					
South West					
Northern Country					
North Central					
Central					
North East					
W & S Gippsland					
East Gippsland					
Alpine Region					

Readiness – October 2022

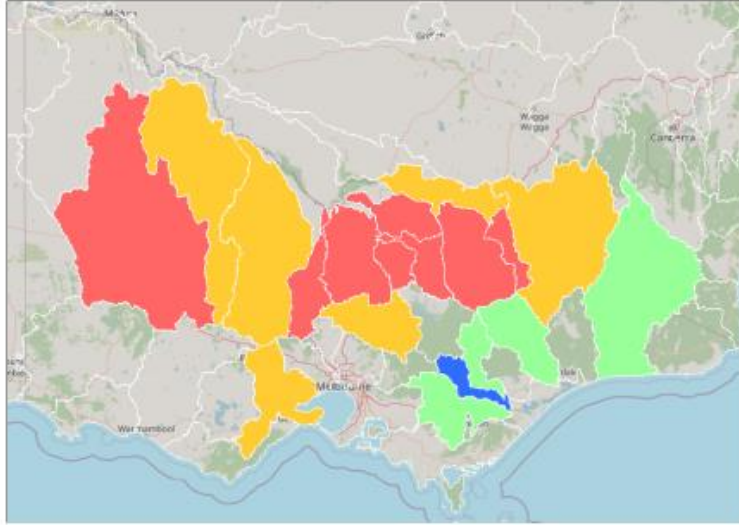
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Issued Wednesday 12/10/22 12:26



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Scenario 1
Most Likely



Scenario 1 - Goulburn River Eildon to Seymour

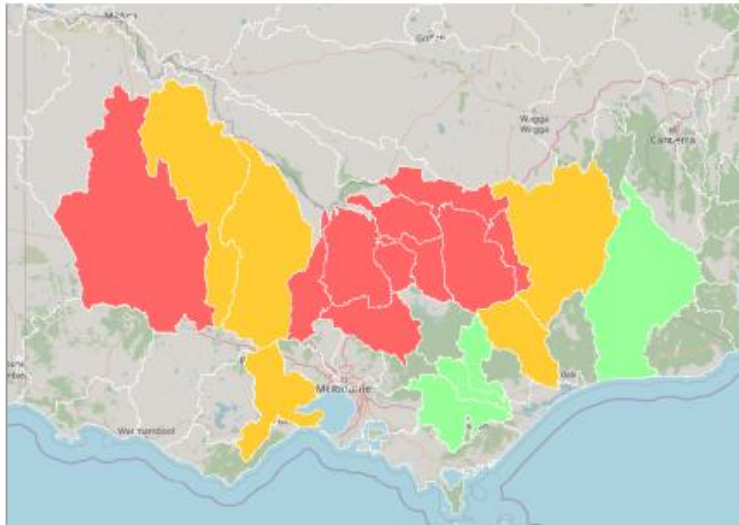


No	Site Name	Highest Modelled Level (m)	Time/Date
1	Lake Eildon D/S	3.0	14/10/2022 00:00 AEDT
2	Taggerty	2.6	14/10/2022 14:00 AEDT
3	Seymour	5.3	14/10/2022 10:00 AEDT

7-DAY-OUTLOOK: Modelled Flood Level - Onwards from 12/10/2022 12:00, 6 hr increments

No	Site Name	12/10	13/10	14/10	15/10	16/10	17/10	18/10	19/10
1	Lake Eildon D/S	Green	Green	Green	Green	Green	Green	Green	Green
2	Taggerty	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue
3	Seymour	Blue	Blue	Green	Yellow	Yellow	Green	Green	Blue

Scenario 2
Higher Possible



Scenario 2 - Goulburn River Eildon to Seymour







No	Site Name	Highest Modelled Level (m)	Time/Date
1	Lake Eildon D/S	3.1	14/10/2022 05:00 AEDT
2	Taggerty	3.1	14/10/2022 15:00 AEDT
3	Seymour	6.6	15/10/2022 16:00 AEDT

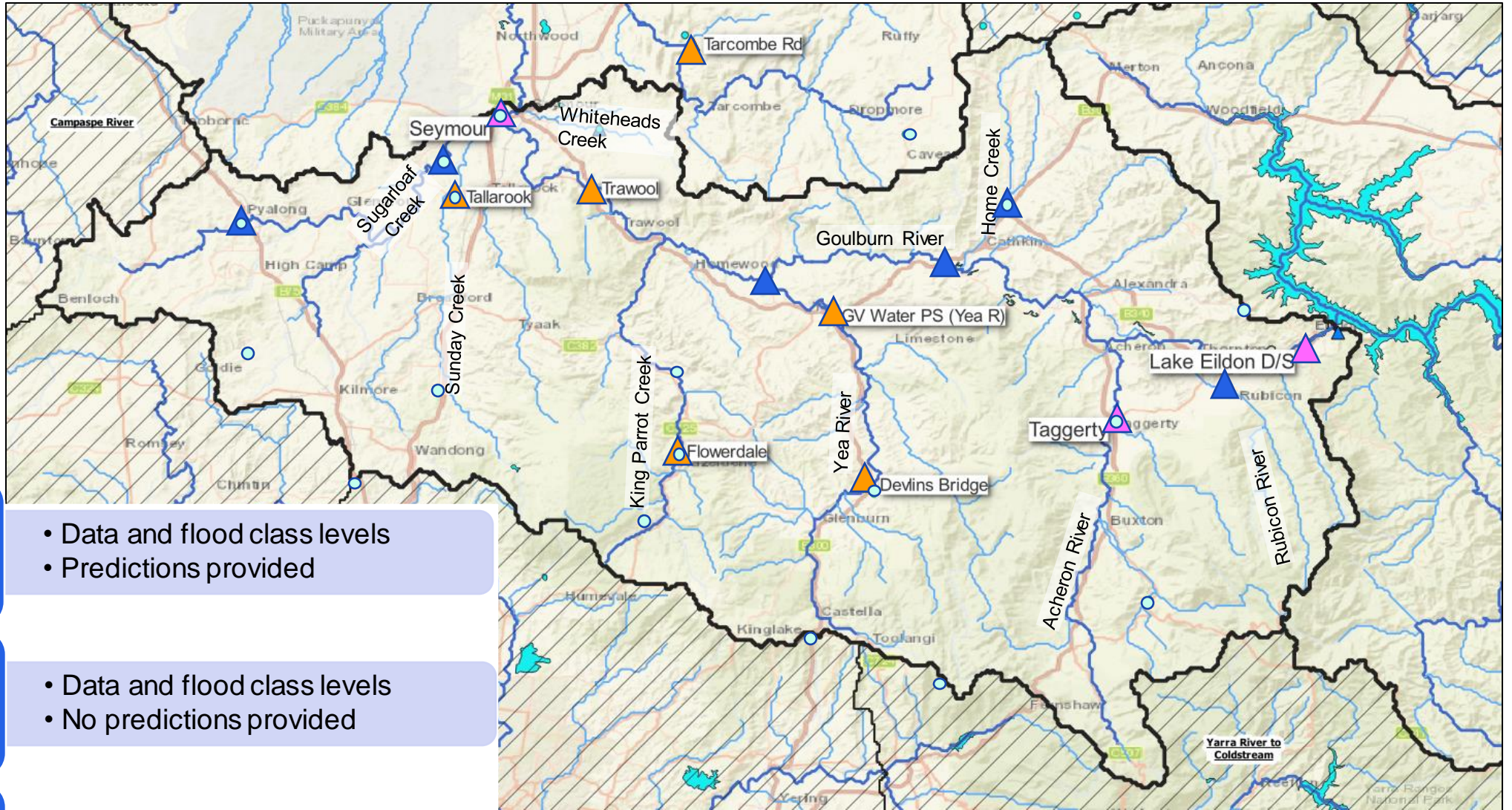
7-DAY-OUTLOOK: Modelled Flood Level - Onwards from 12/10/2022 12:00, 6 hr increments

No	Site Name	12/10	13/10	14/10	15/10	16/10	17/10	18/10	19/10
1	Lake Eildon D/S	Green	Green	Green	Green	Green	Green	Green	Green
2	Taggerty	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue
3	Seymour	Blue	Blue	Green	Yellow	Yellow	Yellow	Green	Green

Goulburn River - Eildon to Seymour (Flood Service today)

Legend

-  WL Forecast
-  WL Information
-  WL Data
-  RN



Forecast Location

- Data and flood class levels
- Predictions provided

Information Location

- Data and flood class levels
- No predictions provided

Data Location

- Data only; no flood class levels
- Data available on bom.gov.au



Observed Rainfall – 12hr to Wed 12/10/2022 11:00



Initial Conditions:
Successive fronts through
August – September

Saturated catchments

Minor flood event on
Goulburn River immediately
prior (8 October)



Flood Watch #3 - Wed 12/10/2022

IDV35010
Australian Government Bureau of Meteorology This Flood Watch provides early advice of possible flooding within the specified catchments.

Flood Watch for Northern and parts of Southern Victoria

Issued at 12:06 pm EDT on Wednesday 12 October 2022 Flood Watch Number: 3

Reissued to correct Watch Title

MAJOR FLOODING LIKELY ACROSS A NUMBER OF NORTHERN VICTORIAN CATCHMENTS

ISOLATED MAJOR FLOODING LIKELY IN THE SOUTH WEST

WIDESPREAD MINOR TO MODERATE FLOODING EXPECTED ACROSS NORTHERN AND PARTS OF WESTERN VICTORIA

ISOLATED MINOR FLOODING POSSIBLE IN PARTS OF GIPPSLAND

A cold front is moving into the west of the state, bringing showers and rain.
Rainfall will increase during Thursday and Friday, with heavy falls likely as the front moves slowly eastwards.

Catchments in the Flood Watch area are very wet as a result of the recent rainfall and river levels are elevated within some catchments.

From Wednesday to Friday, rainfall totals of 60-100 mm are forecast north of the divide, while rainfall totals of 30-60 mm are forecast south of the divide

Flooding is likely to develop from Thursday. Widespread Minor to Major flooding is expected across Northern Victoria and parts of Western Victoria. Isolated Minor flooding is possible in parts of Gippsland.

A minor to moderate flood warning is current for the Murray River. A moderate flood warning is current for the Loddon River. Minor flood warnings are also current in the Avoca, Snowy and Kiewa Rivers.

The Bureau of Meteorology is continuing to monitor the situation and will issue catchment specific warnings as required.

Catchments likely to be affected include:

Mitchell River

Macalister River

Thomson River

Latrobe River

South Gippsland Rivers

Bunyip River and Dandenong Creek

Yarra River to Coldstream

Yarra River downstream of Coldstream

Maribyrnong River

Werribee River

Barwon, Leigh and Moorabool Rivers

Hopkins River

Otway Coast

Upper Murray and Mitta Mitta Rivers

Kiewa River (for Kiewa River to Mongans Bridge)

Ovens and King Rivers

Broken River

Broken Creek

Seven and Castle Creeks

Goulburn River upstream of Lake Eildon

Goulburn River Eildon to Seymour

Goulburn River downstream of Seymour

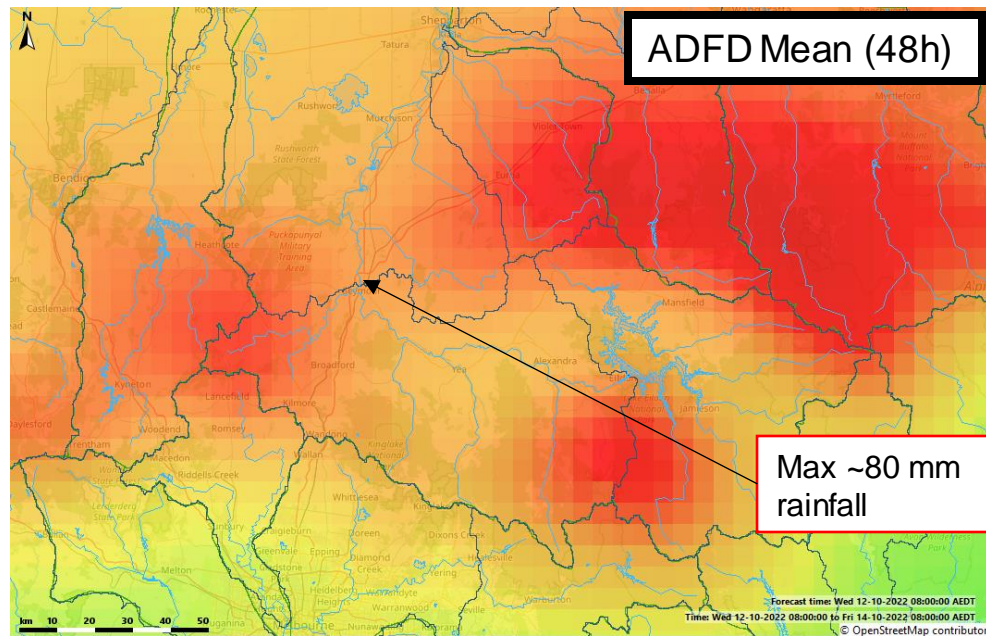
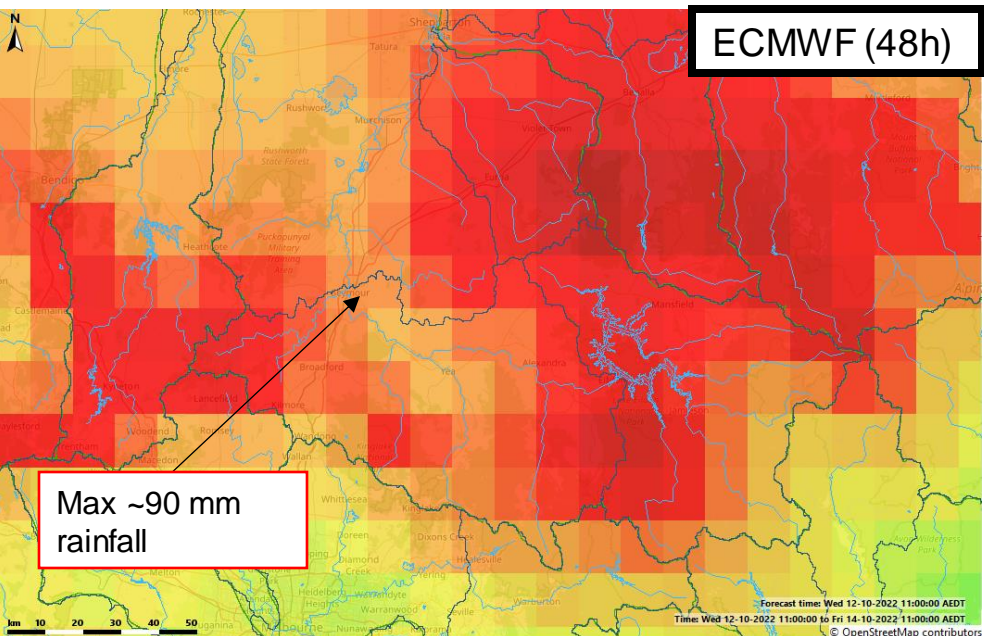
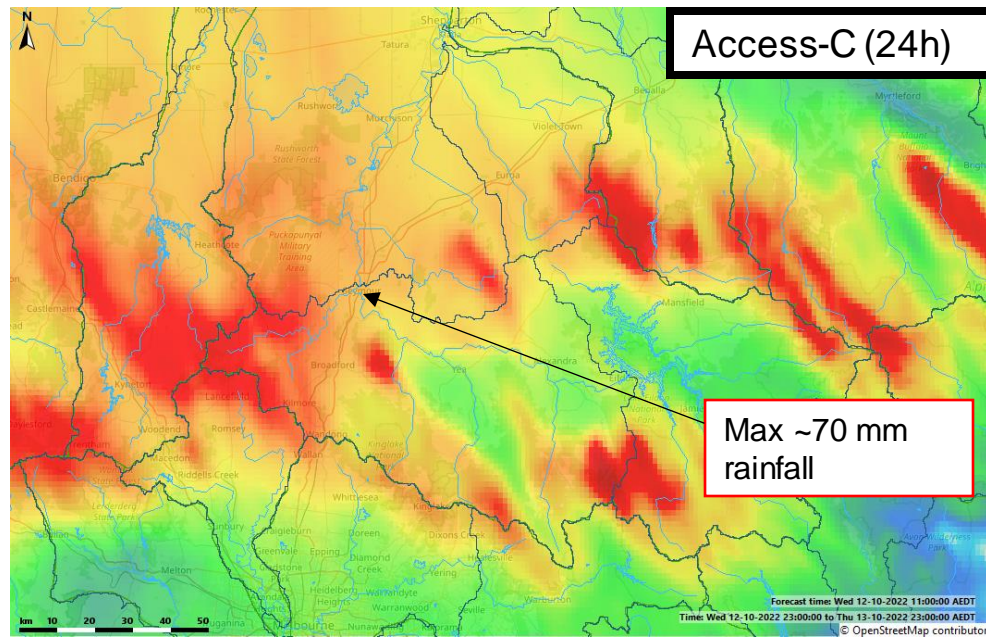
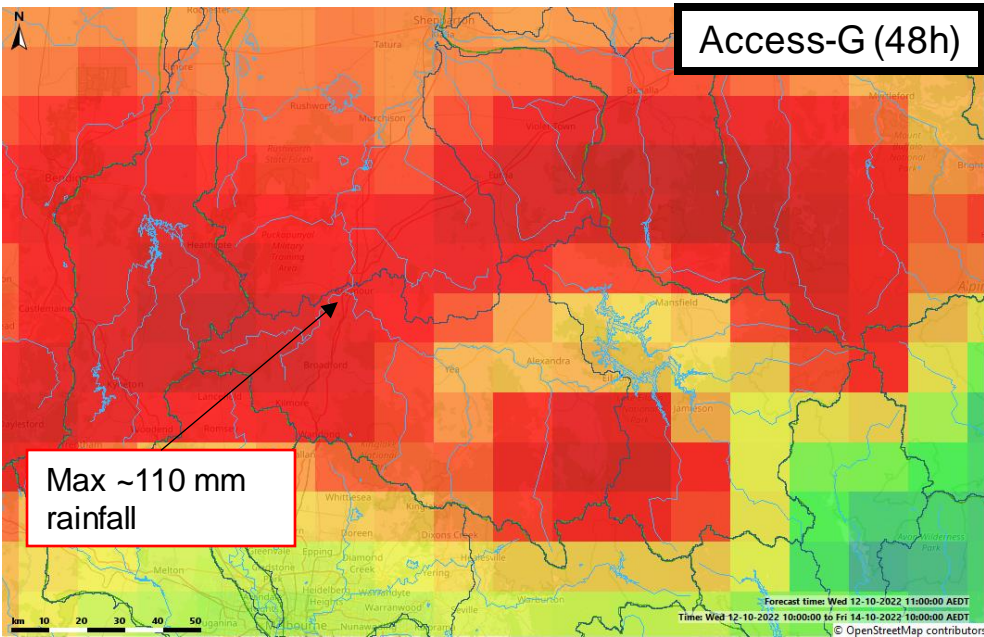
Campaspe River

Wimmera River



Forecast Rainfall – from Wed 12/10/2022 11:00

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Initial Conditions:
Successive fronts through August – September

Saturated catchments

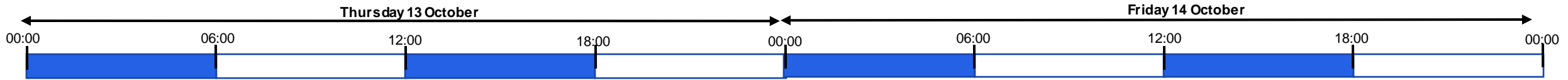
Minor flood event immediately prior (8 October)

	>= 0 mm
	>= 0.2 mm
	>= 1 mm
	>= 5 mm
	>= 10 mm
	>= 25 mm
	>= 50 mm
	>= 75 mm
	>= 100 mm
	>= 200 mm
	>= 400 mm



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Warning Timeline: 13 – 14 October 2022



Warning #	1	2	3	4	5	6	7	8	9	10	11
Issue Time	13/10/2022 0:09	13/10/2022 8:38	13/10/2022 12:11	13/10/2022 14:53	13/10/2022 18:52	13/10/2022 23:25	14/10/2022 1:54	14/10/2022 5:59	14/10/2022 9:00	14/10/2022 13:04	14/10/2022 17:58
Next Issue Time	13/10/2022 12:00	13/10/2022 14:00	13/10/2022 18:00	13/10/2022 21:00	14/10/2022 0:00	14/10/2022 2:00	14/10/2022 6:00	14/10/2022 9:00	14/10/2022 13:00	14/10/2022 18:00	15/10/2022 3:00
Max Warning Severity	Moderate	Major	Major	Major	Major	Major	Major	Major	Major	Major	Major
Warning Title	Initial Moderate Flood Warning for the Goulburn River	Major Flood Warning for the Goulburn River	Major Flood Warning for the Goulburn River	Major Flood Warning for the Goulburn River	Major Flood Warning for the Goulburn River	Major Flood Warning for the Goulburn River	Major Flood Warning for the Goulburn River	Major Flood Warning for the Goulburn River	Major Flood Warning for the Goulburn River	Major Flood Warning for the Goulburn River	Major Flood Warning for the Goulburn River
Max Severity Included Forecast Locations	Taggerty (Acheron River) Seymour (Goulburn River)	Taggerty (Acheron River) Seymour (Goulburn River)	Taggerty (Acheron River) Seymour (Goulburn River)	Taggerty (Acheron River) Seymour (Goulburn River)	Taggerty (Acheron River) Seymour (Goulburn River)	D/S Eildon (Goulburn River) Taggerty (Acheron River) Seymour (Goulburn River)	D/S Eildon (Goulburn River) Taggerty (Acheron River) Seymour (Goulburn River)	D/S Eildon (Goulburn River) Taggerty (Acheron River) Seymour (Goulburn River)	D/S Eildon (Goulburn River) Taggerty (Acheron River) Seymour (Goulburn River)	D/S Eildon (Goulburn River) Taggerty (Acheron River) Seymour (Goulburn River)	D/S Eildon (Goulburn River) Taggerty (Acheron River) Seymour (Goulburn River)
Max Severity Included Information Locations	Yea River King Parrot Creek Sunday Creek	Devlins Bridge (Yea River) King Parrot Creek Tallarook (Sunday Creek) Trawool (Goulburn River)	Devlins Bridge (Yea River) Flowerdale (King Parrot Creek) Tallarook (Sunday Creek) Trawool (Goulburn River)	Devlins Bridge (Yea River) Flowerdale (King Parrot Creek) Tallarook (Sunday Creek) Trawool (Goulburn River)	Devlins Bridge (Yea River) Flowerdale (King Parrot Creek) Tallarook (Sunday Creek) Trawool (Goulburn River)	Devlins Bridge (Yea River) Flowerdale (King Parrot Creek) Tallarook (Sunday Creek) Trawool (Goulburn River)	Devlins Bridge (Yea River) Flowerdale (King Parrot Creek) Tallarook (Sunday Creek) Trawool (Goulburn River)	Devlins Bridge (Yea River) Flowerdale (King Parrot Creek) Tallarook (Sunday Creek) Trawool (Goulburn River)	Devlins Bridge (Yea River) Flowerdale (King Parrot Creek) Tallarook (Sunday Creek) Trawool (Goulburn River)	Devlins Bridge (Yea River) Flowerdale (King Parrot Creek) Tallarook (Sunday Creek) Trawool (Goulburn River)	Devlins Bridge (Yea River) Tallarook (Sunday Creek) Trawool (Goulburn River)

