

Project Report

Yea Flood Intelligence

Goulburn Broken CMA

03 July 2018



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Cover photo: January 1973 flooding, High Street Yea

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03 July 2018

Guy Tierney
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Via email guyt@gbcma.vic.gov.au

Dear Guy

Yea Flood Intelligence

Water Technology is pleased to provide this short report which outlines the flood mapping and flood intelligence for three additional flood events between the minor and major flood class levels. This report should be read in conjunction with the *Yea Flood Study (2005)*, completed by Water Technology on behalf of Murrindindi Shire Council and Goulburn Broken CMA.

If you have any queries regarding this document, please don't hesitate to contact Ben Tate on (03) 8526 0800.

Yours sincerely

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WATER TECHNOLOGY PTY LTD



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1 INTRODUCTION

Water Technology utilised the previous MIKE FLOOD model developed during the *Yea Flood Study (2005)* in this project. The model was re run for the 10% and 1% AEP events and compared to the previous model outputs to validate results. Given the models age, discrepancies between the original and revised model results were expected.

During the model re-establishment several MIKE21 input files were missing from the archive, and needed to be recreated. The topography file was recreated by subtracting the previous 0.5% AEP model depth results from the water surface elevation results and a roughness map was created by using the available polygon shapefiles in the original projects GIS archive, with the roughness values described in the Yea Flood Study report. The recreated input files were able to reproduce flood levels from the Yea Flood Study for both the 10% AEP and the 1% AEP flood events, validating the re-established flood model.

The hydraulic model was run several times, iterating the inflow until the following levels were produced at the Court Street gauge location:

- 3.0 m (minor flood class level)
- 3.3 m
- 3.6 m (moderate flood class level)

The Court Street gauge is a fixed gauge board and is also known as the Yea River at Yea Caravan Park gauge, with the gauge located downstream of the Court Street bridge entrance to the Yea Riverside Caravan Park. The location is shown in the figure to the right. Flood mapping and intelligence was produced for the three scenarios listed above, and is presented in this report.



The Yea River at Goulburn Valley Water Pumping Station gauge is telemetered and is located approximately 900 m upstream of the Court Street gauge, as shown in the figure to the left. The gauge height at this location is required to be linked to the flood intelligence developed as part of the original Yea Flood Study and the additional three flood events modelled as part of this investigation.

As part of this study Victoria Flood Database (VFD2) format data was produced and supplied separately to Goulburn Broken CMA for incorporation into the VFD and visualised on FloodZoom. The flood intelligence information contained in this report should also be used to update the Murrindindi Municipal Flood Emergency Plan (MFEP).

