

Mitchellstown to Kialla

At a glance

The flow footprints constraints work is investigating are 25–40,000 megalitres/day (ML/d) between Mitchellstown and Kialla (e.g. 7.9–9.5 m at Murchison gauging station 405200, around the minor flood level). Flow footprints higher than 40,000 ML/d are not being investigated (e.g. flows greater than 9.5 m at Murchison, gauging station 405200). The overbank flows that constraints work is looking at occurred more frequently in the past.

Feedback from local councils and landholders was that the flow footprint maps looked about right; however, feedback was limited. MDBA encourages other residents to review the maps to check their accuracy and identify any inundation effects we may be missing.

There has not been enough communication of the flow footprint maps for MDBA to be able to determine if there is any tolerable level of inconvenience flooding and what mitigation measures are required in this subreach. The flow footprints between 20,000 and 30,000 ML/d at Nagambie, and 25,000 and 40,000 ML/d at Murchison could be created by releases from Eildon Dam in combination with unregulated tributary flows.

Reach characteristics

This subreach flows from Mitchellstown to Kialla just upstream of Shepparton (Figure 34). The townships of Nagambie and Murchison are located in this part of the Goulburn. Four unregulated creeks contribute flows to the Goulburn River: Hughes Creek upstream of Mitchellstown, Major Creek, Pranjip Creek and Castle Creek.