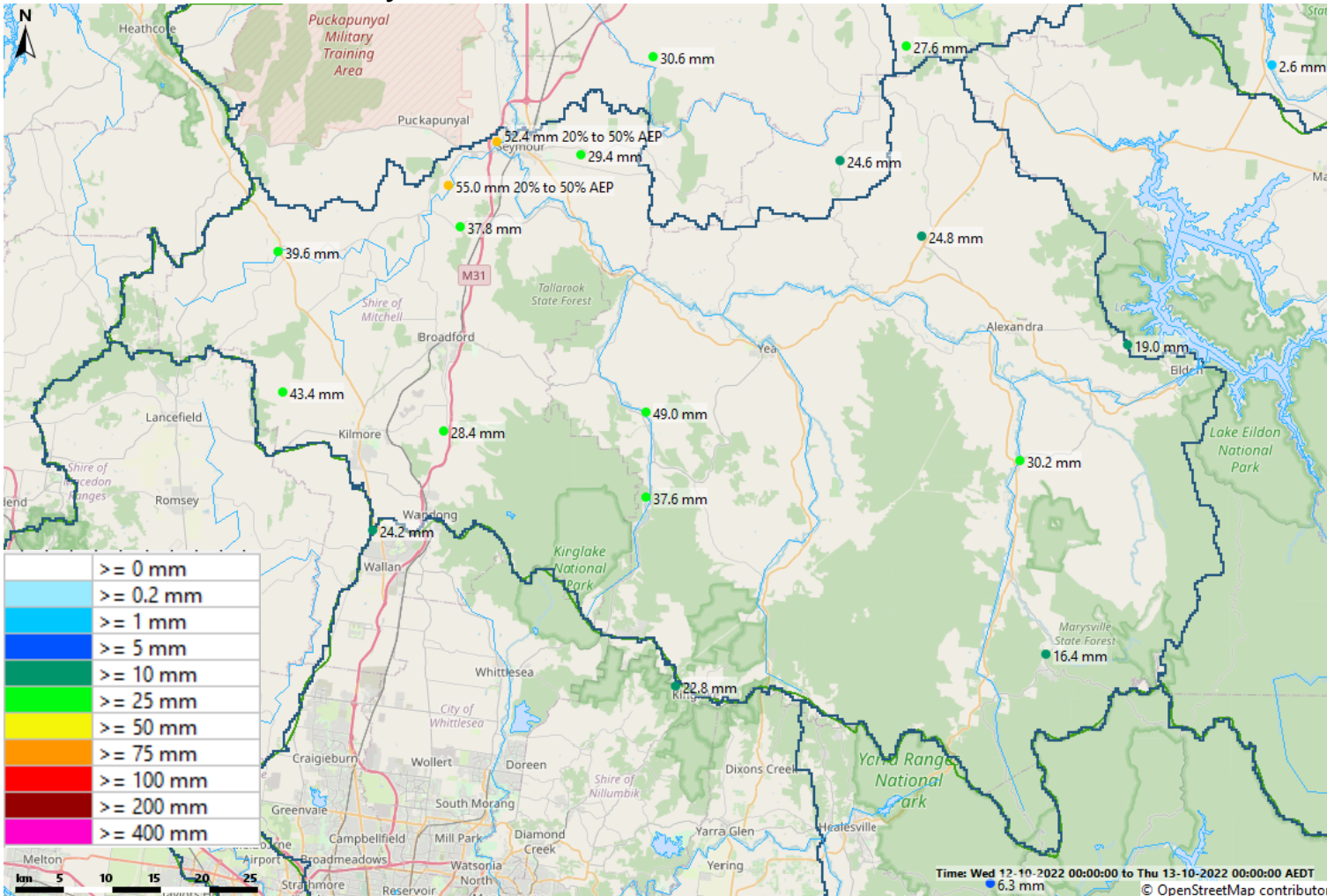
Legend
 Below Minor
 Minor
 Moderate
 Major

◄ - - - - Warning issued earlier than scheduled - - - - ►



Warning #1

00:09 Thursday 13/10/2022



Goulburn River upstream of Lake Eildon:
 Minor flooding is likely along the Goulburn River upstream of Lake Eildon during Thursday. Moderate flooding may develop overnight Thursday into Friday.
 Further rises are possible with forecast rainfall.

Acheron River:
 Moderate flooding may occur along the Acheron River.

The Acheron River at Taggerty is currently at 1.47 m and rising, below the minor flood level. The Acheron River at Taggerty is likely to exceed the minor flood level (2.30 m) early Thursday morning. The river level may reach the moderate flood level (2.60 m) early Thursday afternoon. Further rises are possible with forecast rainfall.

Yea River:
 Minor flooding is likely to develop along the Yea River during Thursday.
 Moderate flooding may develop overnight Thursday into Friday. Further rises are possible with forecast rainfall.

King Parrot Creek:
 Minor flooding is likely to develop along the King Parrot Creek during Thursday. Moderate flooding may develop overnight Thursday into Friday. Further rises are possible with forecast rainfall.

Sunday Creek:
 Minor flooding is likely along the Sunday Creek during Thursday. Moderate flooding may develop overnight Thursday into Friday. Further rises are possible with forecast rainfall.

Goulburn River Lake Eildon to Seymour:
 Moderate flooding may occur along the Goulburn River Lake Eildon to Seymour.

The Goulburn River at Seymour is currently at 3.58 metres and rising, below the minor flood level. The Goulburn River at Seymour is likely to exceed the minor flood level (3.80 m) early Thursday morning. The river level may reach the moderate flood level (5.20 m) Thursday evening. Further rises are possible with forecast rainfall.

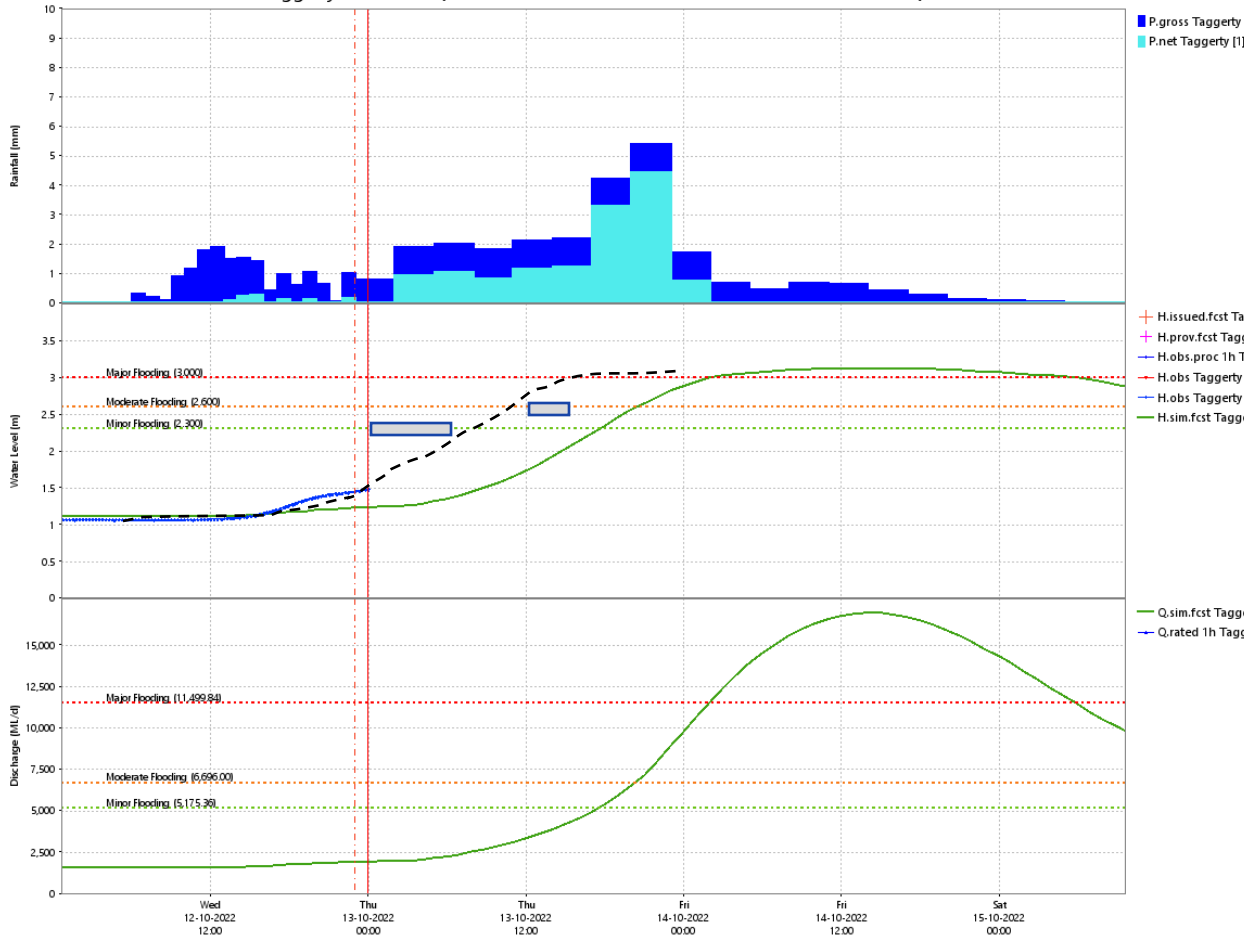
Hughes Creek:
 Minor flooding is likely to develop along the Hughes Creek during Thursday.
 Further rises are possible with forecast rainfall.

24 hr rainfall observations to 00:00 13/10/2022



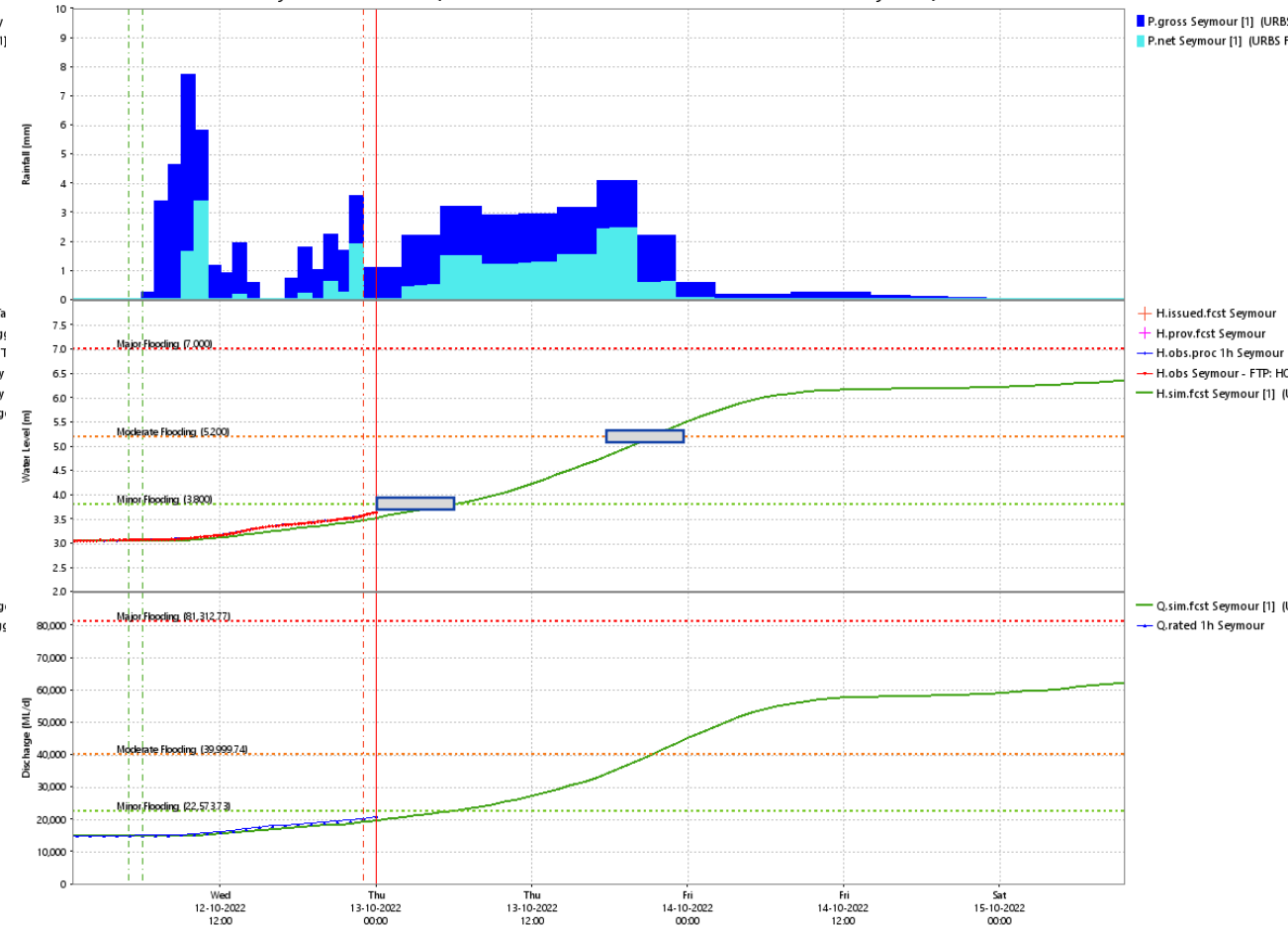
Warning #1 - 00:09 Thursday 13/10/2022

URBS: Taggerty - H088119 (SubCatch: Goulburn River Catchment Eildon to Trawool)



Goulburn URBS Forecast (Current Policy): [1] Wed 12-10-2022 23:00:00 AEDT Current

URBS: Seymour - H088126 (SubCatch: Goulburn River Catchment Trawool to Seymour)



Goulburn URBS Forecast (Current Policy): [1] Wed 12-10-2022 23:00:00 AEDT Current

- Warning Timeframe
- Modelled Hydrograph
- Observed Water Level

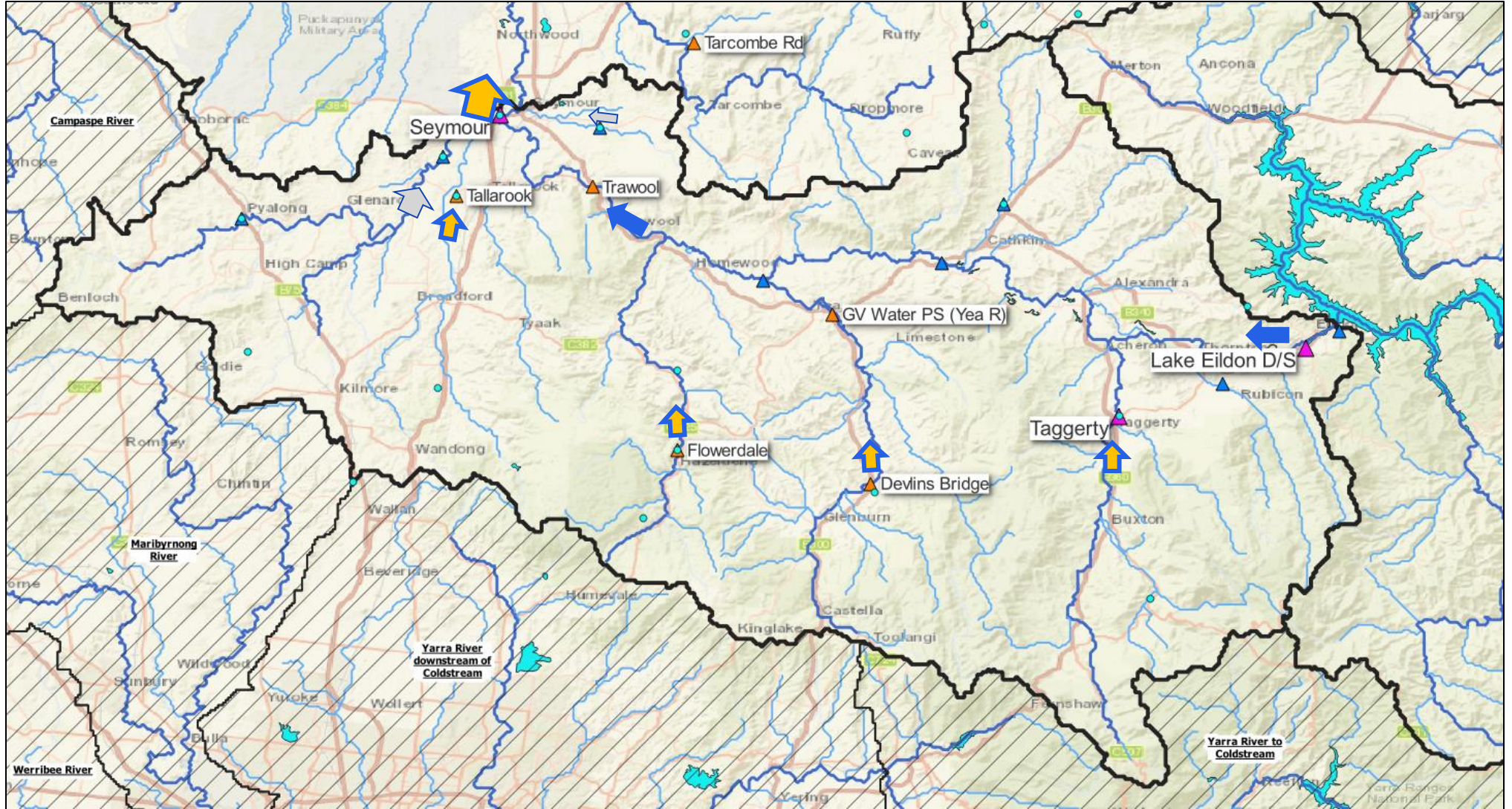


Warning #1

Legend

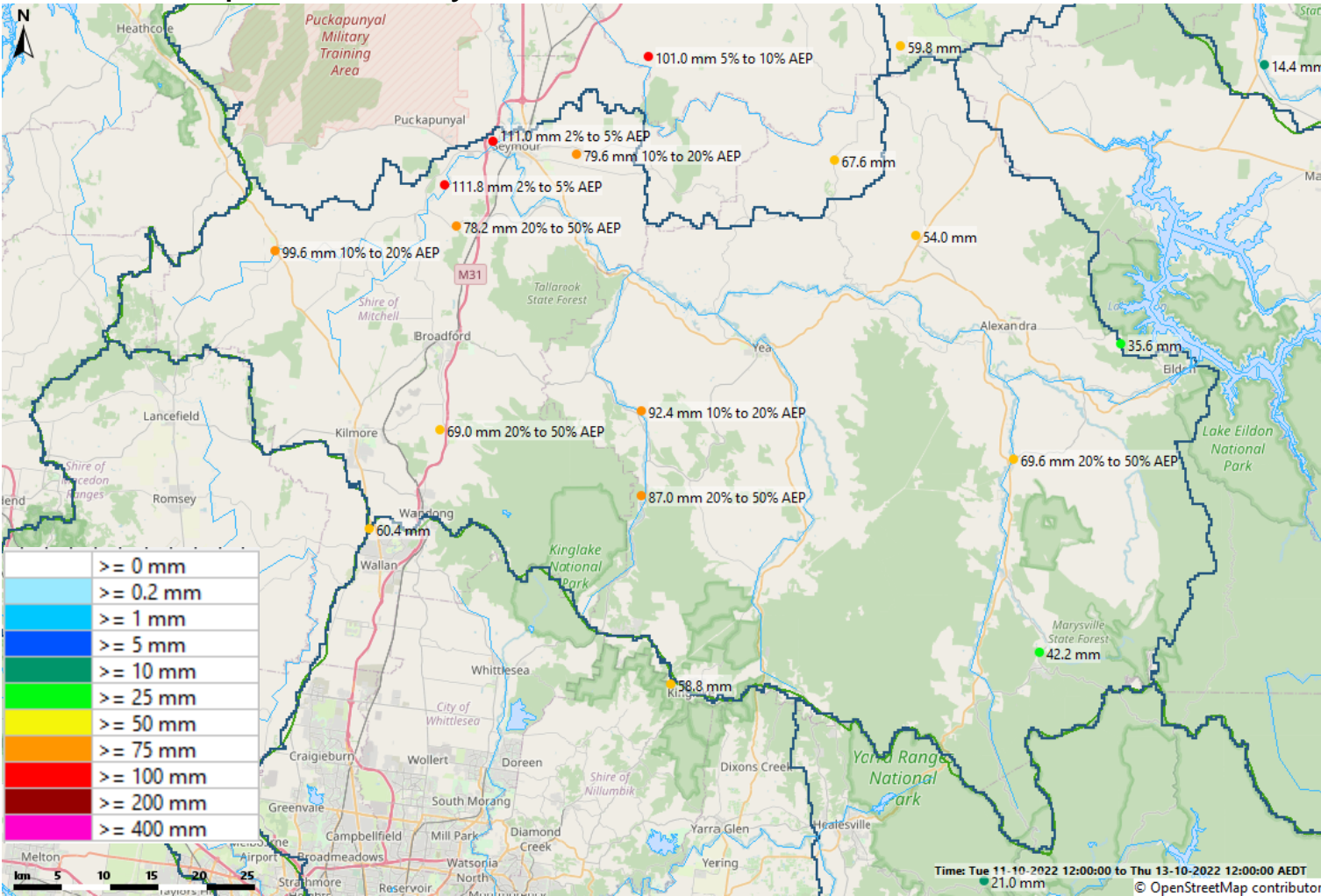
-  Forecast
-  Current

- Data
-  Below Minor
 -  Minor
 -  Moderate
 -  Major



Warning #3

12:11 pm Thursday 13/10/2022



Goulburn River upstream of Lake Eildon:
Minor flooding is likely along the Goulburn River upstream of Lake Eildon during Thursday. Further rises are possible with forecast rainfall.

Acheron River:
Major flooding is likely along the Acheron River.

The Acheron River at Taggerty is currently at 2.64 metres and steady, with moderate flooding. The Acheron River at Taggerty is likely to exceed the major flood level (3.00 m) Thursday evening. Further rises are possible with forecast rainfall.

Yea River:
Major flooding is occurring along the Yea River at Devlins Bridge. Further rises are possible with forecast rainfall.

King Parrot Creek:
Minor flooding is occurring along the King Parrot Creek. Moderate flooding is expected Thursday afternoon. Major flooding is possible from Thursday evening. Further rises possible with forecast rainfall.

Sunday Creek:
Moderate flooding is occurring along the Sunday Creek at Tallarook. Major flooding is possible from Thursday afternoon. Further rises are possible with forecast rainfall.

Goulburn River Lake Eildon to Seymour:
Major flooding is likely along the Goulburn River Lake Eildon to Seymour. Minor flooding is occurring along the Goulburn River to Trawool and moderate flooding is likely to develop from Thursday evening. Further rises are possible with forecast rainfall.

The Goulburn River at Seymour is currently at 5.73 metres and steady, with moderate flooding. The Goulburn River at Seymour is likely to exceed the major flood level (7.00 m) Thursday evening. Further rises are possible with forecast rainfall.

Hughes Creek:
Major flooding is occurring along the Hughes Creek at Tarcombe. Further rises are possible with forecast rainfall.