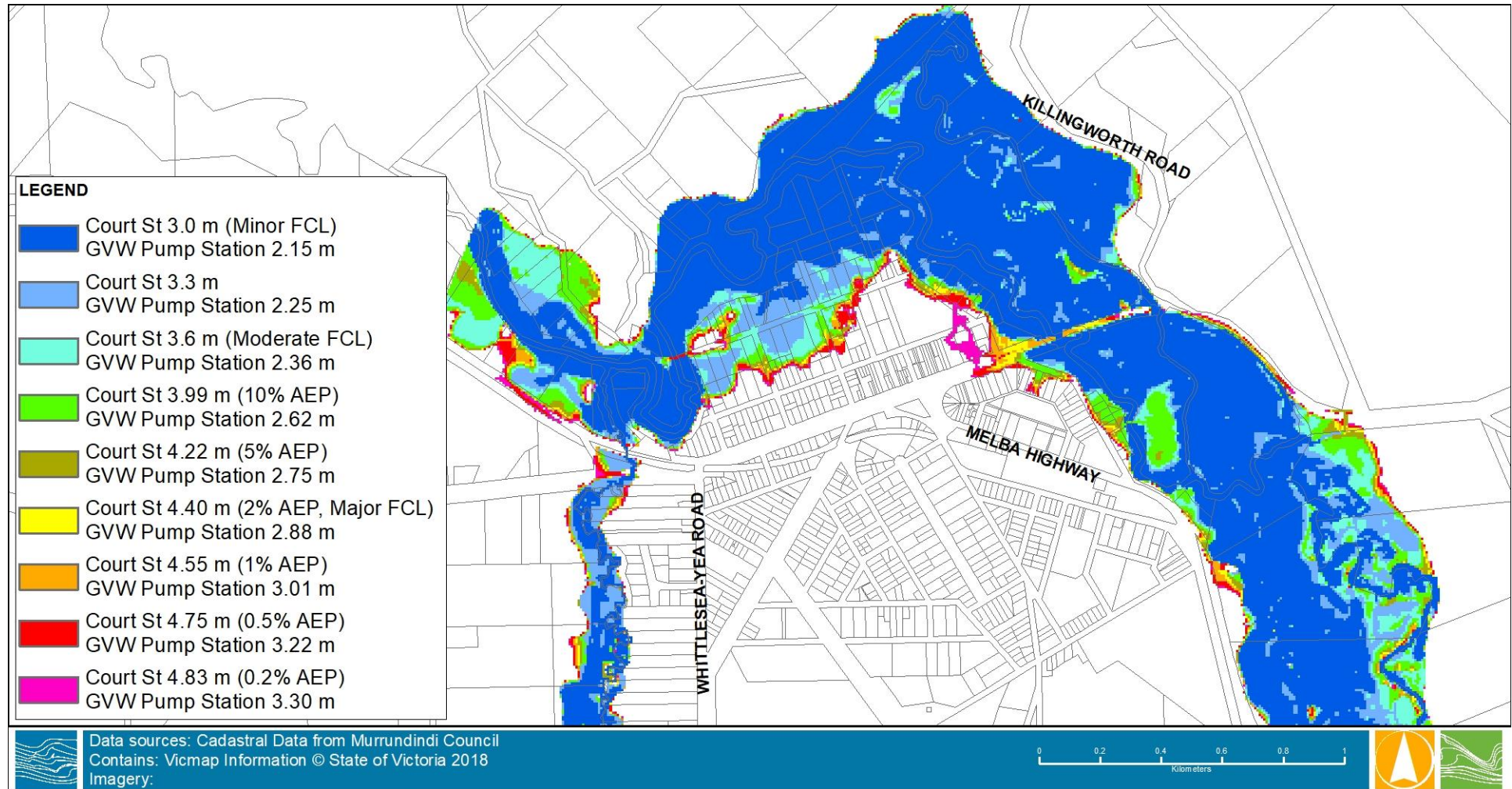


2 FLOOD MAPPING

Three flood events representing gauge levels of 3.0, 3.3 and 3.6 m on the Yea River at Court Street gauge were modelled as part of this project and the following VFD2 format deliverables were provided for each event:

- maximum water surface elevation grid
- maximum depth grid
- maximum velocity grid
- maximum VxD grid
- maximum water surface elevation contour
- maximum extent polygon

Figure 2-1 below shows the three new flood events mapped, along with the other design floods modelled during the Yea Flood Study.



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3/07/2018

FIGURE 2-1 DESIGN FLOOD MAPPING FOR YEA



3 FLOOD INTELLIGENCE

Table 3-1 below provides a summary of the relationship between water level at the Yea River at Court Street gauge and the Yea River at Goulburn Valley Water Pumping Station gauge.

TABLE 3-1 GAUGE RELATIONSHIP

Flood Event	Court St		Goulburn Valley Water Pump Station	
	(m)	(m AHD)	(m)	(m AHD)
Minor FCL	3.00	165.72	2.15	166.69
	3.30	166.02	2.25	166.79
Moderate FCL	3.60	166.32	2.36	166.90
10% AEP	3.99	166.71	2.62	167.15
5% AEP	4.22	166.94	2.75	167.28
2% AEP, Major FCL	4.40	167.12	2.88	167.41
1% AEP	4.55	167.27	3.01	167.54
0.5% AEP	4.75	167.47	3.22	167.75
0.2% AEP	4.83	167.55	3.30	167.83

Court St gauge zero – 162.72 m AHD; Goulburn Valley Water Pumping Station gauge zero – 164.54 m AHD

Figure 2-1 above shows all design flood events for the Yea township overlaid, demonstrating how the flood extent is likely to change as flood magnitude increases.