48 hr rainfall observations to 12:00 13/10/2022



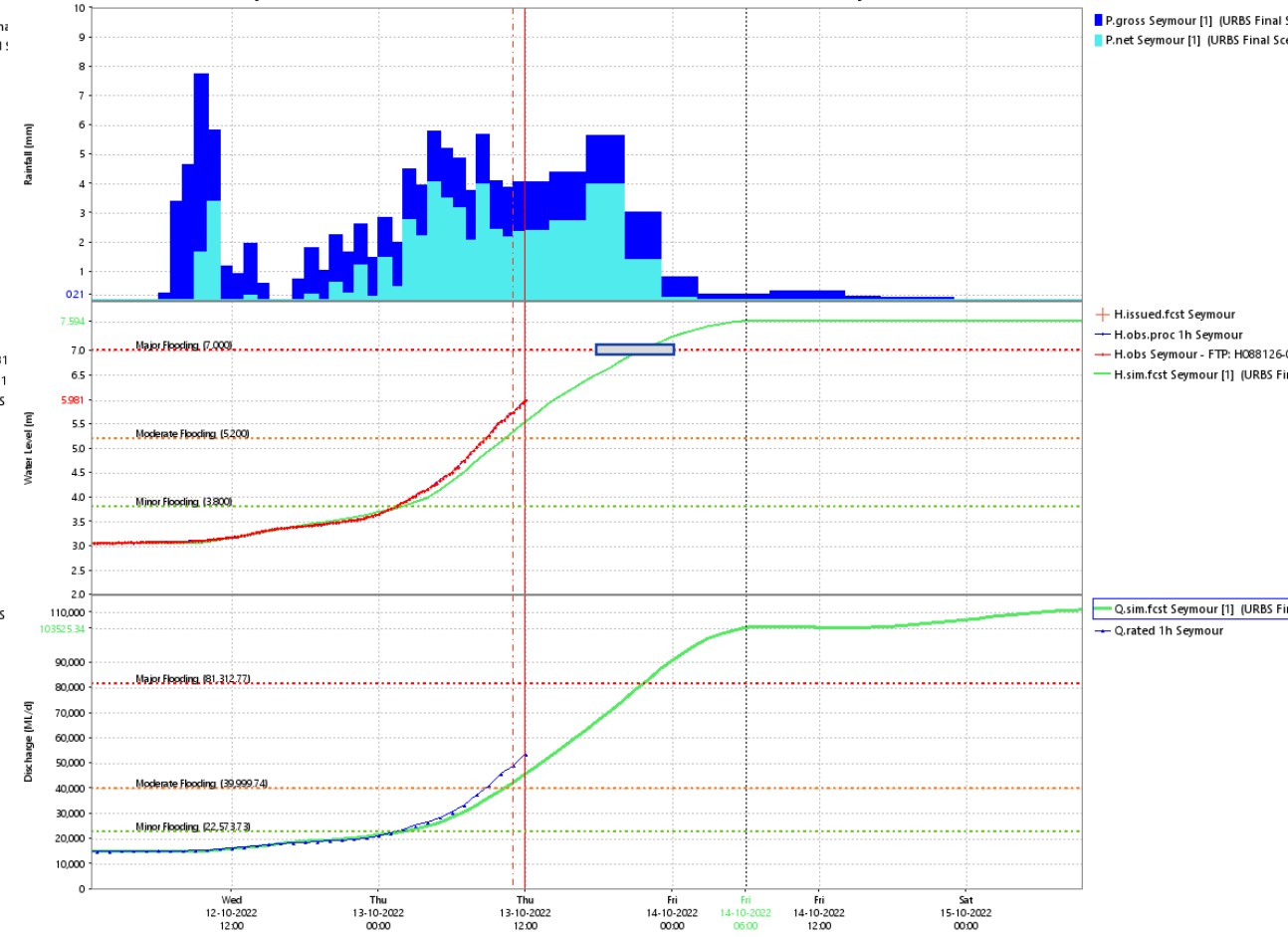
Warning #3 - 12:11 pm Thursday 13/10/2022

URBS: Taggerty - H088119 (SubCatch: Goulburn River Catchment Eildon to Trawool)



Goulburn URBS Forecast (What-If Scenario): [1] Thu 13-10-2022 11:00:00 AEDT Current

URBS: Seymour - H088126 (SubCatch: Goulburn River Catchment Trawool to Seymour)



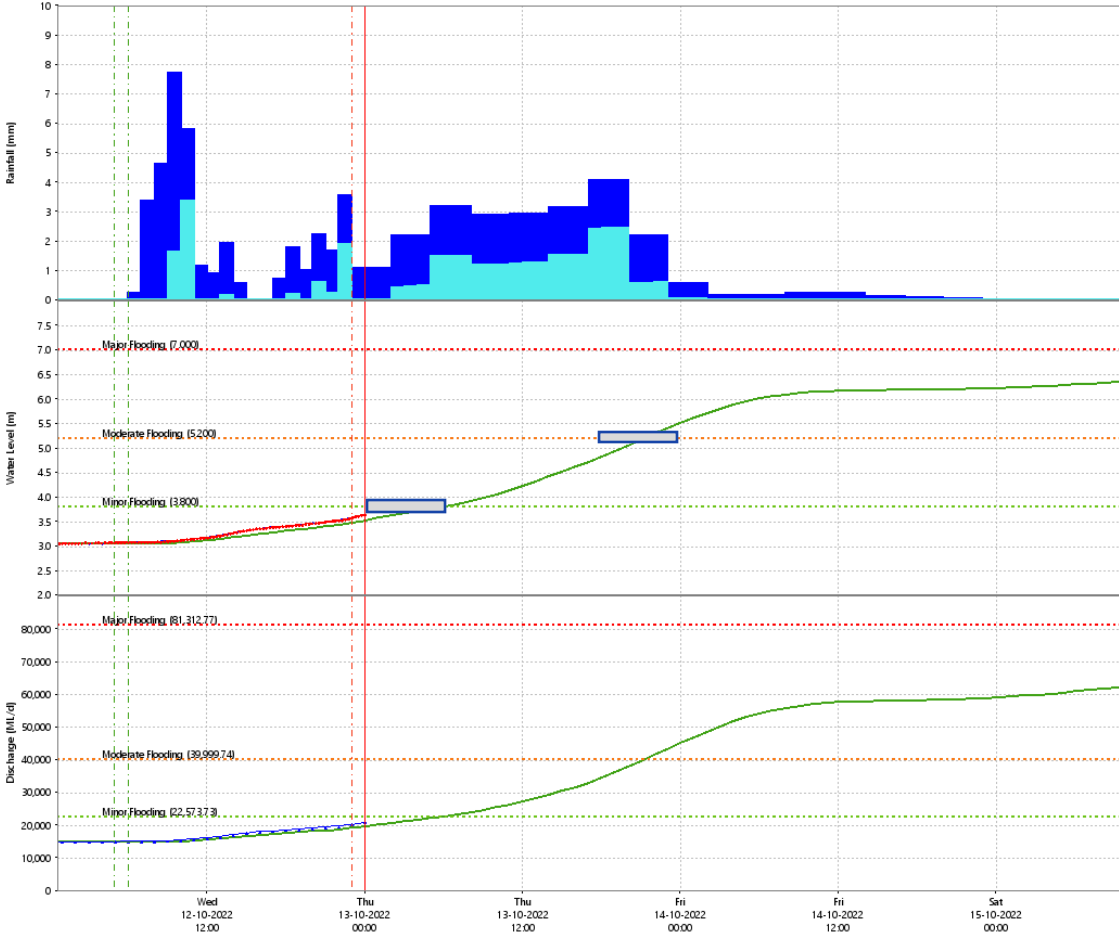
Goulburn URBS Forecast (What-If Scenario): [1] Thu 13-10-2022 11:00:00 AEDT Current

- Warning Timeframe
- Modelled Hydrograph
- Observed Water Level



Warning #1

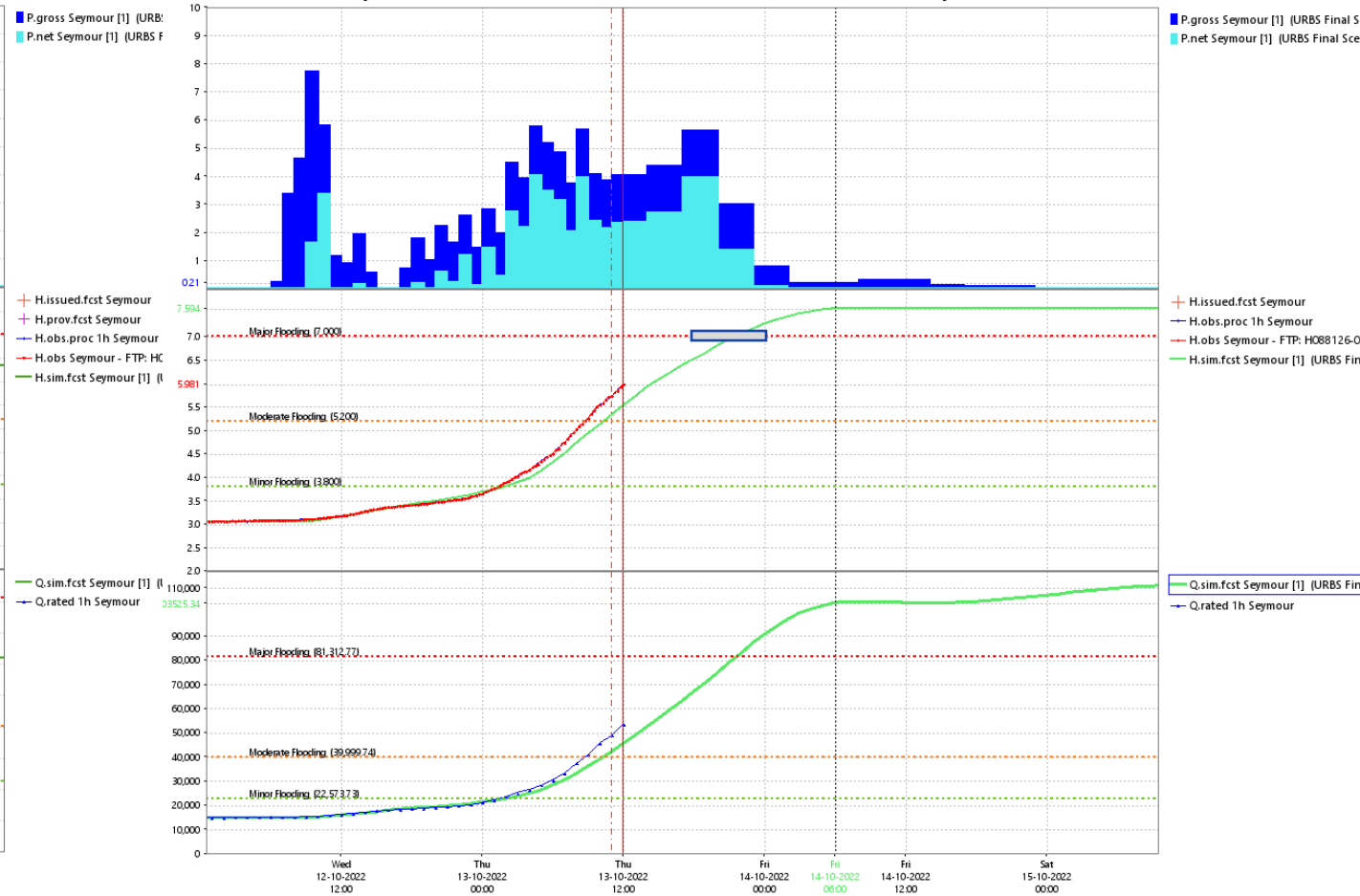
URBS: Seymour - H088126 (SubCatch: Goulburn River Catchment Trawool to Seymour)



Goulburn URBS Forecast (Current Policy): [1] Wed 12-10-2022 23:00:00 AEDT Current

Warning #3

URBS: Seymour - H088126 (SubCatch: Goulburn River Catchment Trawool to Seymour)



Goulburn URBS Forecast (What-If Scenario): [1] Thu 13-10-2022 11:00:00 AEDT Current

- Warning Timeframe
- Modelled Hydrograph
- Observed Water Level

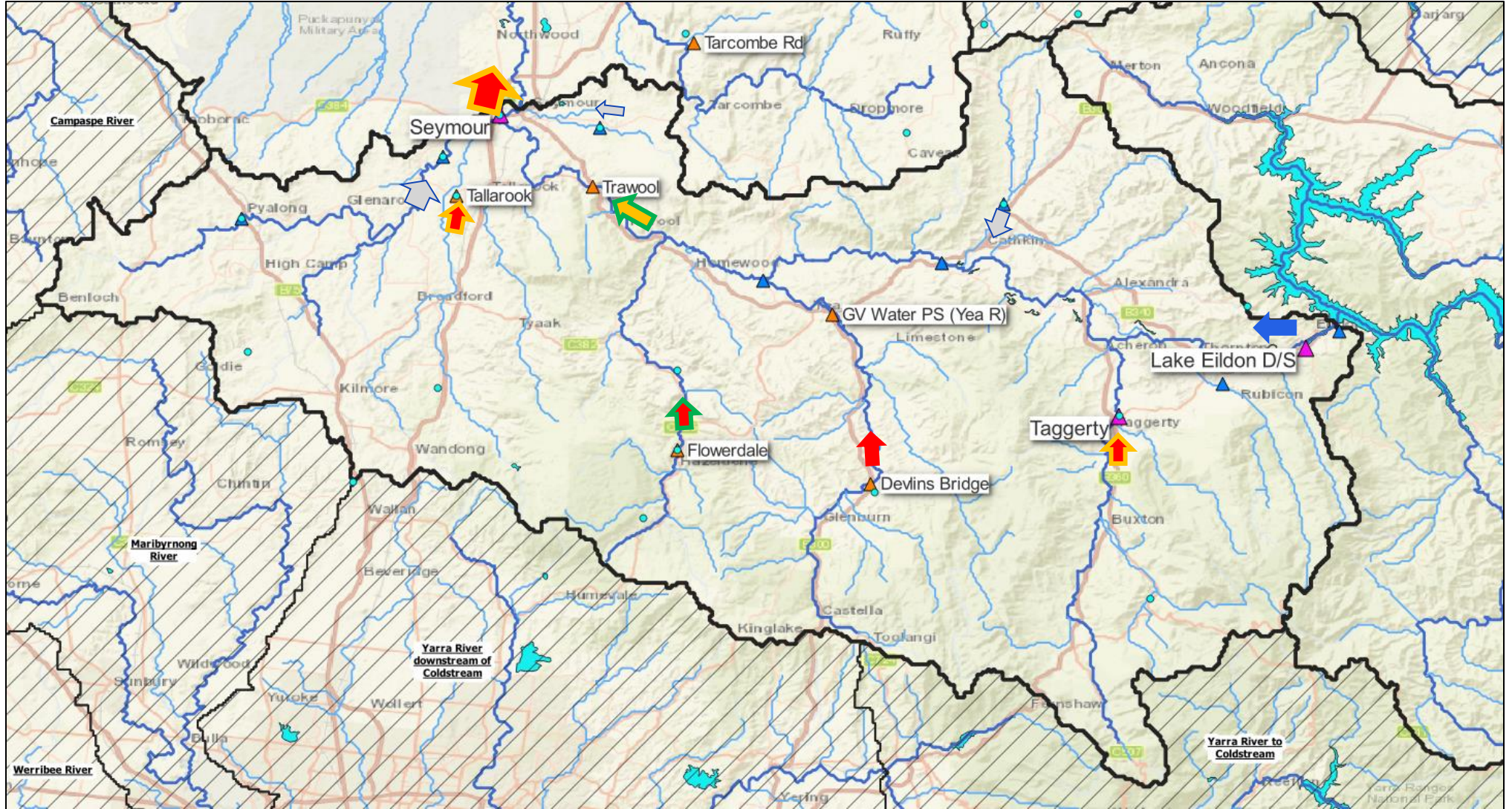


Warning #3

Legend

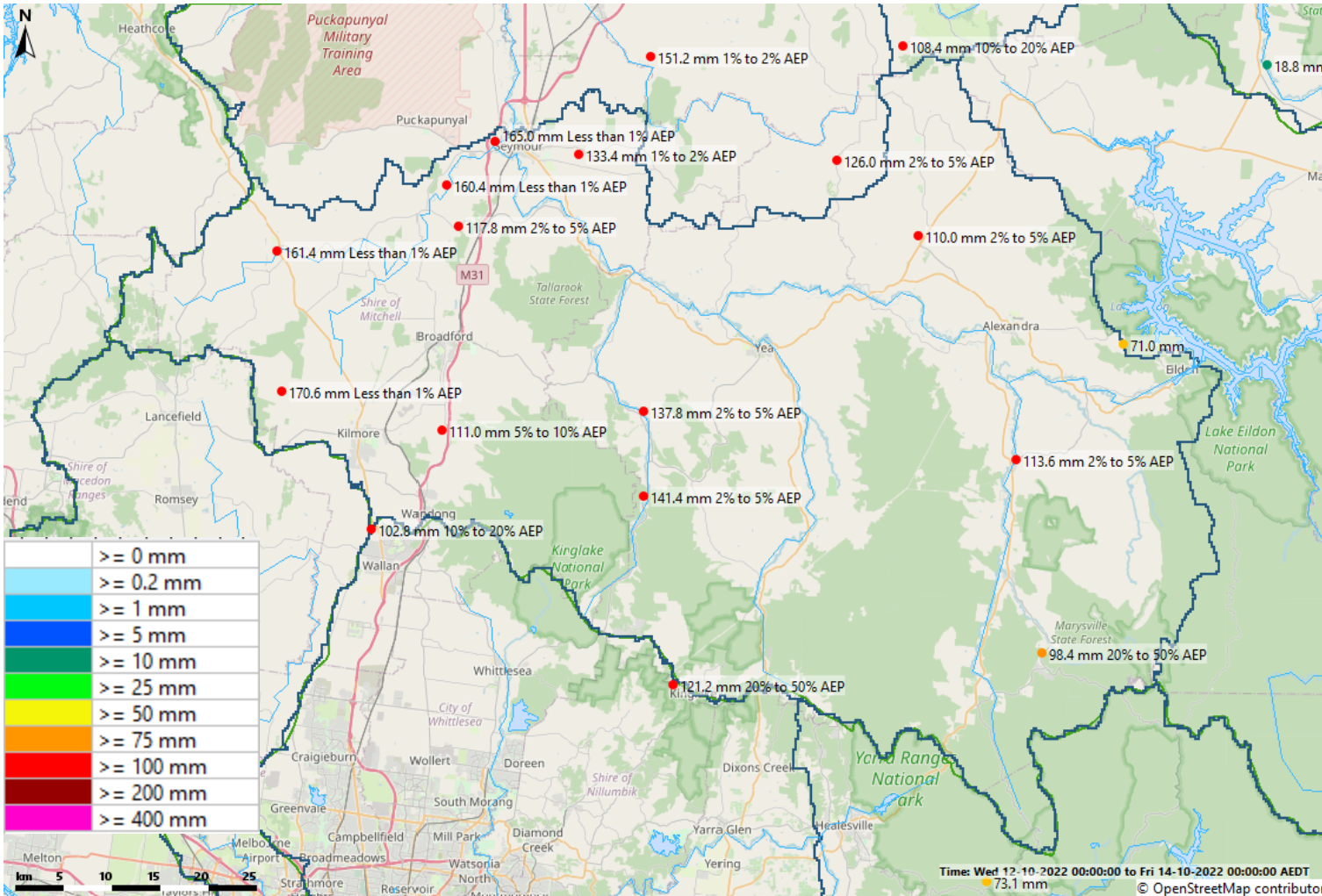
-  Forecast
-  Current

- Data
-  Below Minor
 -  Minor
 -  Moderate
 -  Major



Warning #6

11:25pm Thursday 13/10/2022



Goulburn River upstream of Lake Eildon:

Minor flooding is likely along the Goulburn River upstream of Lake Eildon during Thursday and Friday. Further rises are possible with forecast rainfall.

Acheron River:

Major flooding is expected along the Acheron River.

The Acheron River at Taggerty is currently at 2.95 metres and rising, with moderate flooding. The Acheron River at Taggerty is expected to exceed the major flood level (3.00 m) early Friday morning. Further rises are possible with forecast rainfall, and the river level may reach 3.20 metres

Yea River:

Major flooding is occurring along the Yea River at Devlins Bridge. Further rises are possible with forecast rainfall.

King Parrot Creek:

Major flooding is occurring at King Parrot Creek at Flowerdale. Further rises are possible with forecast rainfall.

Sunday Creek:

Major flooding is occurring along the Sunday Creek at Tallarook. Further rises are possible with forecast rainfall.

Goulburn River Lake Eildon to Seymour:

Major flooding is imminent along the Goulburn River Lake Eildon to Seymour. Further rises are possible with forecast rainfall.

The Goulburn River D/S Lake Eildon is currently at 3.27 metres and rising with minor flooding. Further rises above the minor flood level (3.00 m) are likely during Friday morning.

The Goulburn River at Seymour is currently at 8.04 metres and rising, with major flooding. The Goulburn River at Seymour is likely to reach around 8.20 metres early Friday morning. Further rises are possible, and the river level may reach around 8.50 metres by 6am Friday morning.

Hughes Creek:

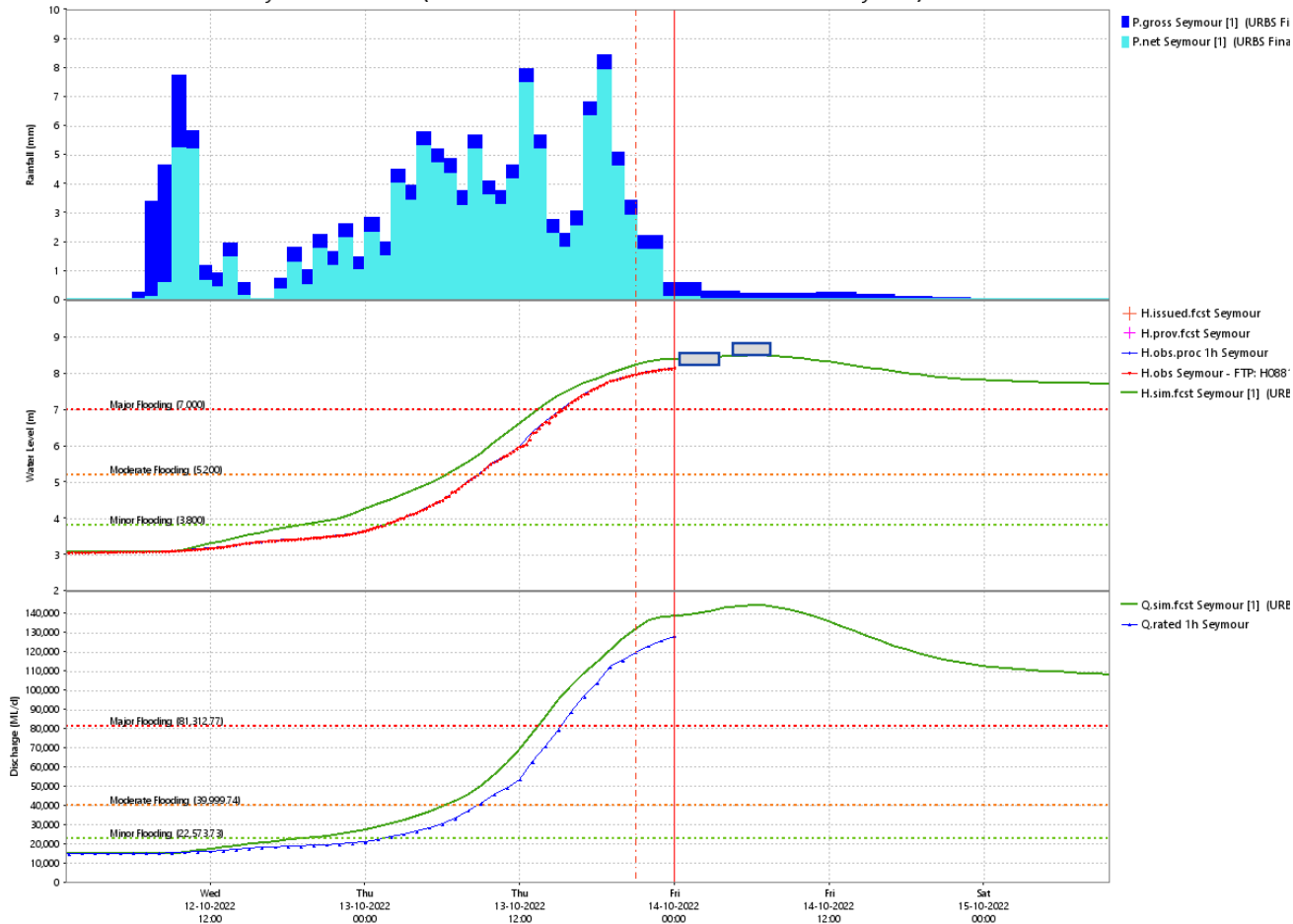
Major flooding is occurring along the Hughes Creek at Tarcombe Road. Further rises are possible with forecast rainfall.

48 hr rainfall observations to 00:00 14/10/2022



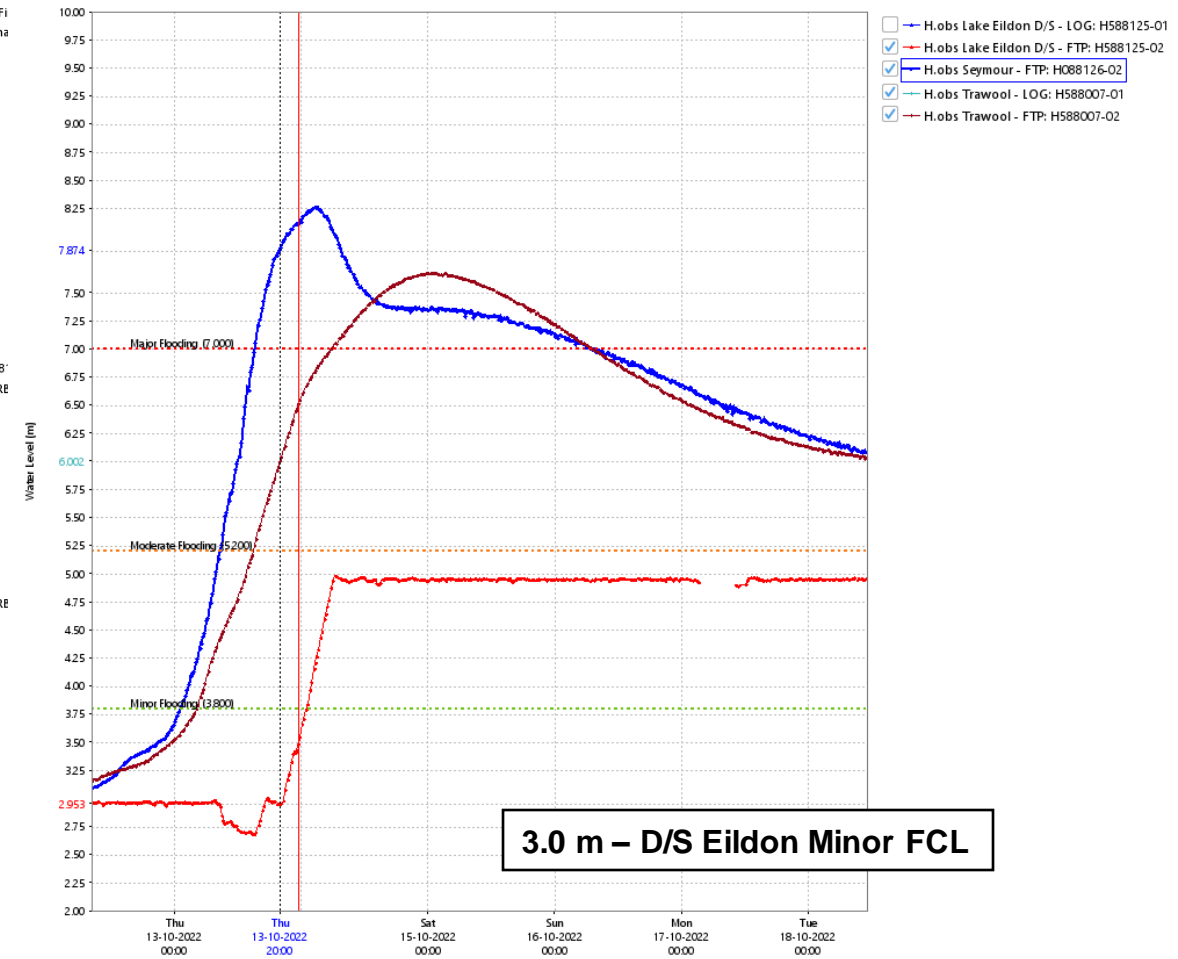
Warning #6

URBS: Seymour - H088126 (SubCatch: Goulburn River Catchment Trawool to Seymour)



Goulburn URBS Forecast (Current Policy): [1] Thu 13-10-2022 21:00:00 AEDT Current

- Warning Timeframe
- Modelled Hydrograph
- Observed Water Level

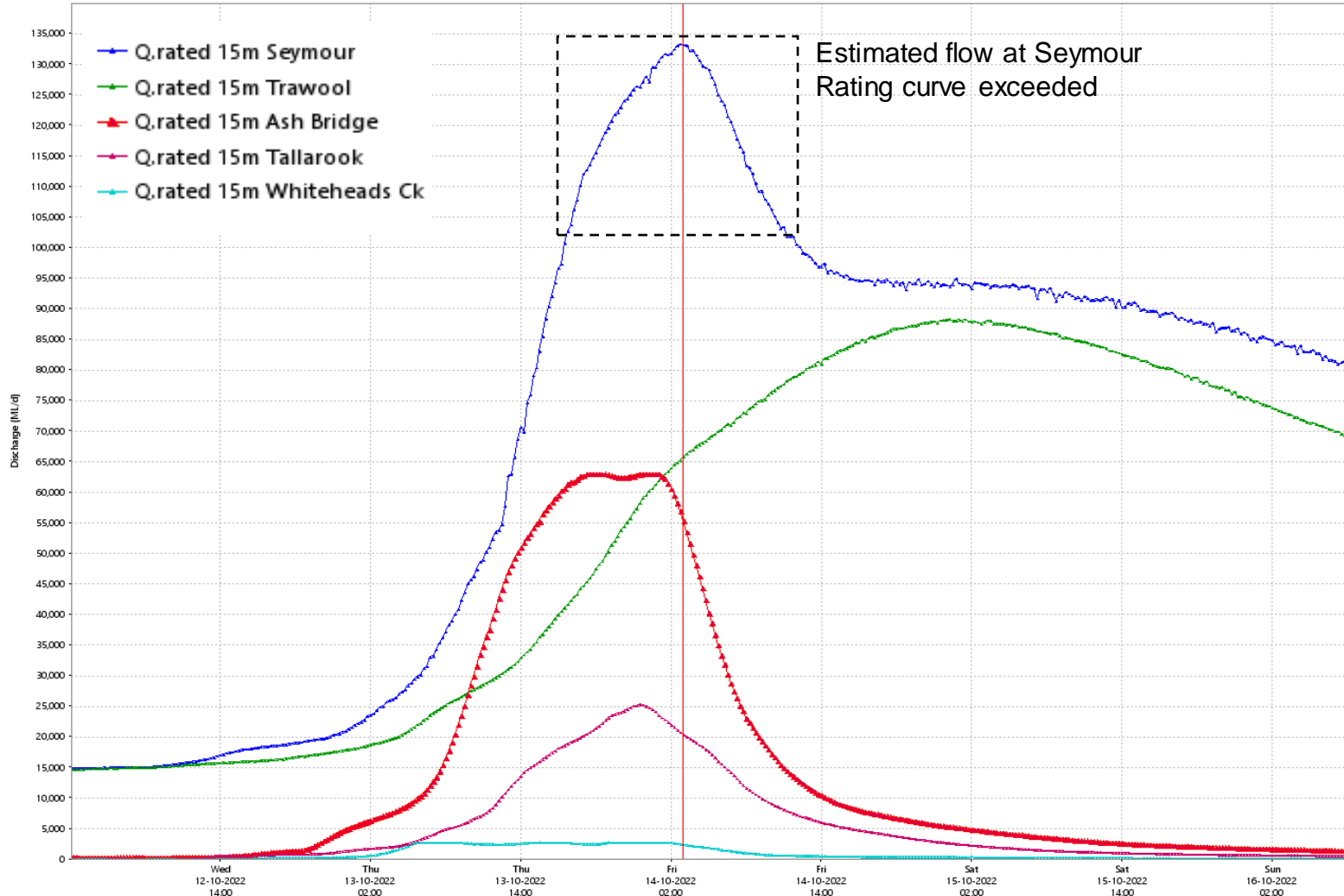
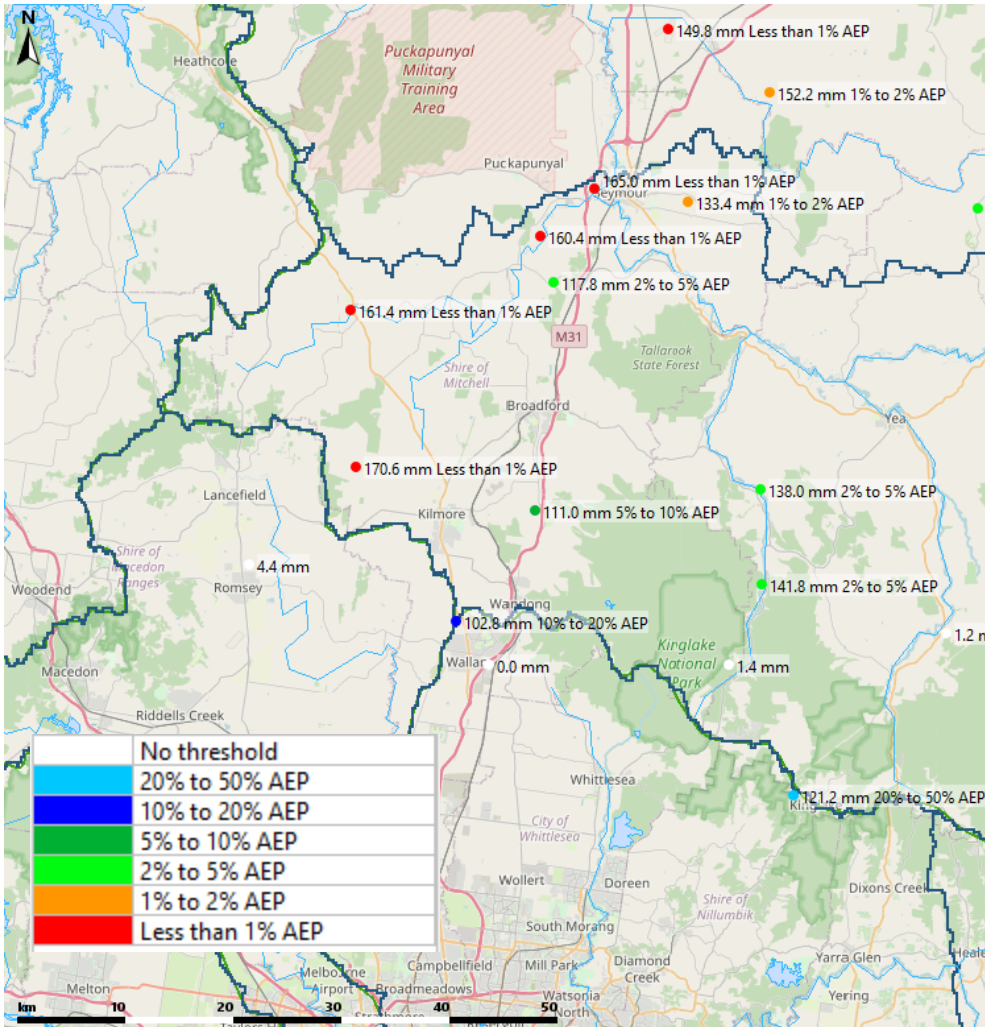


Observed Hydrograph



Seymour Peak – 3:00 am 14/10/2022

48 hr rainfall observations to 03:00 14/10/2022

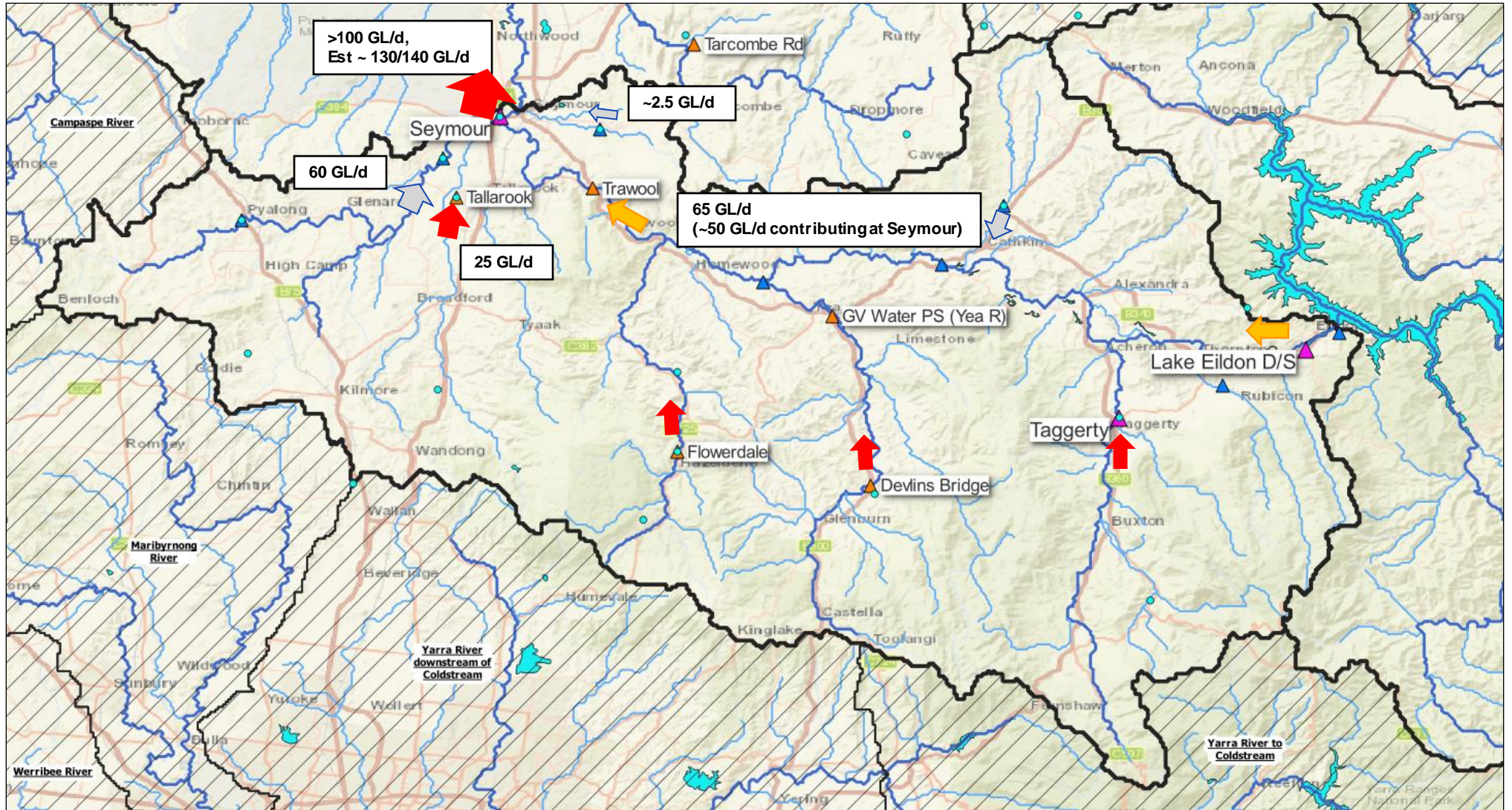


Seymour Peak – 3:00 am Fri 14/10/2022

Legend
➔ Severity

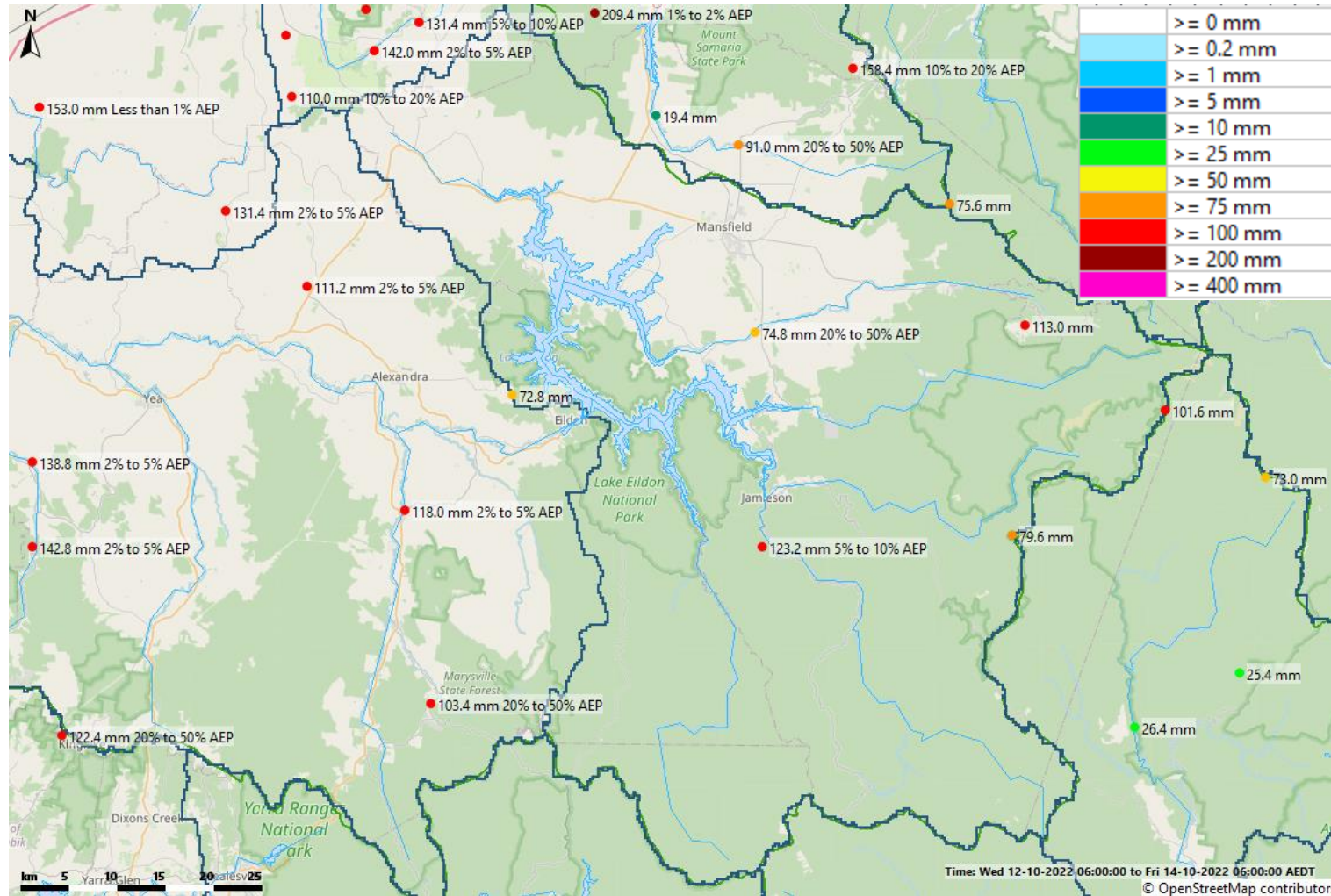
Data
Below Minor
Minor
Moderate
Major

NB:
1 GL/d = 1 000 ML/d



Warning #8

5:59 am Friday 14/10/2022



Goulburn River upstream of Lake Eildon:
Minor flooding is occurring along the Goulburn River upstream of Lake Eildon, and will continue during Friday.

Acheron River:
Major flooding is occurring along the Acheron River.

The Acheron River at Taggerty peaked at 3.27 metres around 03:00 am Friday 14 October and is currently at 3.14 metres and falling. The Acheron River at Taggerty is likely to fall below the major flood level (3.00 m) Friday morning.

Yea River:
Major flooding is occurring along the Yea River at Devlins Bridge.

King Parrot Creek:
Moderate flooding is occurring at King Parrot Creek at Flowerdale.

Sunday Creek:
Major flooding is occurring along the Sunday Creek at Tallarook.

Goulburn River Lake Eildon to Seymour:
Major flooding is occurring along the Goulburn River Lake Eildon to Seymour.

The Goulburn River D/S Lake Eildon is currently at 4.71 metres and rising with moderate flooding. The Goulburn River D/S Lake Eildon is likely to reach around 4.90 metres Friday morning.

The Goulburn River at Seymour peaked at 8.26 metres around 03:00 am Friday 14 October and is currently at 8.17 metres and falling with major flooding. The Goulburn River at Seymour is likely to remain above the major flood level (7.00 m) during Friday and into the weekend. River levels will remain high as water from the upper Goulburn arrive, but flood levels are not expected to exceed the peak on Friday morning.

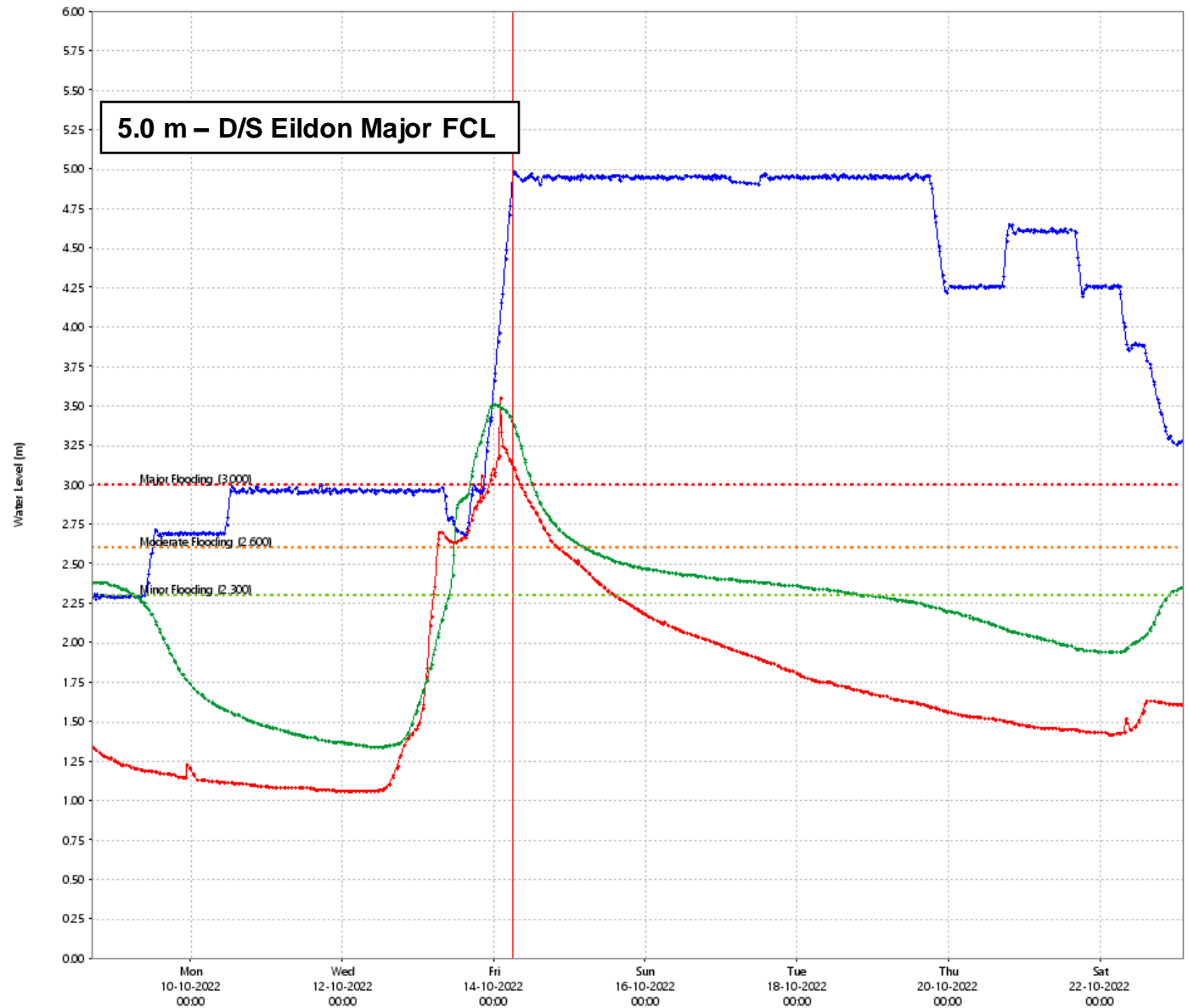
Hughes Creek:
Major flooding is occurring along the Hughes Creek at Tarcombe Road.