The flood intelligence table from the Yea Flood Study is included below in Table 3-2 and has been appended with additional data from modelling of the events producing levels of 3.0, 3.3 and 3.6 m at the Court Street gauge. These gauge heights already had flood intelligence recorded in the flood intelligence table, presumably from anecdotal accounts of historic flooding. There are some differences between the modelled and previously recorded flood consequences completed as part of the Yea Flood Study. Table 3-2 provides an updated flood consequence table, for all design events, and should replace the flood intelligence from the earlier Yea Flood Study. Some of the road inundation depths included in the consequence table are different to the Yea Flood Study, with the depths calculated using the modelled water surface elevation grids and the topography levels from the photogrammetry used during the flood study. The 0.5% and 0.2% AEP events did not have flood intelligence prepared in the Yea Flood Study report, these events have been included in Table 3-2 for completeness.

It is noted that the Yea Visitor Information Centre has been developed in recent years and no recorded floor level is available. It is assumed that it would have been developed with a floor level a minimum of 300 mm above the 1% AEP flood level, but this should be confirmed, as it is likely to be surrounded by flood water in events greater than or equal to a 2% AEP (Major Flood Class Level).

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TABLE 3-2 FLOOD BEHAVIOUR AND CONSEQUENCE SUMMARY

Gauge Height	Flood Behaviour and Consequences							
	Caravan Park	Craigie Street west of Provenance Bridge	Craigie Street east of Provenance Bridge	Webster Street	Marshbank Street and Hood St	Miller Street	Goulburn Valley Hwy west of Boundary Ck confluence (to Seymour)	Goulburn Valley Hwy at eastern end of township (to Yarack)
Court St 3.0 m GVW Pumping Station 2.15 m	Flooding occurs in lower parts of the Caravan Park	Possible overtopping of road but very shallow depth.	Possible flooding at low levels of properties close to the river, not threatening any dwellings.	No flooding to properties along Webster Street	Possible flooding at low levels of properties close to the river, not threatening any dwellings.	No flooding to properties along Miller Street	Flooding at low levels of properties close to the river and creek, not threatening dwellings or access.	No flooding
Court St 3.3 m GVW Pumping Station 2.25 m	Flooding occurs in lower parts of the Caravan Park	Possible overtopping of road but very shallow depth.	Flooding commences across Craigie Street between Nolan and Giffard St, 0.1 m deep. Private properties flooded along Craigie, Street with flood depths to up 0.2 m. Dwelling at 20-22 Craige St may be flooded above floor.	Flooding commences across Webster Street, south of Craige St intersection, 0.1 m deep. Flooding at low levels to private properties along Webster Street but not threatening any dwellings.	Possible flooding at low levels of properties close to the river, not threatening any dwellings.	No flooding to properties along Miller Street	Flooding at low levels of properties close to the river and creek. Dwelling to north of Hwy, west of Boundary Creek isolated, with flood depths around 0.2 m on access track.	No flooding