48 hr rainfall observations to 06:00 14 October 2022



Warning #8

5:59 am Fri 14/10/2022




- H.obs.proc 15m Lake Eildon D/S
- H.obs.proc 15m Taggerty
- H.obs.proc 15m GV Water PS (Yea R)


FCLs at Taggerty displayed



Warning #8

Legend

 Forecast

 Current

Data

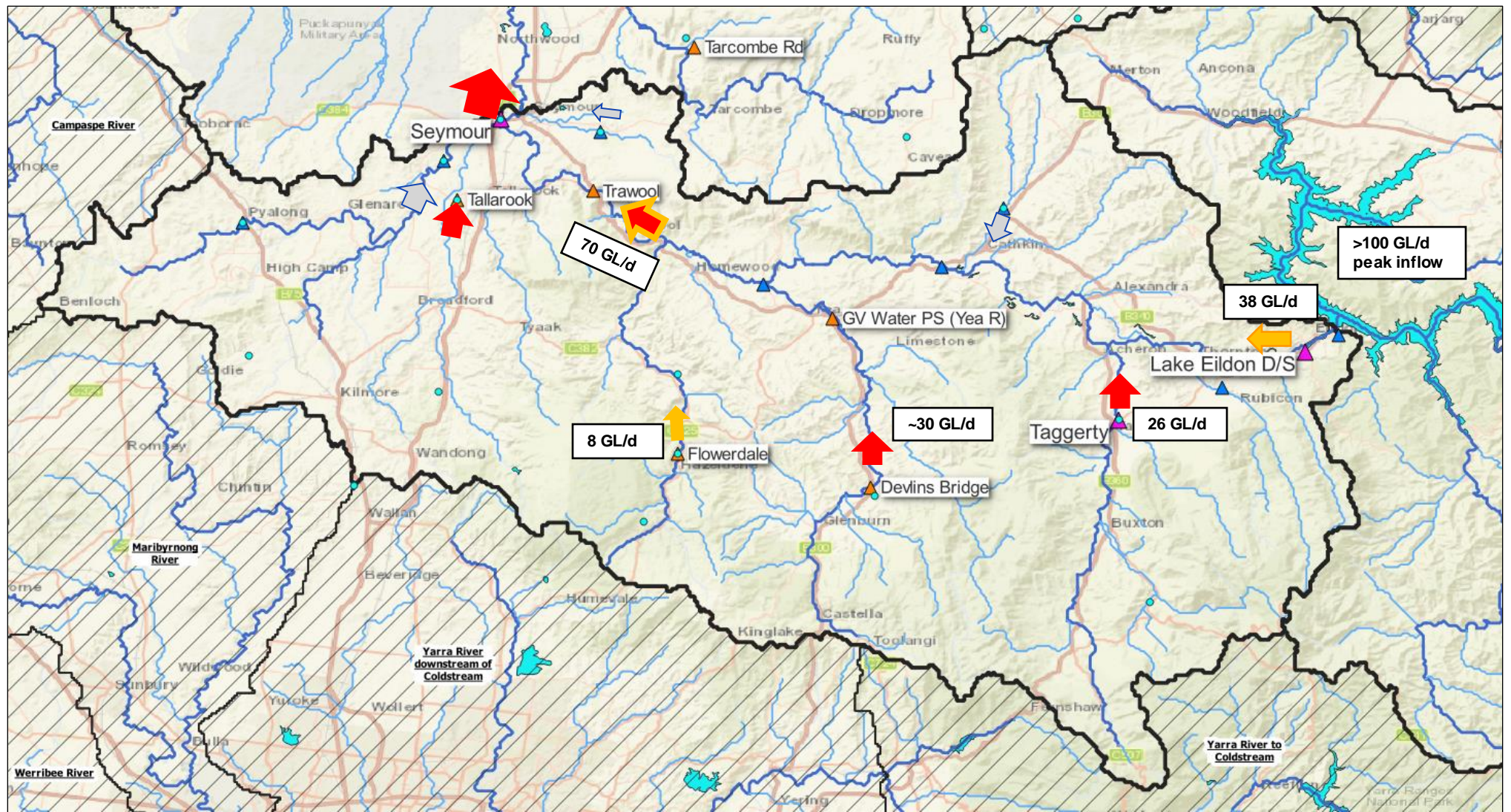
 Below Minor

 Minor

 Moderate

 Major

NB:
1 GL/d = 1 000 ML/d

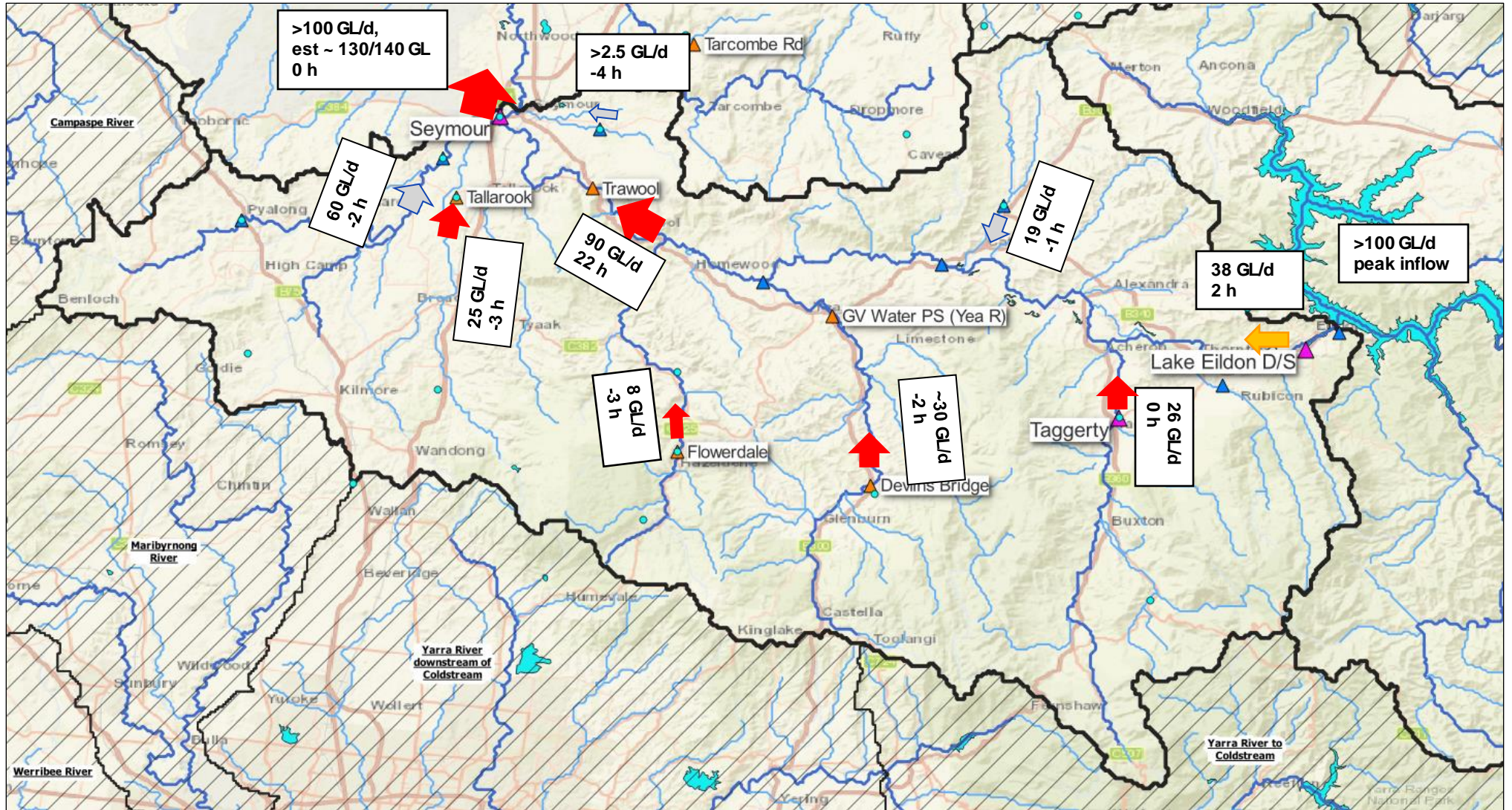


Peak Flow & Timing -- occurred almost simultaneously

Legend
➔ Max Severity

Data
Below Minor
Minor
Moderate
Major

NB:
1 GL/d = 1 000 ML/d

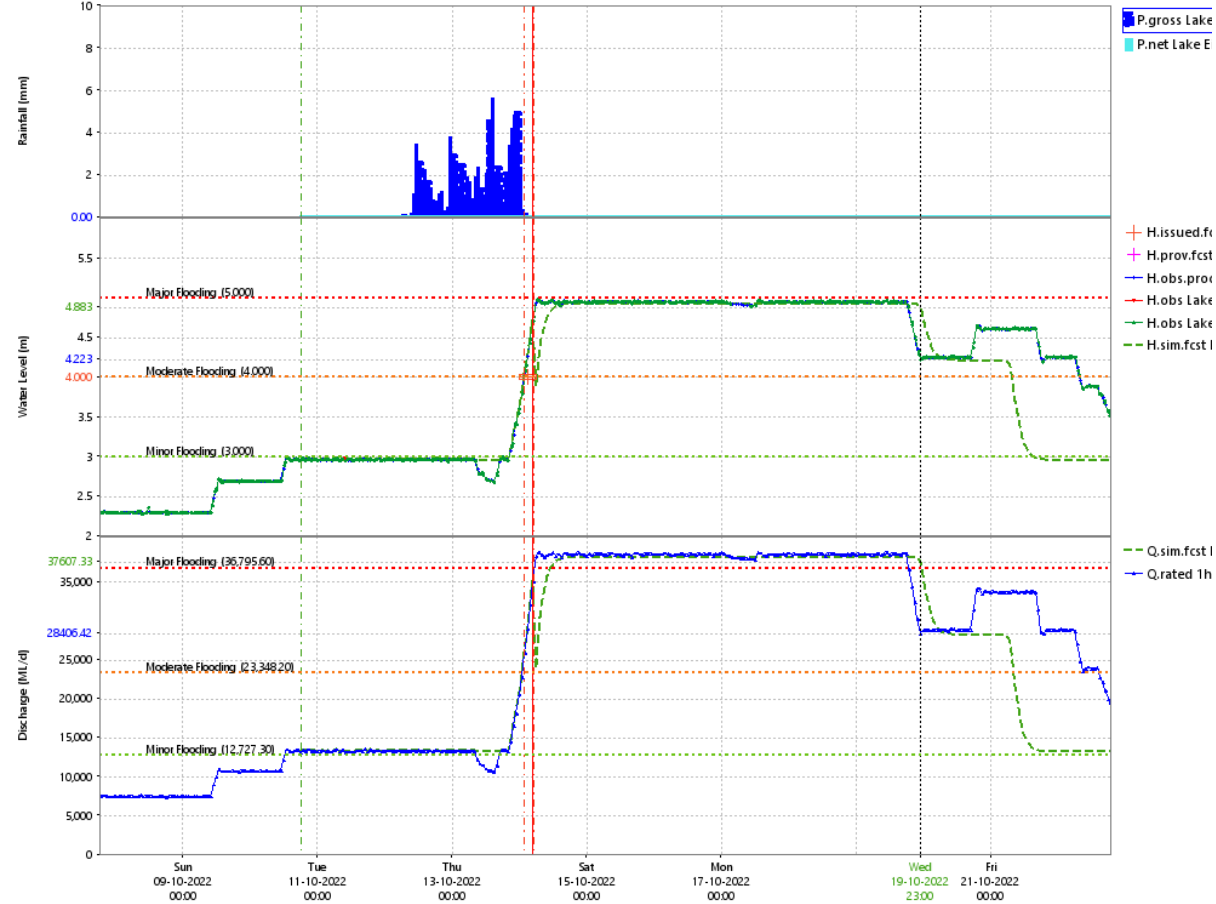


Zero time – Seymour peak at 03:00 14/10/2022



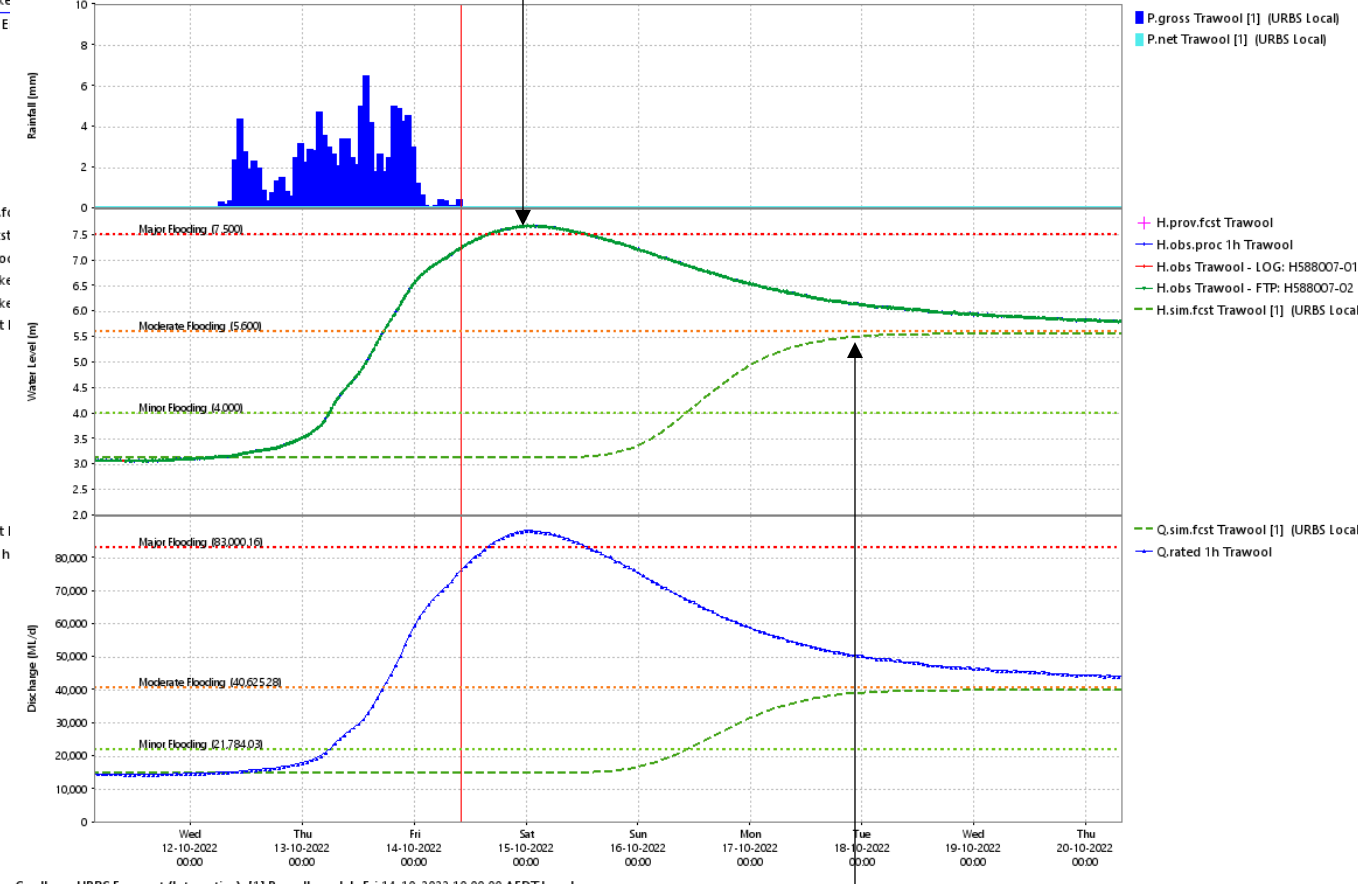
Timing of Eildon Releases

URBS: Lake Eildon D/S - H588125 (SubCatch: Goulburn River Catchment Eildon to Trawool)



Observed Trawool peak

URBS: Trawool - H588007 (SubCatch: Goulburn River Catchment Eildon to Trawool)



External: [1] Fri 14-10-2022 01:54:43 AEDT Goulburn URBS Forecast (Interactive); [2] Run all models Fri 14-10-2022 05:00:00 AEDT Local

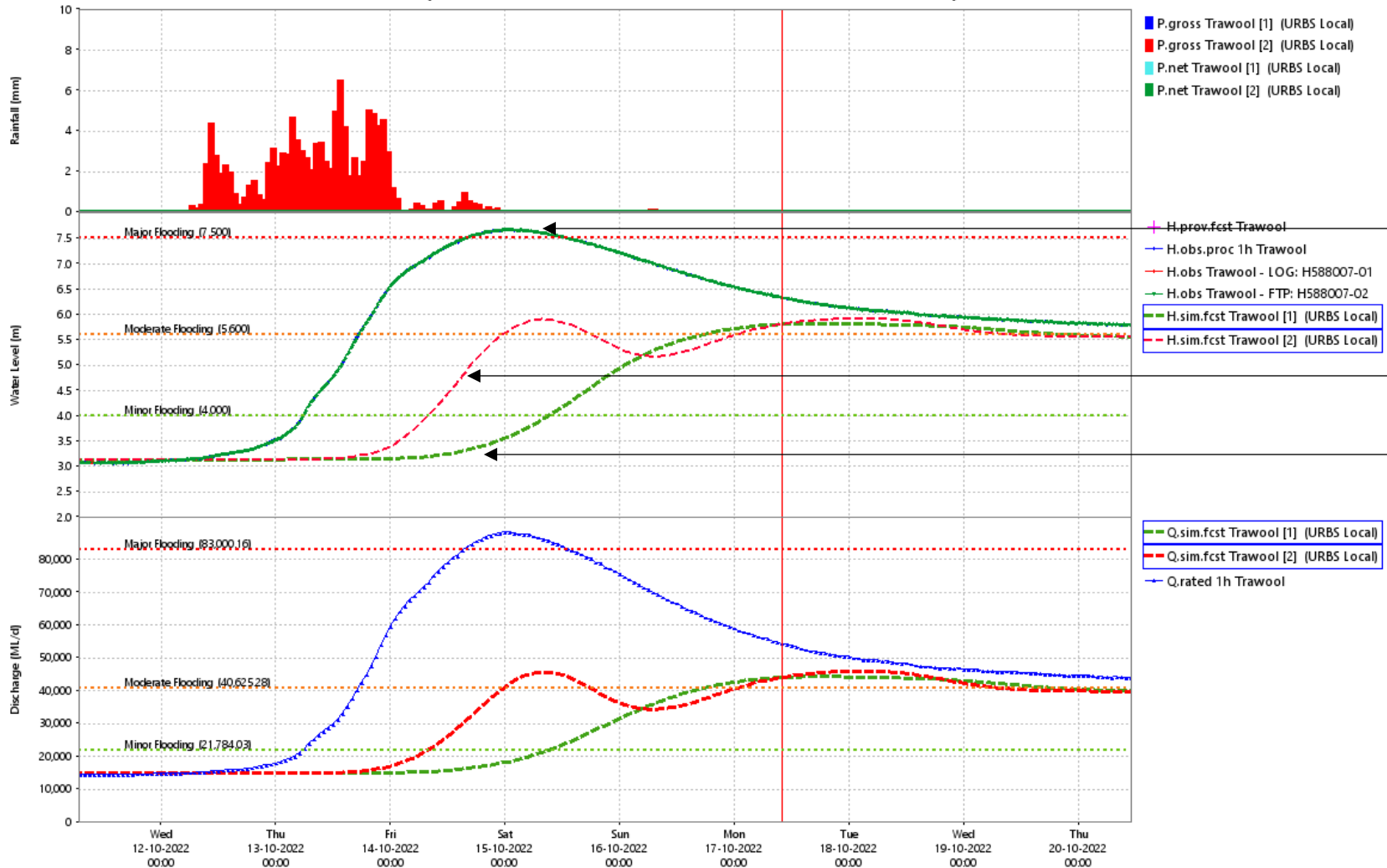
Goulburn URBS Forecast (Interactive): [1] Run all models Fri 14-10-2022 10:00:00 AEDT Local

Modelled Eildon releases arrive at Trawool after peak.
Acheron, Rubicon arrive slightly earlier



Timing of Tributary Inflows

URBS: Trawool - H588007 (SubCatch: Goulburn River Catchment Eildon to Trawool)



Observed Trawool peak

Input flows only at Home Ck, Yea River, King Parrot Creek and Eildon.

Input flows only at Acheron River, Rubicon River and Eildon

No extra modelled rainfall runoff allowed.

Significant local inflows contributed to rises & peak

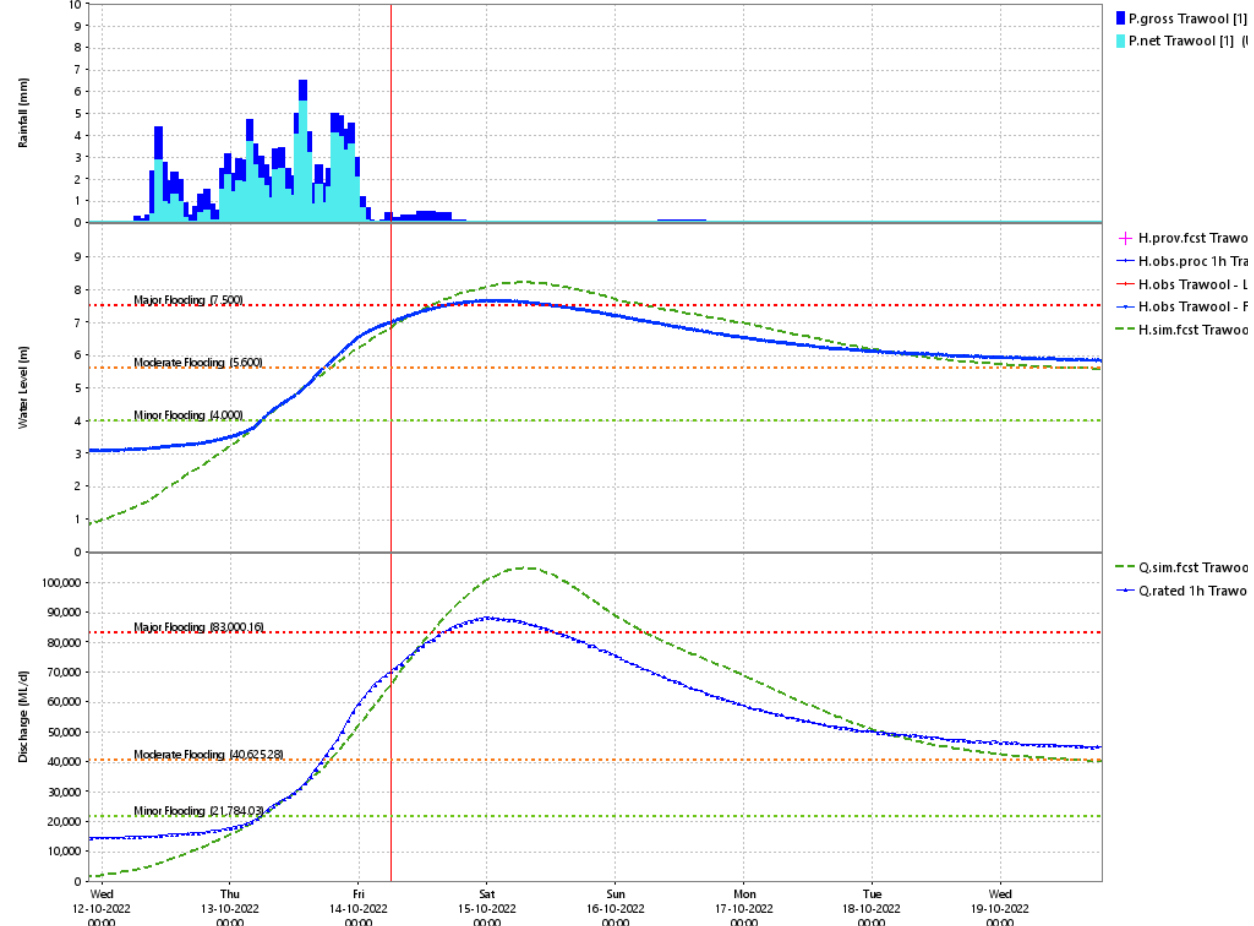
Goulburn URBS Forecast (Interactive): [1] Goulburn R to Trawool Mon 17-10-2022 10:00:00 AEDT Local

Goulburn URBS Forecast (Interactive): [2] Mon 17-10-2022 10:00:00 AEDT Local



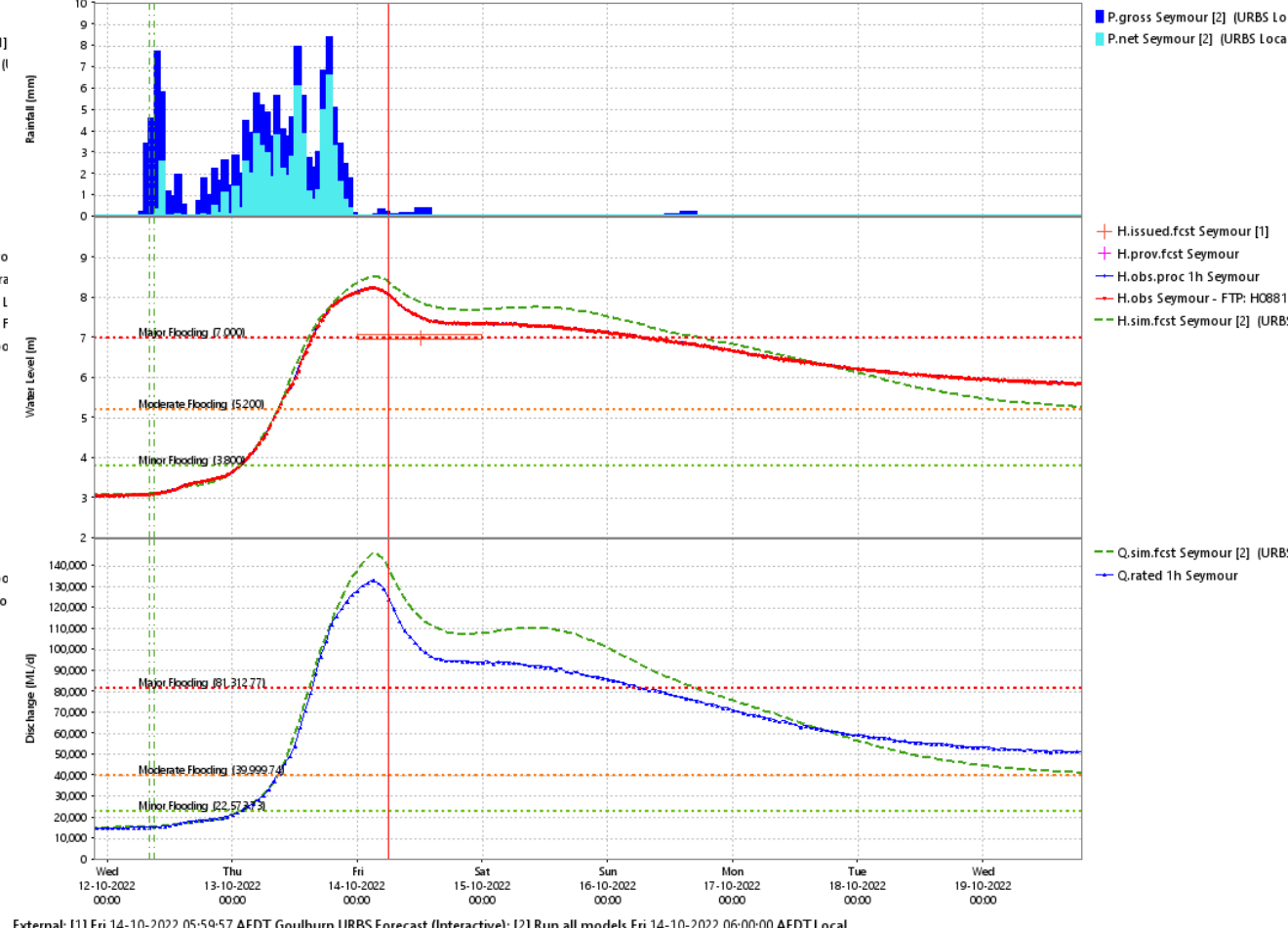
Including Rainfall Runoff

URBS: Trawool - H588007 (SubCatch: Goulburn River Catchment Eildon to Trawool)



Goulburn URBS Forecast (Interactive): [1] Run all models Fri 14-10-2022 06:00:00 AEDT Local

URBS: Seymour - H088126 (SubCatch: Goulburn River Catchment Trawool to Seymour)

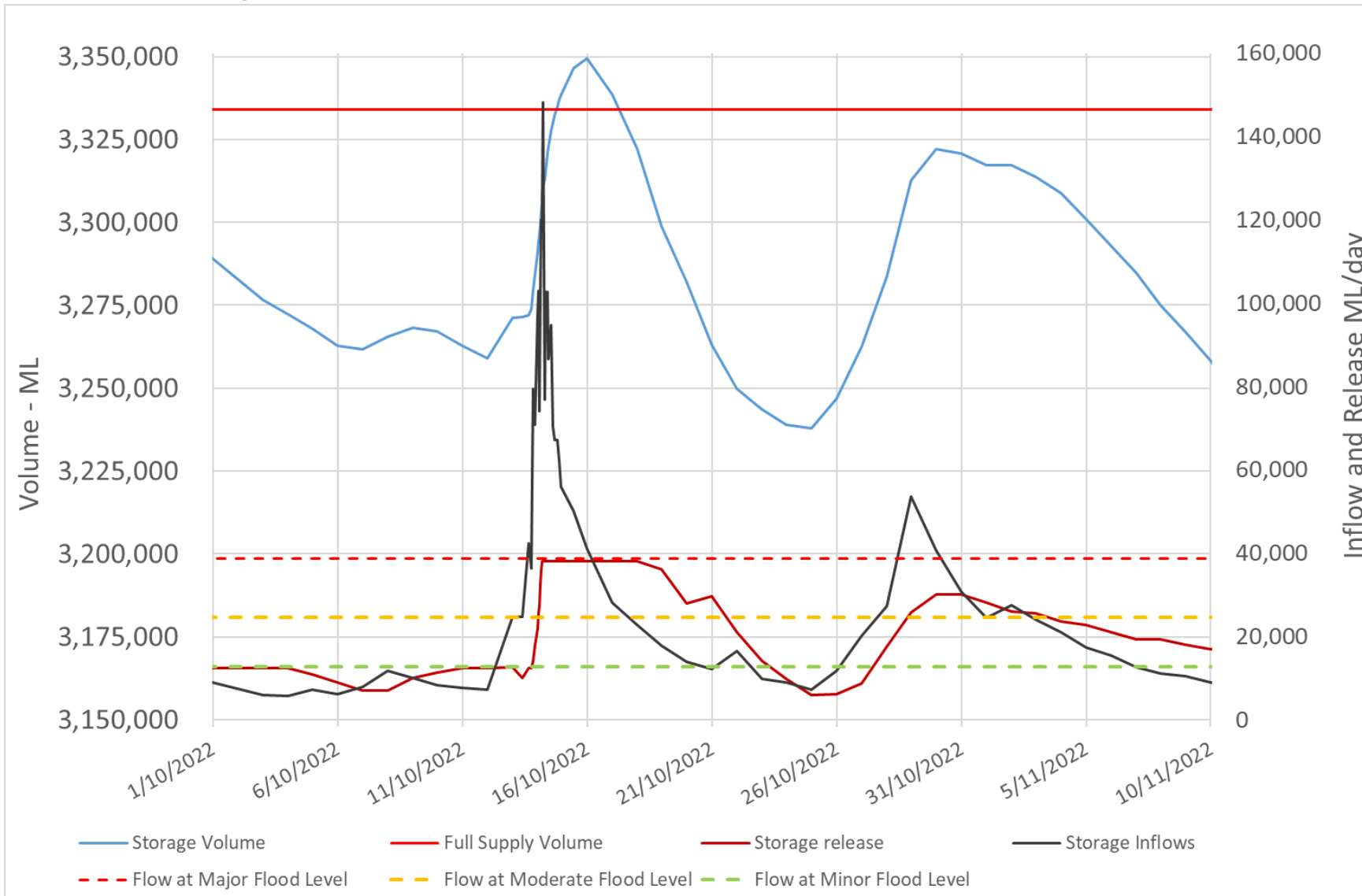


External: [1] Fri 14-10-2022 05:59:57 AEDT Goulburn URBS Forecast (Interactive); [2] Run all models Fri 14-10-2022 06:00:00 AEDT Local

Significant local inflows contributed to rises & peak at Seymour and Trawool



Goulburn Murray Water Operations



Delivering for our region and our future

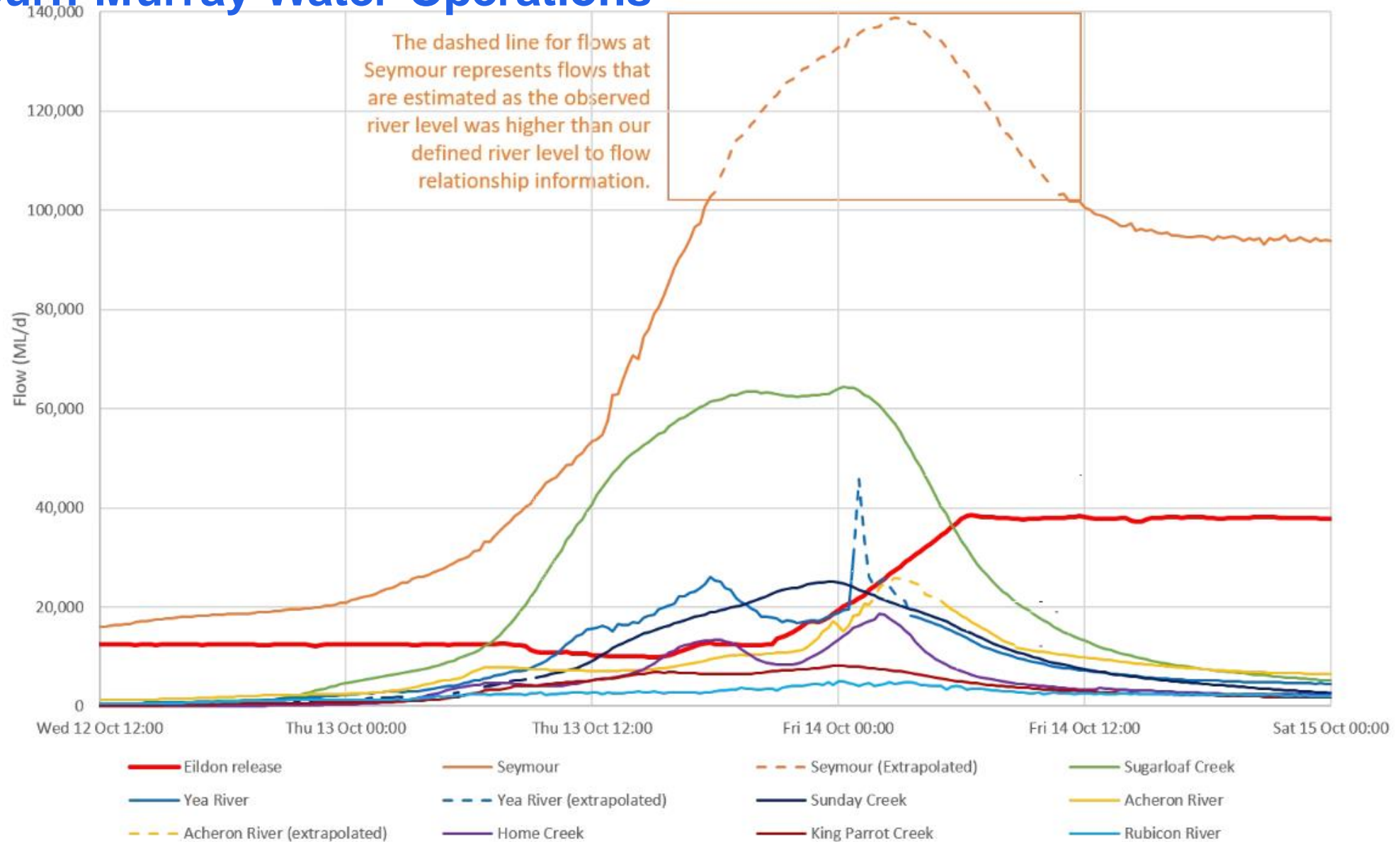
OFFICIAL



1800 013 357

Goulburn Murray Water Operations

OFFICIAL



Delivering for our region and our future

OFFICIAL

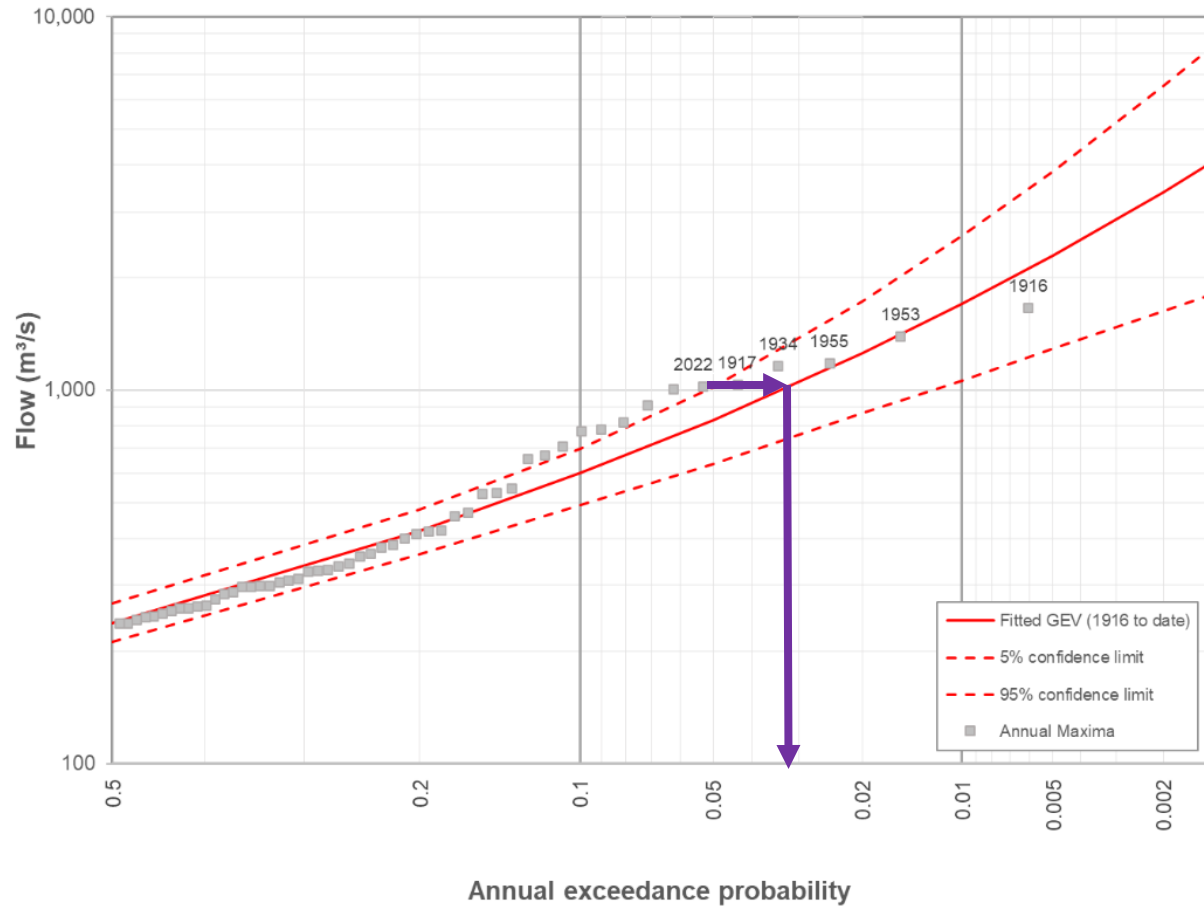


1800 013 357

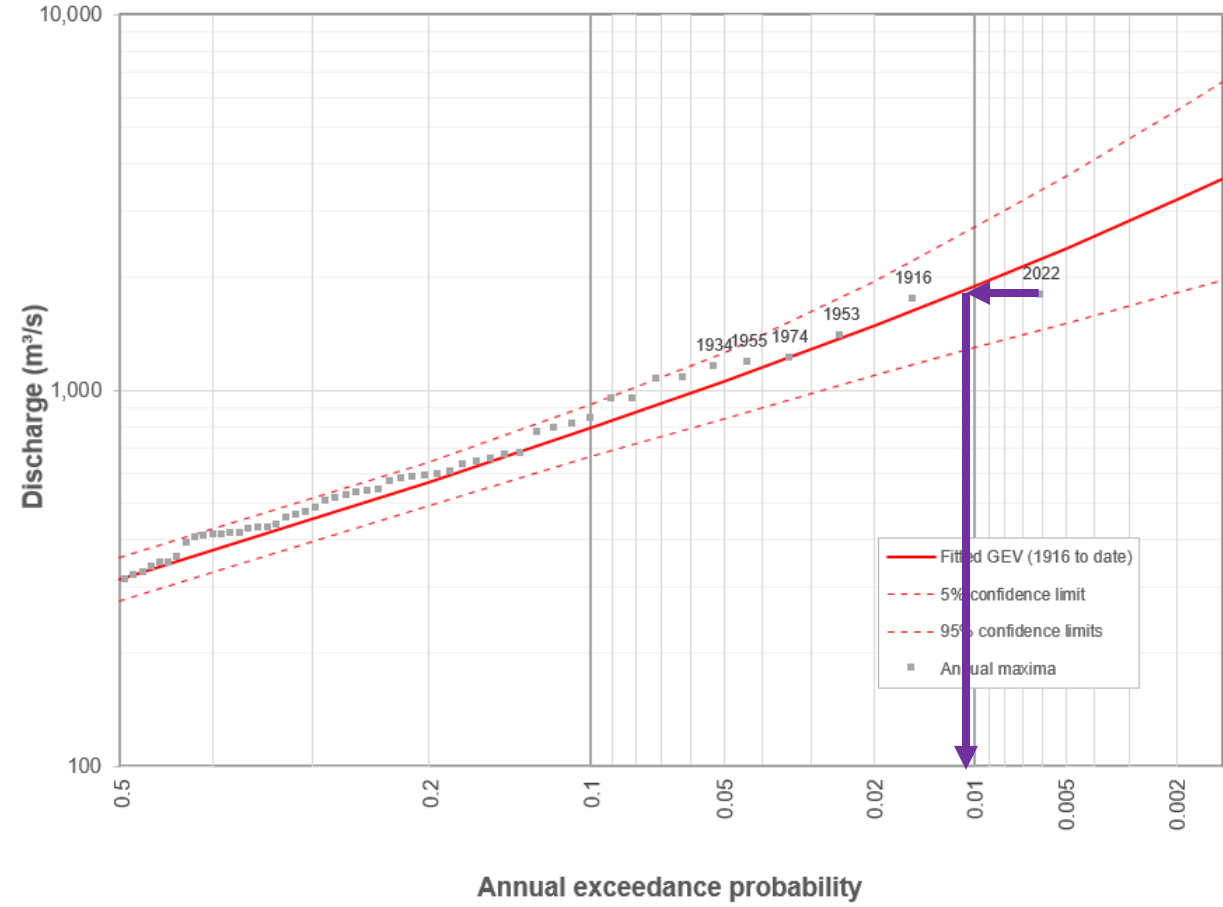
2022 Flood Analysis

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Trawool – 1 in 27 AEP (3.7% AEP)

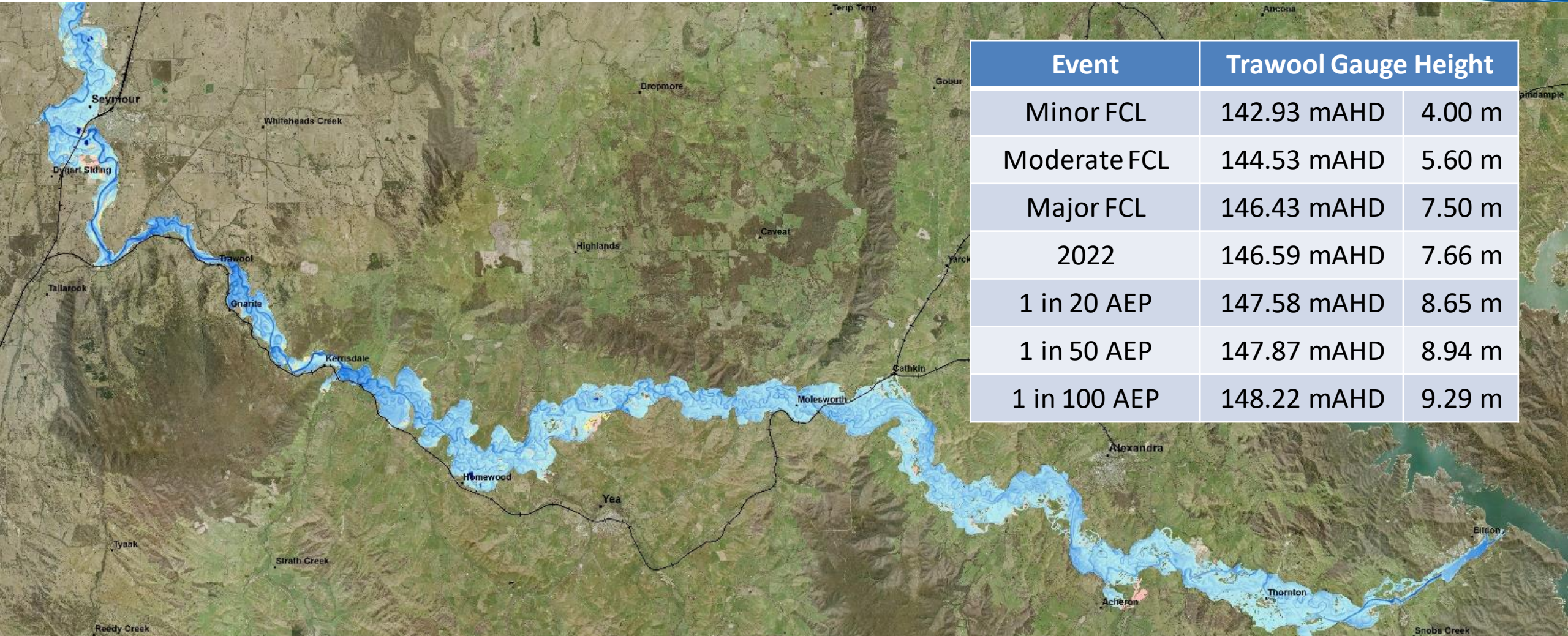


Seymour – 1 in 80 AEP (1.2% AEP)