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Gauge Height	Flood Behaviour and Consequences							
	Caravan Park	Craigie Street west of Provenance Bridge	Craigie Street east of Provenance Bridge	Webster Street	Marshbank Street and Hood St	Miller Street	Goulburn Valley Hwy west of Boundary Ck confluence (to Seymour)	Goulburn Valley Hwy at eastern end of township (to Yarack)
Court St 3.6 m GVW Pumping Station 2.36 m	Flooding occurs in lower parts of the Caravan Park, Court Street access not inundated, but within 0.1-0.2 m of bridge deck.	Road overtopped to depths of around 0.5 m. 1 dwelling on Old Killingworth Road inundated below floor.	Flooding across Craigie Street between Recreation Ave and west of Nolan St, 0.3 m deep. Private properties flooded along Craigie Street with flood depths up to 0.4 m. Dwellings at 20-22 Craige St flooded above floor. Dwellings north of Craige St and west of Nolan St isolated.	Flooding across Webster Street with flow path from Craige/Nolan intersection now flowing over Webster St and back to river. Depths of between 0.4 to 0.7 m. Flooding at low levels to private properties along Webster Street but not threatening any dwellings.	Flooding at low levels of properties close to the river, not threatening any dwellings.	Flooding to low levels in private property along the northern end of Miller St, not threatening any dwellings.	Flooding at low levels of properties close to the river and creek. Dwelling to north of Hwy, west of Boundary Creek isolated, with flood depths around 0.4 to 0.5 m on access track.	No flooding
10% AEP Court St 3.99 m GVW Pumping Station 2.62 m	Caravan Park fully inundated with flood depths up to 0.4 m. Up to 25 caravans inundated above floor level. Approaches to the Court Street Bridge not inundated. Court Street Bridge deck may be inundated to very shallow depths.	Inundated with flood depth up to 0.8 m. 1 dwelling on Old Killingworth Road inundated close to floor level.	Flooding across Craigie Street between Recreation Ave and west of Nolan St, 0.6 m deep. Private properties flooded along Craigie Street with flood depths up to 0.8 m. Dwellings at 20-22 Craige St flooded above floor. Dwellings north of Craige St and west of Nolan St isolated.	Flooding across Webster Street, depths of up to 1 m. Flooding at low levels to private properties along Webster Street but not threatening any dwellings.	Flooding at low levels of properties close to the river, not threatening any dwellings.	Dwellings along Miller Street to the north of Court St inundated below floor level. Flooding commences across Miller Street adjacent to corner with High Street with a flood depths up to 0.3 m.	Flooding at low levels of properties close to the river and creek. Dwelling to north of Hwy, west of Boundary Creek isolated, with flood depths around 0.8 m on access track.	No flooding

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Gauge Height	Flood Behaviour and Consequences							
	Caravan Park	Craigie Street west of Provenance Bridge	Craigie Street east of Provenance Bridge	Webster Street	Marshbank Street and Hood St	Miller Street	Goulburn Valley Hwy west of Boundary Ck confluence (to Seymour)	Goulburn Valley Hwy at eastern end of township (to Yarack)
<p>5% AEP</p> <p>Court St 4.22 m</p> <p>GVW Pumping Station 2.75 m</p>	<p>Caravan Park fully inundated with flood depths up to 0.6 m.</p> <p>Up to 25 caravans inundated above floor level plus one permanent building in the caravan park.</p> <p>Court Street Bridge inundated below 0.3 m deep.</p>	<p>Inundated with flood depth up to 0.9 m.</p> <p>1 dwelling on Old Killingworth Road inundated potentially above floor.</p>	<p>Flooding across Craigie Street between Recreation Ave and west of Nolan St, 0.8 m deep.</p> <p>Private properties flooded along Craigie Street with flood depths up to 0.9 m. Dwellings at 20-22 Craige St flooded above floor.</p> <p>Dwellings north of Craige St and west of Nolan St isolated.</p>	<p>Flooding across Webster Street, depths of up to 1.1 m.</p> <p>Flooding at low levels to private properties along Webster Street but not threatening any dwellings.</p>	<p>Flooding at low levels of properties close to the river, not threatening any dwellings.</p> <p>Flooding possible across Marshbank Street adjacent to corner with Craigie Street to very low depths below 0.1 m.</p>	<p>Dwellings along Miller Street to the north of Court St inundated below floor level.</p> <p>Flooding across Miller Street adjacent to corner with High Street with flood depths up to 0.5 m.</p>	<p>Flooding at low levels of properties close to the river and creek. Dwelling to north of Hwy, west of Boundary Creek isolated, with flood depths just under 1 m on access track.</p>	<p>No flooding</p>
<p>2% AEP</p> <p>Court St 4.40 m</p> <p>GVW Pumping Station 2.88 m</p>	<p>Caravan Park fully inundated with flood depths up to 0.7 m.</p> <p>Up to 25 caravans inundated above floor level plus two permanent buildings in the caravan park</p> <p>Court Street Bridge inundated up to 0.4 m deep.</p>	<p>Inundated with flood depth up to 0.9 m.</p> <p>1 dwelling on Old Killingworth Road inundated potentially above floor.</p>	<p>Flooding across Craigie Street between Recreation Ave and west of Nolan St, 0.9 m deep.</p> <p>Private properties flooded along Craigie Street with flood depths up to 1 m. Dwellings at 20-22 Craige St flooded above floor.</p> <p>Dwellings north of Craige St and west of Nolan St isolated.</p>	<p>Flooding across Webster Street, depths of up to 1.2 m.</p> <p>Flooding at low levels to private properties along Webster Street but not threatening any dwellings.</p>	<p>Flooding at low levels of properties close to the river, 10 and 12 Marshbank St inundated below floor.</p> <p>Flooding across Marshbank Street adjacent to corner with Craigie Street to depths below 0.3 m.</p> <p>Flooding below floor around the Visitor Information Centre.</p>	<p>Dwellings along Miller Street to the north of Court St inundated below floor level.</p> <p>Flooding across Miller Street adjacent to corner with High Street with flood depths up to 0.7 m.</p>	<p>Flooding at low levels of properties close to the river and creek. Dwelling to north of Hwy, west of Boundary Creek isolated, with flood depths around 1.1 m on access track.</p>	<p>Goulburn Valley Highway inundation below 0.1 m deep.</p>