Goulburn Rv Mapping

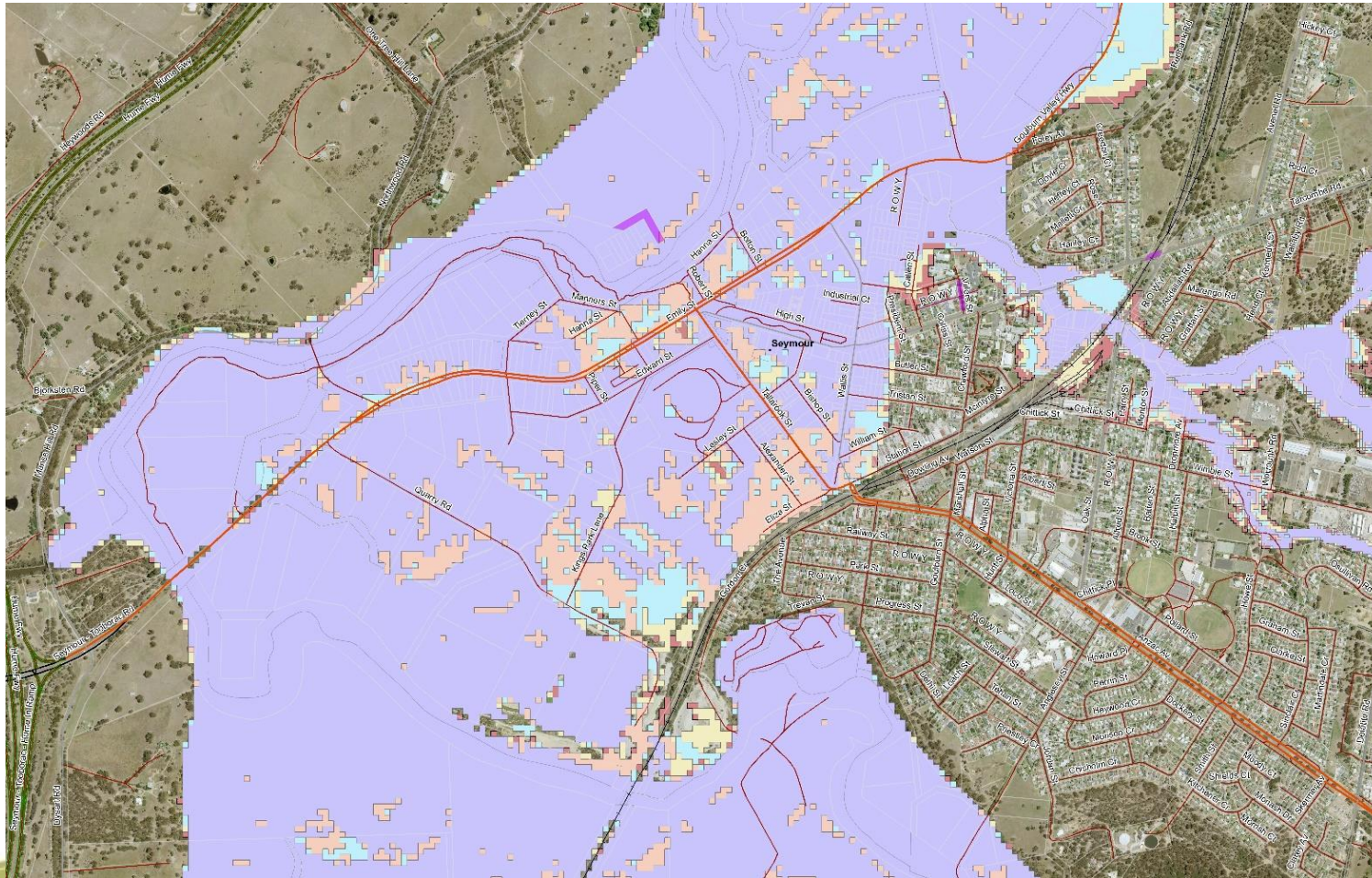
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Event	Trarool Gauge Height	
Minor FCL	142.93 mAHD	4.00 m
Moderate FCL	144.53 mAHD	5.60 m
Major FCL	146.43 mAHD	7.50 m
2022	146.59 mAHD	7.66 m
1 in 20 AEP	147.58 mAHD	8.65 m
1 in 50 AEP	147.87 mAHD	8.94 m
1 in 100 AEP	148.22 mAHD	9.29 m

Seymour Mapping

OFFICIAL



Event	Seymour Gauge Height	
Minor FCL	134.05 mAHD	3.80 m
Moderate FCL	135.45 mAHD	5.20 m
Major FCL	137.25 mAHD	7.00 m
1 in 5 AEP		
1 in 10 AEP	137.60 mAHD	7.36 m
1 in 20 AEP	138.06 mAHD	7.82 m
2022	138.49 mAHD	8.25 m
1 in 50 AEP	138.63 mAHD	8.39 m
1 in 100 AEP	139.00 mAHD	8.76 m



VICSES Warnings



State-wide	Warnings
Riverine Flood	
Advice	2,662
Watch & Act	1,315
Emergency Warning	374
Total	4351

Seymour	Warnings
Advice	96
Watch & Act	72
Emergency Warning	17
Total	185



Acheron R.	Warnings
Advice	28
Watch & Act	12
Total	40

Yea River	Warnings
Advice	34
Watch & Act	13
Total	47

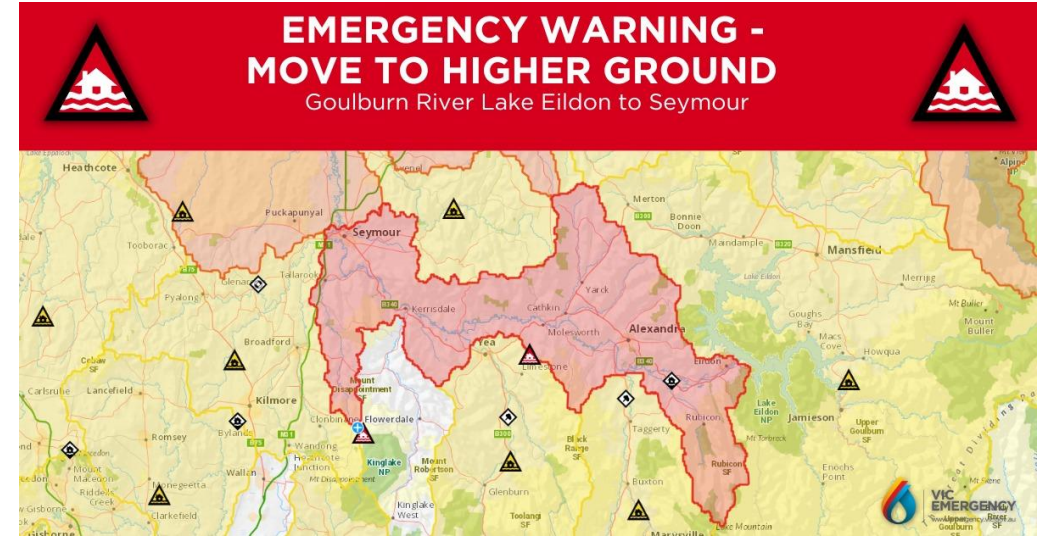


*Note – some warnings data may be inaccurate due to complexities in systems – every attempt has been made to remove variances

VICSES Warnings – Lake Eildon - Seymour

- Watch & Act – **Prepare Now** issued 13/10 at 02:35 (around 24 hours before flood peak)
- Escalated to Watch & Act – **Move to higher ground** 13/10 at 14:15

“Goulburn River- Lake Eildon to Seymour could be impacted anytime from Thursday afternoon. If you are located in low lying areas or close to a waterway you are in danger - act now to protect yourself and move to higher ground”



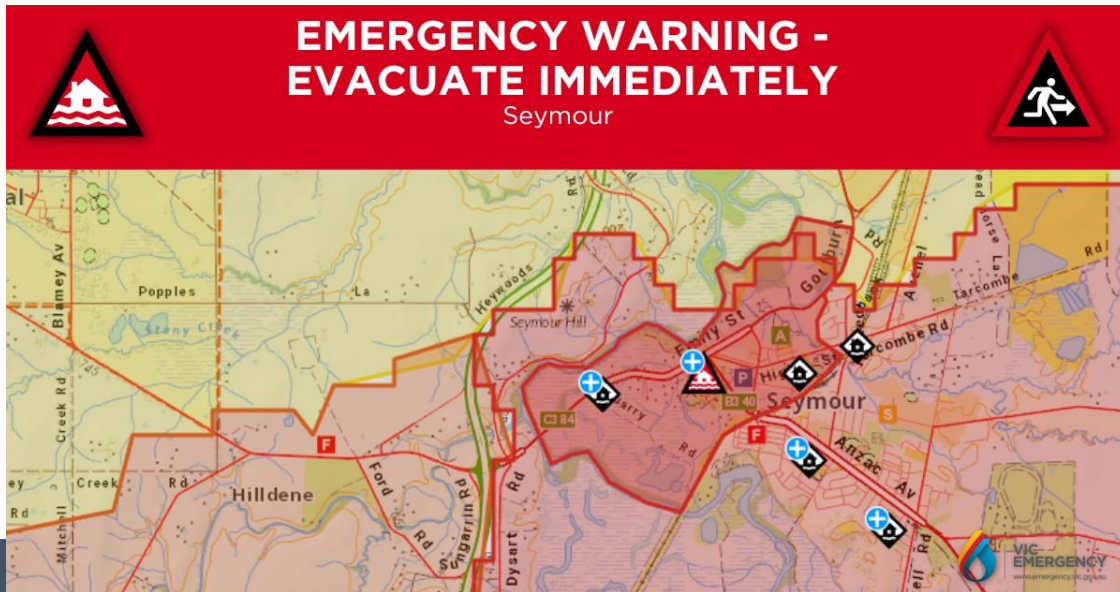
This **Major Flood Warning** is being issued for Goulburn River- Lake Eildon to Seymour.

- MAJOR FLOODING EXPECTED AT SEYMOUR FROM THURSDAY EVENING.
- Rapid and significant river level rises are occurring along the Goulburn River and its tributaries.

VICSES Warnings – Seymour

- Emergency Warning – **Evacuate Immediately** 13/10 at 19:18 (around 6 hours before flood peak)
- **Emergency Alert** issued to mobiles & landlines 21:36
- This **Emergency Alert** was successfully delivered to 1,014 Landlines and 7,953 mobiles
- A second Emergency Warning – **Evacuate Immediately** issued at 23:09 on 13/10

“If you are located in the area bounded by the Goulburn River to Redbank Rd; along the Goulburn Valley Hwy to Whiteheads Creek up to the railway line and along to the bridge crossing the river to the south, it is recommended you Evacuate Immediately”



VICSES Warnings – Yea River

- Escalation from Advice to **Watch & Act – Prepare Now** (Moderate Flood Warning) 13/10 at 12:34
- Escalated to **Watch & Act – Move to Higher Ground** (Major Flood Warning) – 13/10 at 20:26

This **Moderate Flood Warning** is being issued for the Yea River .

MODERATE FLOODING OCCURRING ALONG THE GOULBURN RIVER AND ITS TRIBUTARIES

“Prepare for flooding now. Take actions to protect your life and property against potential hazards caused by flooding”



VICSES Warnings – Acheron River

- Watch & Act – Prepare Now (Moderate Flood Warning) issued 13/10 at 02:34
- Escalated to Watch and Act – Move to higher ground (major flood warning) 13/10 at 12:40


This **Major Flood Warning** is being issued for Acheron River.

MAJOR FLOODING LIKELY AT TAGGERTY FROM THURSDAY EVENING.



“People in low lying areas should move to higher ground. Act now – immediately take actions to protect your life and property”

Flash Flood Warnings

Issuing warnings - a guide		Flash Flood	
			
Action statement	Warning level	Suggested use	
Flood Warning	Stay Indoors	Watch and Act	Issued when there (s verified report(s) of flash flooding causing significant impacts to property
	Take Shelter Now	Emergency Warning	Issued when there is verified report(s) of flash flooding causing significant impacts with a risk to life
	Threat is Reduced	Advice	For when an incident has subsided, to inform the community they can return to normal activity
Evacuation messages	Evacuate Immediately*	Emergency Warning	Issued when the the time to evacuate is urgent. I.E. Less than 12hrs
	Too Late to Leave*	Emergency Warning	Issued when it's no longer safe to evacuate. Used to clearly advise the community that the time to evacuate is over and it's now too late to leave. Only used as part of the evacuation process
	Threat is Reduced*	Advice	Issued to inform the community that the evacuation is now over

Flash flooding

Flash flooding occurs when soil absorption, runoff or drainage cannot adequately disperse intense rainfall, and is usually caused by slow-moving thunderstorms. Flash floods are generally defined as developing in six hours or less from rainfall to the onset of flooding.





LUNCH BREAK



TFWS Roles & Responsibilities

Victorian Floodplain Management Strategy



TFWS – Roles and responsibilities for service planning and implementation (Non-operational)

LGA, CMA & VICSES

CMA & LGA (Services)
VICSES (EM plans)

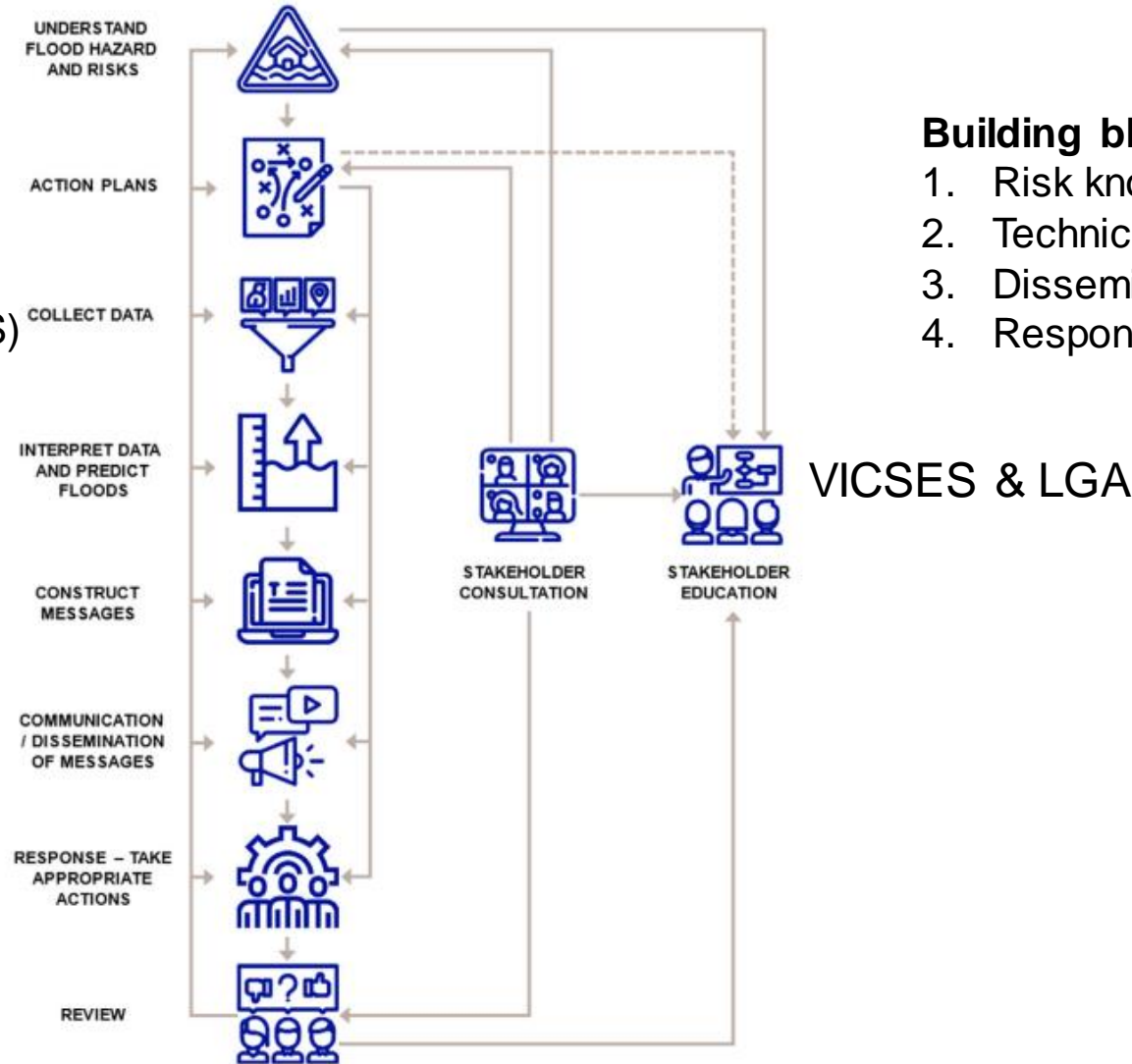
DEECA (RWMP), BoM (SLS)
and LGA

BoM (Predict), CMA
and Flood Analysts (Impact)

BoM (Forecast / Warning
VICSES (Warning/Actions)

BoM (Forecast / Warning
VICSES (Warning/Actions)

VICSES, LGA
& Community



Building blocks

1. Risk knowledge
2. Technical monitoring and warning service
3. Dissemination and communication
4. Response capability









Current Flood Warning Service

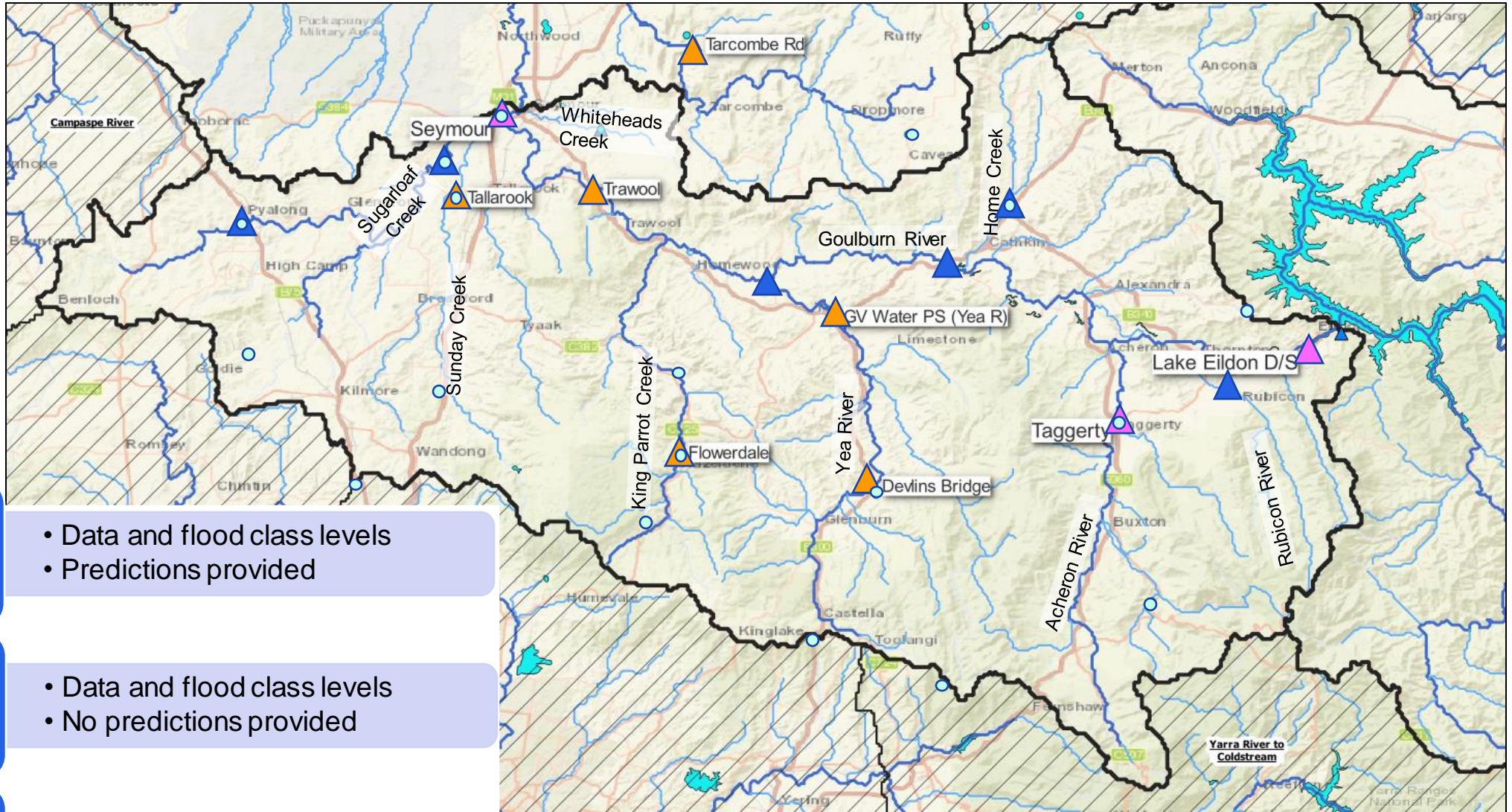


Goulburn River at Trawool

Goulburn River - Eildon to Seymour (Flood Service today)

Legend

-  WL Forecast
-  WL Information
-  WL Data
-  RN



Forecast Location

- Data and flood class levels
- Predictions provided

Information Location

- Data and flood class levels
- No predictions provided

Data Location

- Data only; no flood class levels
- Data available on bom.gov.au



Goulburn River - Flood Warning Service

Victorian Service Level Specification – Schedule 2a, Forecast Locations by Bureau of Meteorology

http://www.bom.gov.au/vic/flood/brochures/VIC_SLS_current.pdf

Bureau number	AWRC Number	Forecast location	Station Operator	Station type	Flood classification (m)			Prediction type	Target warning lead time		70% of peak forecasts within	Priority
					Minor	Moderate	Major		Time	Trigger height (m)		
88119	405209	Taggerty	Northern RWMP	Automatic	2.3	2.6	3.0	Qualitative	3 hrs	>2.3m	n/a	High
88126	405202	Seymour	Northern RWMP	Automatic	3.8	5.2	7.0	Quantitative	3 hrs	>3.8m	+/- 0.3m	High
581001	405200	Murchison	Northern RWMP	Automatic	9.0	10.2	10.7	Quantitative	6 hrs	>9.0m	+/- 0.3m	High
81044	405204	Shepparton	Northern RWMP	Automatic	9.5	10.7	11	Quantitative	9 hrs	>9.5m	+/- 0.3m	High
580000	405232	McCoys Bridge	Northern RWMP	Automatic	9.0	10.0	10.2	Quantitative	9 hrs	>9.0m	+/- 0.3m	High

Victorian Service Level Specification – Schedule 2c, Forecast Locations at tail water gauges or immediately downstream of storages where predictions are provided by storage operators

Bureau number	AWRC Number	Forecast location	Station Operator	Station type	Flood classification (m)			Priority
					Minor	Moderate	Major	
588125	405203	Lake Eildon D/S	Goulburn-Murray Water	Automatic	3.0	4.0	5.0	High

Forecast Location

- Data and flood class levels
- Predictions provided



Goulburn River - Flood Warning Service

Victorian Service Level Specification – Schedule 3, Information Locations

http://www.bom.gov.au/vic/flood/brochures/VIC_SLS_current.pdf

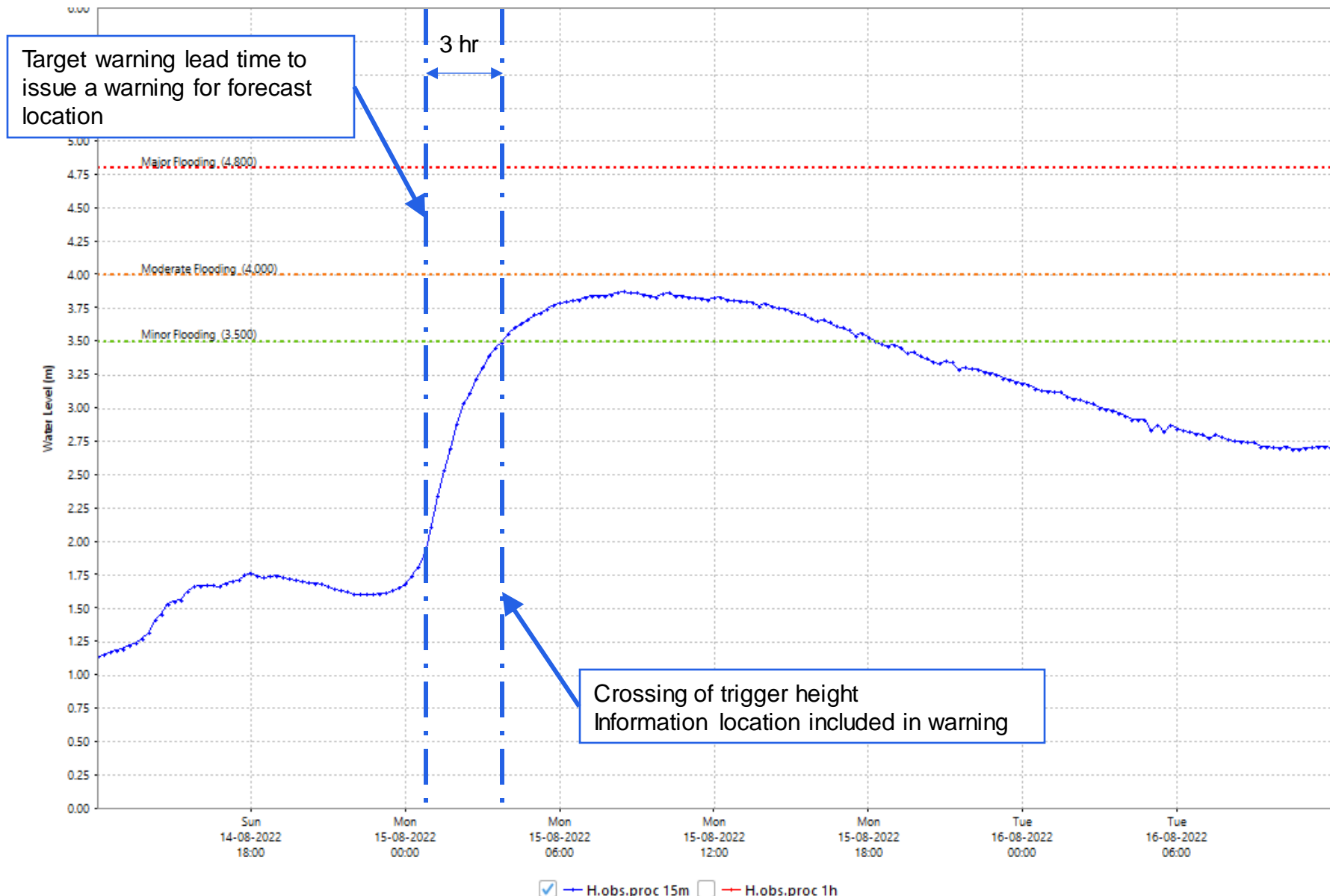
Bureau number	AWRC Number	Information location	Station Operator	Station type	Flood classification (m)			Priority
					Minor	Moderate	Major	
583151	405219	Dohertys	Northern RWMP	Automatic	2	3.5	6	High
588127	405214	Tonga Bridge	Northern RWMP	Automatic	3	4	5	High
88125	405217	Devlins Bridge	Northern RWMP	Automatic	1.8	2.3	2.8	High
588020	405325	Yea GV Water PS (Yea R)	Northern RWMP	Automatic	tbc*	tbc*	tbc*	High
588129	405231	Flow erdale	Northern RWMP	Automatic	2	2.5	3	High
588007	405201	Traw ool	Northern RWMP	Automatic	4	5.6	7.5	High
588126	405212	Tallarook	Northern RWMP	Automatic	3	3.5	4.5	High

Information Location

- Data and flood class levels
- No predictions provided



Flood Warning Service – Trigger Warning Lead Time



Target warning lead time	
Time	Trigger height (m)
3 hrs	>3.5m

Target warning lead time is balance between

- providing a reliable forecast
- community needs to respond



Goulburn River - Flood Warning Service

Victorian Service Level Specification – Schedule 4, Data Locations (WL), Schedule 7a/7b Rainfall Stations (RN)

http://www.bom.gov.au/vic/flood/brochures/VIC_SLS_current.pdf

Bureau number	AWRC Number	WL Station name	Station operator
583014	405218	Gerrans Bridge	Northern RWMP
088064	405238	Pyalong	Northern RWMP
588008	405248	Major Creek @ Graytown	Northern RWMP
588001	405240	Ash Bridge	Northern RWMP
588009	405241	Rubicon	Northern RWMP
581011	405246	Arcadia	Northern RWMP
581009	405253	Goulburn Weir D/S	Northern RWMP
581013	405259	Goulburn Weir HG	Northern RWMP
588002	405274	Yarck	Northern RWMP
588021	405291	Whiteheads Ck	Northern RWMP
088078	405310	Ghin Ghin	Northern RWMP
581026	405700	Stuart Murray Canal	Northern RWMP
581025	405701	Cattanach Canal	Northern RWMP
581024	405704	East Goulburn Main Channel	Northern RWMP

Data Location

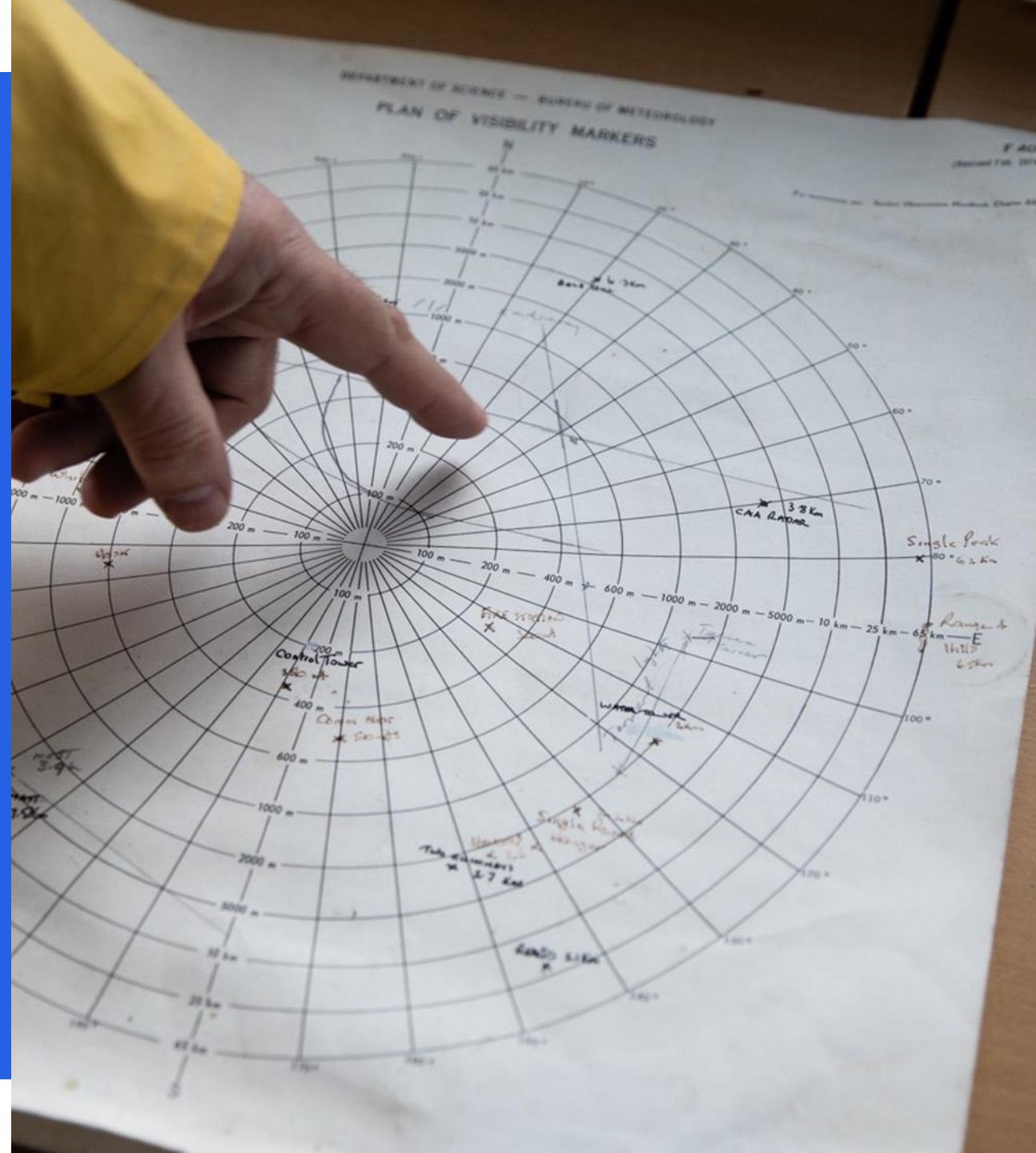
- Data only; no flood class levels
- Data collected and available to view on website [bom.gov.au](http://www.bom.gov.au)

Bureau number	AWRC Number	RN Station name	Station operator
088126	405202	Seymour	Northern RWMP
088119	405209	Taggerty	Northern RWMP
588126	405212	Tallarook	Northern RWMP
588127	405214	Tonga Bridge	Northern RWMP
583151	405219	Dohertys	Northern RWMP
588129	405231	Flowerdale	Northern RWMP
088064	405238	Pyalong	Northern RWMP
588001	405240	Ash Bridge	Northern RWMP
588008	405248	Graytown	Northern RWMP
581009	405253	D/S Goulburn Weir	Northern RWMP
588002	405274	Yarck	Northern RWMP
588022	405290	Broadford	Northern RWMP
588021	405291	Whiteheads Ck	Northern RWMP
088010	405836	Avalon Station (Willomavin)	Northern RWMP
088103	405837	Marysville Golf Course	Northern RWMP
588023	405839	Temagong	Northern RWMP
088154	405840	* Highway	Northern RWMP
582037	405841	Booroola	Northern RWMP
088164	n/a	Eldon Firetower	Bureau of Meteorology
088162	n/a	Kilmore Gap	Bureau of Meteorology
080091	n/a	Kyabram	Bureau of Meteorology
088109	n/a	Mangalore Airport	Bureau of Meteorology
083024	n/a	Mount Buller	Bureau of Meteorology
081125	n/a	Shepparton Airport	Bureau of Meteorology
081049	n/a	Tatura	Bureau of Meteorology
581001	405200	Murchison	Northern RWMP



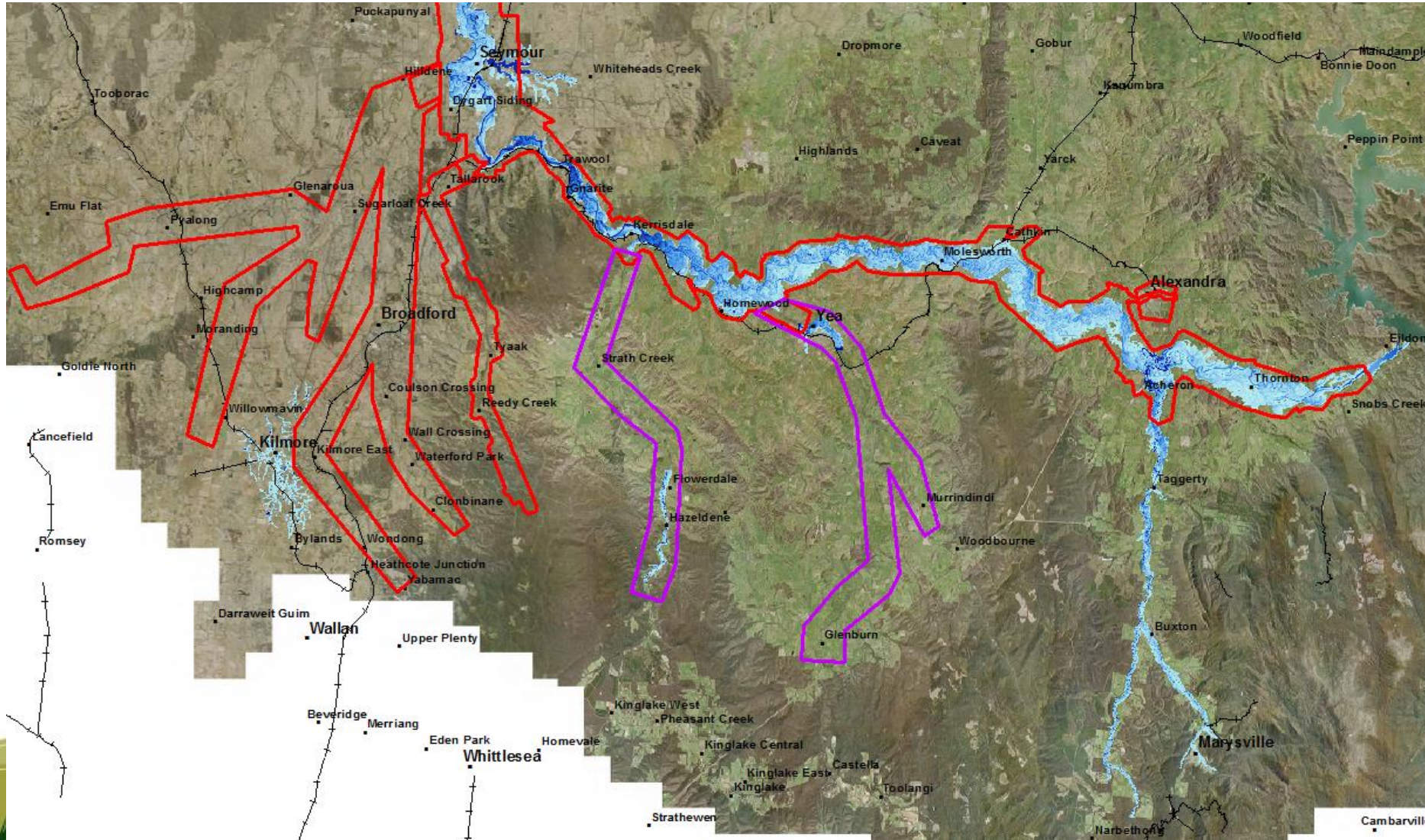


Works Identified / Works in Progress



Flood Mapping

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Key

Blue – Completed flood studies

Red – Flood studies currently in progress

Purple – Future flood studies (identified in RFMS)



Current Projects

- Goulburn Broken CMA and VICSES working to update flood intelligence (MFEPs) and prepare Local Flood Guides (incl. Kilmore, Whiteheads Creek, Flowerdale, Buxton, 2022 Flood).
- MFEP updates included in Goulburn and Broken Rivers Flood Study and Sunday and Dry Creek Flood Study

Healthy landscapes, resilient communities.



New/Updated Gauges

- New stream level gauges on King Parrot Creek, Yea River and Goulburn River (Molesworth) as part of Goulburn River Constraints Project
- Translation of Flood Class Levels from Yea Gauge (Court Street) to Yea Gauge (GV Water Pump Station)

Healthy landscapes, resilient communities.



Community Engagement & Warnings

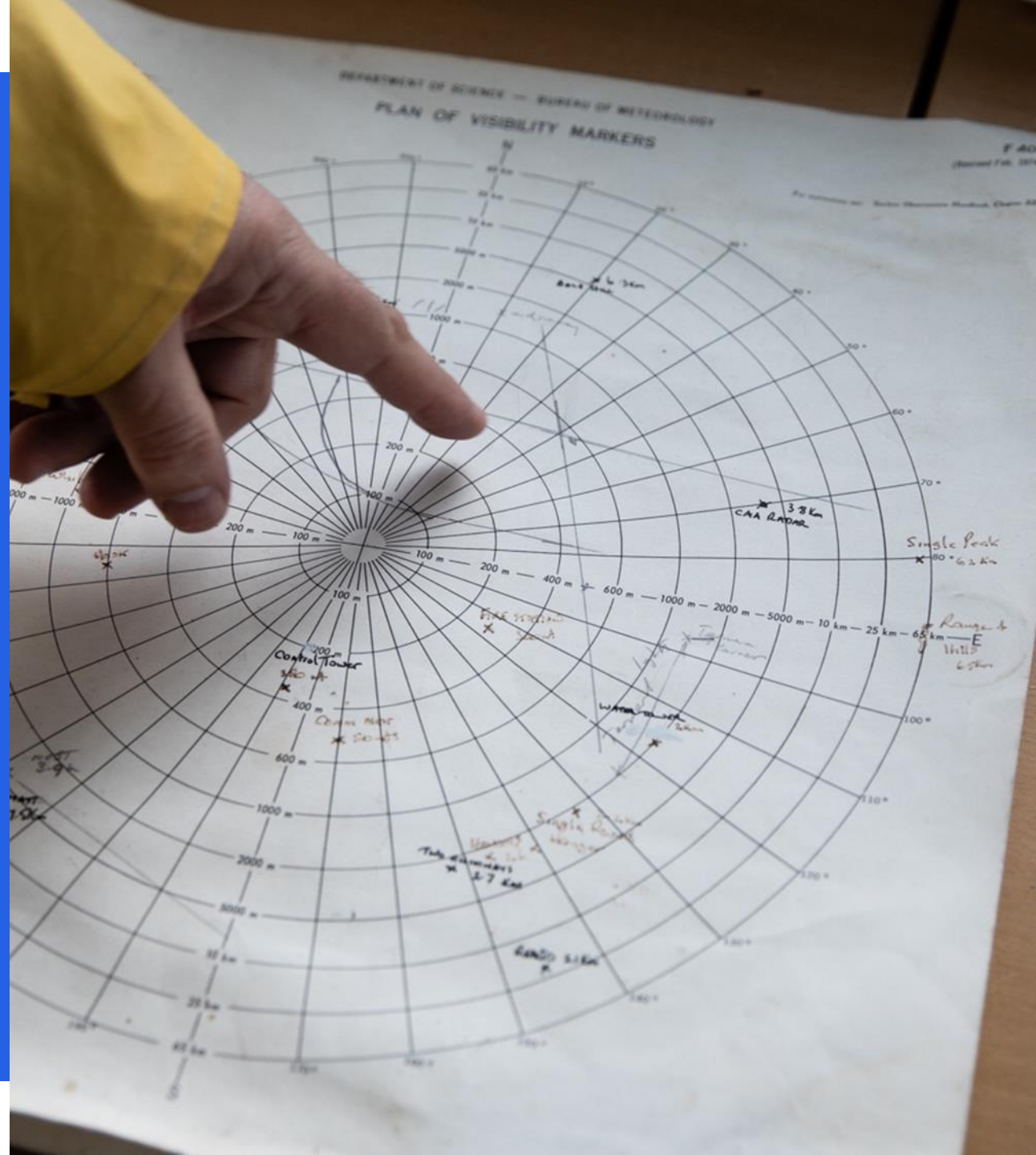
- Ongoing community engagement
 - Engagement and awareness programs and opportunities
 - Strengthened community partnerships and consultations (ie, LFGs)
 - Future identification of need for any new Local Flood Guides or other community flood risk awareness products.
- Ongoing warning enhancements
 - Review of flood class levels (state-wide project being scoped)
 - Continually use updated intelligence to move to more tailored & relevant warnings





Flood Risk Mitigation

Service Development / Enhancement Process



Flood risk mitigation framework



Victorian floodplain management strategic framework Accountabilities, policy and objectives



Regional Floodplain Management Strategy

- Community engagement
- Regional risk assessment
- Priority-setting for local and regional activities
- Implementation of regional strategies



Local investigations

- Community engagement
- Local risk assessment
- Priority-setting for local activities
- Implementation of local activities



Floodplain management activities



Planning and building systems



Urban and stormwater
flood management



Coastal flood management



Flood warnings and
emergency management



Flood mitigation infrastructure



Flood insurance



Flood risk information assessment and sharing

Risk and Resilience Grants Program

- Local councils access funds through competitive funding opportunities - Risk and Resilience Grants Program is Victoria's annual program.
- Criteria
 - local contribution is one third (cash and/or in-kind).
 - Commitment to on-going maintenance
 - Priority in the regional floodplain management strategy
 - Support from the CMA.
- In recent rounds of the program all complaint submissions have been successful.
- Regions are working to prepare a snapshot review of five years' implementation of the regional strategies – includes a review of local priorities and implementation plans.

Additional funding

- DEECA has secured \$10 million for 32 flood studies over the next 5 years.
- DEECA is investing in a strategic levee assessment with the 4 northern CMAs.
 - identify levees locals believe either:
 - ✓ require ongoing formal management and maintenance
 - ✓ may need to be reinforced ahead of a flood, or
 - ✓ provide limited community benefit and can be allowed to weather away.

Steps towards new and upgraded flood warning services

Community Consultation

1. Request to DEECA (Council)
2. Identify risk (Council with support of CMA, VICSES)
3. Identify actions (Council with the support of CMA, VICSES)
4. Define preferred service level (Council, VICSES)

Existing forecasting tool (model)?

Yes

No

5. Review service level vs current forecasting capability (Bureau)

5. Build new forecasting tool with existing network and historic data (Bureau)

Current forecasting capability sufficient?

Yes

No

10. Endorse achievable service level (TFWS partners, VFWCC)

6. Network upgrade study (Bureau, DEECA)
7. Investment decision (Council)
8. Construct infrastructure (DEECA)
9. Review model and forecasting capability (Bureau)

11. Update operational systems and procedures (TFWS partners)

12. Update SLS (Bureau)

13. On-going Actions (TFWS partners):
- Review service performance
 - Review forecasting capability
 - Continued community engagement

Community Engagement

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The Bureau
of Meteorology



Thank you

Victoria State Emergency Service

Bureau of Meteorology

Goulburn Murray Water

Goulburn Broken CMA

Department of Energy, Environment and Climate Action