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Gauge Height	Flood Behaviour and Consequences							
	Caravan Park	Craigie Street west of Provenance Bridge	Craigie Street east of Provenance Bridge	Webster Street	Marshbank Street and Hood St	Miller Street	Goulburn Valley Hwy west of Boundary Ck confluence (to Seymour)	Goulburn Valley Hwy at eastern end of township (to Yarack)
<p>1% AEP</p> <p>Court St 4.55 m</p> <p>GVW Pumping Station 3.01 m</p>	<p>Caravan Park fully inundated with flood depths up to 0.9 m.</p> <p>Up to 25 caravans inundated above floor level plus two permanent buildings in the caravan park</p> <p>Court Street Bridge inundated up to 0.6 m deep.</p>	<p>Inundated with flood depth around 1 m.</p> <p>1 dwelling on Old Killingworth Road inundated potentially above floor.</p>	<p>Flooding across Craigie Street between Recreation Ave and west of Nolan St, 1.1 m deep.</p> <p>Private properties flooded along Craigie Street with flood depths up to 1.2 m. Dwellings at 20-22 Craige St flooded above floor.</p> <p>Dwellings north of Craige St and west of Nolan St isolated, possibly inundated below floor.</p>	<p>Flooding across Webster Street, depths of up to 1.4 m.</p> <p>Flooding at low levels to private properties along Webster Street but not threatening any dwellings.</p>	<p>Flooding at low levels of properties close to the river, 10 and 12 Marshbank St inundated below floor.</p> <p>Flooding across Marshbank Street adjacent to corner with Craigie Street to depths below 0.5 m.</p> <p>Flooding surrounding the Visitor Information Centre, with Hood St inundated to depths below 0.1 m.</p>	<p>Dwellings along Miller Street to the north of Court St inundated below floor level, with 9 Miller St flooded above floor.</p> <p>Flooding across Miller Street adjacent to corner with High Street with flood depths up to 0.9 m.</p>	<p>Flooding at low levels of properties close to the river and creek. Dwelling to north of Hwy, west of Boundary Creek isolated, with flood depths around 1.25 m on access track.</p>	<p>Goulburn Valley Highway inundation below 0.25 m deep.</p>

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Gauge Height	Flood Behaviour and Consequences							
	Caravan Park	Craigie Street west of Provenance Bridge	Craigie Street east of Provenance Bridge	Webster Street	Marshbank Street and Hood St	Miller Street	Goulburn Valley Hwy west of Boundary Ck confluence (to Seymour)	Goulburn Valley Hwy at eastern end of township (to Yarack)
<p>0.5% AEP</p> <p>Court St 4.75 m</p> <p>GVW Pumping Station 3.22 m</p>	<p>Caravan Park fully inundated with flood depths up to 1.1 m.</p> <p>Up to 25 caravans inundated above floor level plus two permanent buildings in the caravan park</p> <p>Court Street Bridge inundated up to 0.8 m deep.</p>	<p>Inundated with flood depth around 1.3 m.</p> <p>1 dwelling on Old Killingworth Road inundated potentially above floor.</p>	<p>Flooding across Craigie Street between Recreation Ave and west of Nolan St, 1.4 m deep.</p> <p>Private properties flooded along Craigie Street with flood depths up to 1.5 m. Dwellings at 20-22 Craige St flooded above floor.</p> <p>Dwellings north of Craige St and west of Nolan St isolated, inundated below floor.</p>	<p>Flooding across Webster Street, depths of up to 1.6 m.</p> <p>Flooding at low levels to private properties along Webster Street but not threatening any dwellings.</p>	<p>Below floor flooding at properties along Marshbank St.</p> <p>Flooding of northern end of Marshbank Street to depths around 0.8 m.</p> <p>Flooding surrounding the Visitor Information Centre, with Hood St inundated to depths below 0.2 m.</p>	<p>Dwellings along Miller Street to the north of Court St inundated below floor level, with 9 Miller St flooded above floor.</p> <p>Flooding across Miller Street adjacent to corner with High Street with flood depths up to around 1 m.</p>	<p>Flooding at low levels of properties close to the river and creek. Dwelling to north of Hwy, west of Boundary Creek isolated, with flood depths around 1.5 m on access track.</p>	<p>Goulburn Valley Highway inundation around 0.4 m deep.</p>

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Gauge Height	Flood Behaviour and Consequences							
	Caravan Park	Craigie Street west of Provenance Bridge	Craigie Street east of Provenance Bridge	Webster Street	Marshbank Street and Hood St	Miller Street	Goulburn Valley Hwy west of Boundary Ck confluence (to Seymour)	Goulburn Valley Hwy at eastern end of township (to Yarack)
<p>0.2% AEP</p> <p>Court St 4.83 m</p> <p>GVW Pumping Station 3.30 m</p>	<p>Caravan Park fully inundated with flood depths up to 1.2 m.</p> <p>Up to 25 caravans inundated above floor level plus two permanent buildings in the caravan park</p> <p>Court Street Bridge inundated up to 0.9 m deep.</p>	<p>Inundated with flood depth around 1.35 m.</p> <p>1 dwelling on Old Killingworth Road inundated potentially above floor.</p>	<p>Flooding across Craigie Street between Recreation Ave and west of Nolan St, 1.5 m deep.</p> <p>Private properties flooded along Craigie Street with flood depths up to 1.6 m. Dwellings at 20-22 Craige St flooded above floor.</p> <p>Dwellings north of Craige St and west of Nolan St isolated, inundated below floor.</p>	<p>Flooding across Webster Street, depths of up to 1.8 m.</p> <p>Flooding at low levels to private properties along Webster Street but not threatening any dwellings.</p>	<p>Below floor flooding at properties along Marshbank St.</p> <p>Flooding of northern end of Marshbank Street to depths around 0.9 m.</p> <p>Flooding surrounding the Visitor Information Centre, with Hood St inundated to depths around 0.3 m.</p> <p>Breakout across the Goulburn Valley Hwy and through the Foodworks and Rendezvous in Yea café.</p>	<p>Dwellings along Miller Street to the north of Court St inundated below floor level, with 9 Miller St flooded above floor.</p> <p>Flooding across Miller Street adjacent to corner with High Street with flood depths up to around 1 m.</p>	<p>Flooding at low levels of properties close to the river and creek. Dwelling to north of Hwy, west of Boundary Creek isolated, with flood depths around 1.65 m on access track.</p>	<p>Goulburn Valley Highway inundation to just below 0.5 m deep.</p>

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4 RECOMMENDATIONS

It is recommended that Goulburn Broken CMA add the VFD2 formatted datasets for the 3.0, 3.3 and 3.6 m at the Court St gauge events to the Yea VFD geodatabase and upload to FloodZoom. The flood gauge height tables should be included in the VFD update for both the Court Street gauge and the Goulburn Valley Water Pumping Station gauge.

It is recommended that the new flood intelligence be validated using local knowledge where possible.

It is recommended that Goulburn Broken CMA provide this report to VICSES and Murrindindi Shire Council to update the Municipal Flood Emergency Plan consequence table for Yea.



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