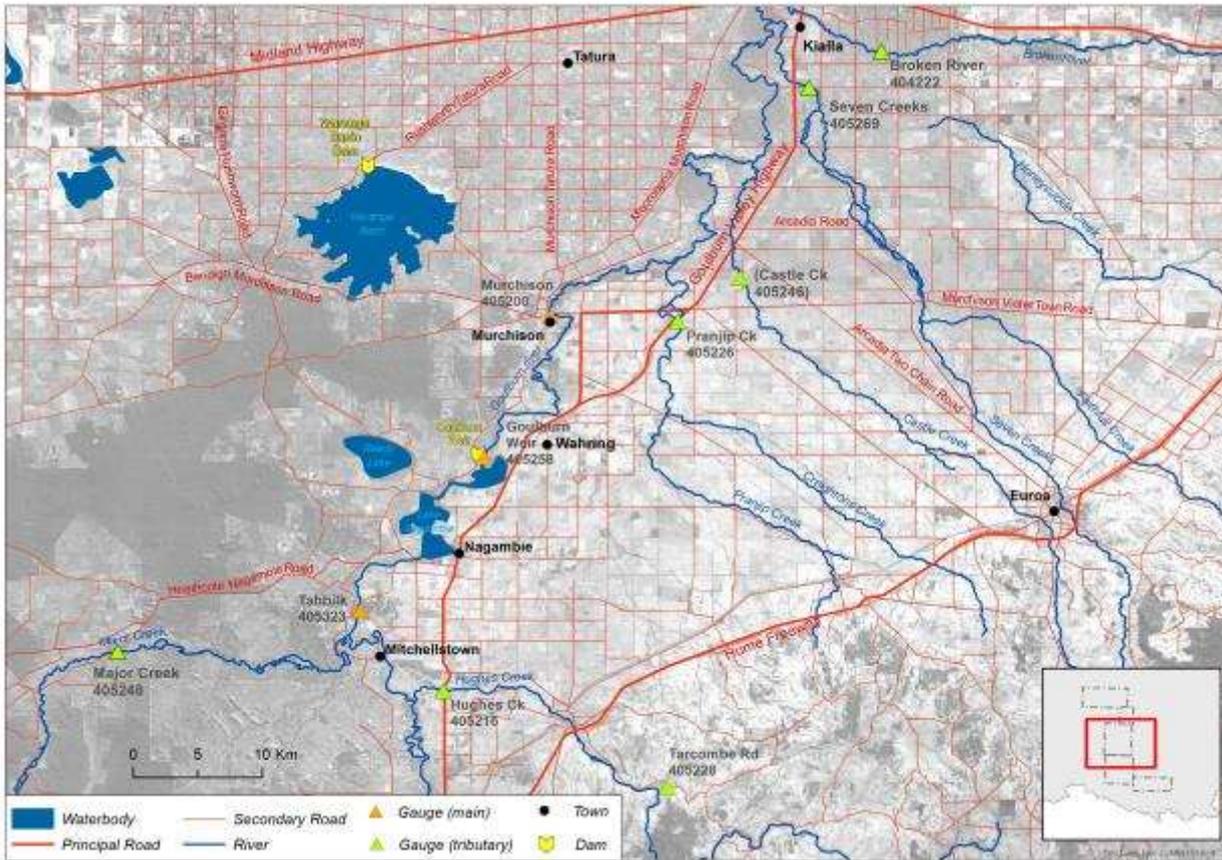


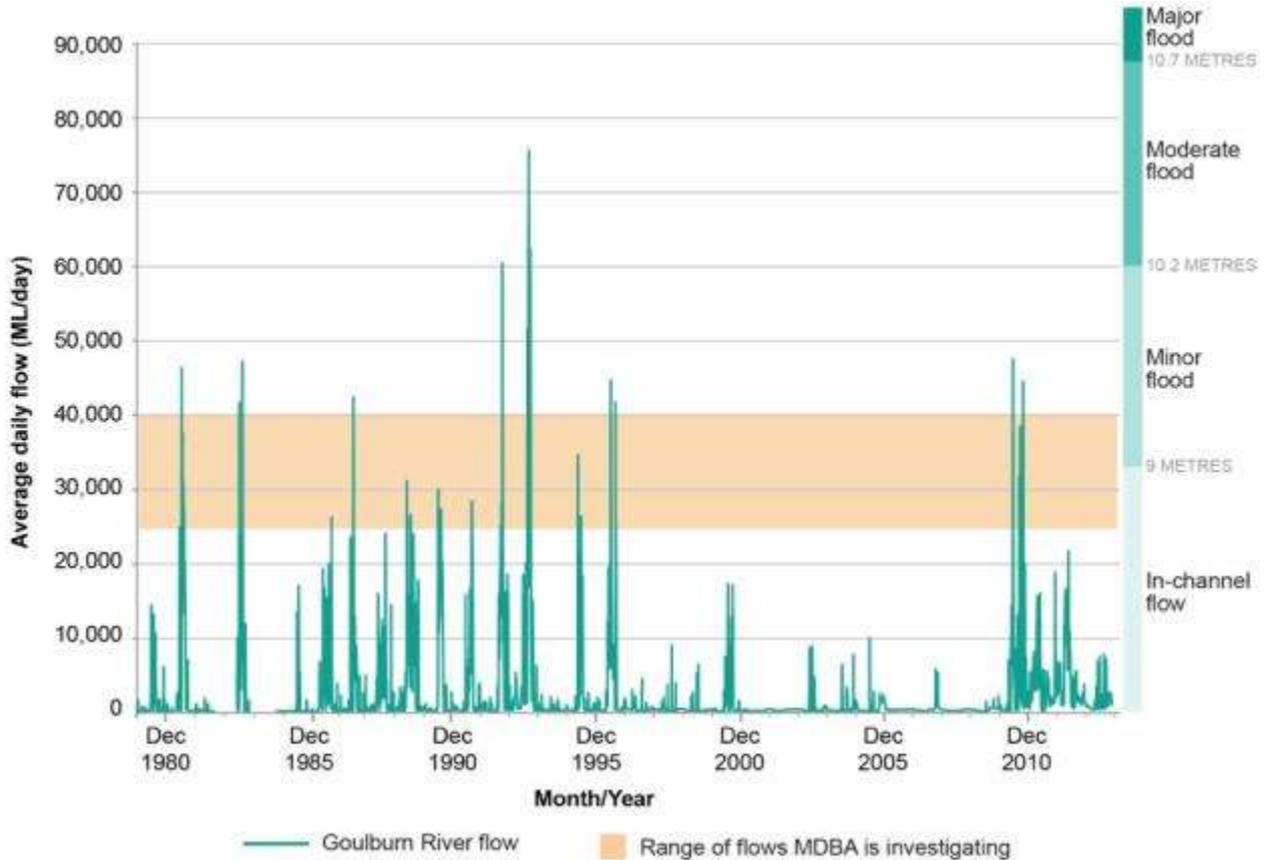
Figure 34 Mitchellstown to Kialla subreach

This subreach includes Goulburn Weir, which is an important mid-river regulating structure approximately 235 kilometres downstream of Eildon Dam. Water is diverted at Goulburn Weir to the large off-stream storage Waranga Basin for irrigation, and stock and domestic purposes (Cattanach canal and Stuart Murray canal). Water is also diverted through the East Goulburn main channel to supply the Shepparton Irrigation Area. Goulburn Weir forms Lake Nagambie, which is a significant recreation site and also supplies local farming and residential water needs. The waterways of Lake Nagambie are popular with locals and tourists for boating activities, fishing, swimming, cycling, walking, hunting and camping. Major sporting events are held every year, including rowing regattas and waterskiing.

Goulburn Weir is usually held at close-to-full capacity to keep water levels high, so that water can be diverted via gravity along the three irrigation canals.

Goulburn–Murray Water operates Goulburn Weir primarily for water supply to customers. Although operational decisions, including water levels and release patterns do consider effects on recreational users in Lake Nagambie, the primary consideration is to supply water entitlement holders. The entitlement holders primarily fund the storage operation and maintenance cost of Goulburn Weir.

There is one flood gauge in this subreach (at Murchison) that is used by the Bureau of Meteorology for flood forecasting purposes. The river flows recorded at the Goulburn River gauge at Murchison between 1979 and 2013 can be seen in Figure 35.



MDBA = Murray-Darling Basin Authority; ML = megalitre

Note: The shaded box outlines the range of flows that MDBA is investigating (25–40,000 ML/day).

The flood categories (minor, moderate and major floods) are as defined by the Bureau of Meteorology, noting that flood categories are linked to specific gauges. As you move away from the gauge, the river situation can be quite different from what is being recorded at the gauge.

Figure 35 Flows in the Goulburn River at the Murchison gauge, 1979–2013

Previous major floods at Murchison occurred in 1974 and 1975, with flows well above 100,000 ML/d. As can be seen from Figure 35, moderate flooding at Murchison has occurred twice since 1979, with the most recent event in September 1993. In 1993, flood levels peaked at 10.6 m, flowing at more than 80,000 ML/d. These historical data are presented in Table 10, together with examples of smaller minor flood events that are around the size of flows constraints work is looking into. A range of flows has been provided as background context for the river levels that people have experienced first-hand. Many are far larger and more damaging than the flows constraints work is investigating; they are not the aim of this Strategy. Some of the smaller historical events are also included in Table 10 that are in the range of the managed overbank flows being investigated. This is so people can think about the types of effects that have occurred at flows of these sizes.

Table 10 Example recorded flows for Goulburn River at Murchison (gauging station 405200)

Flood class	Date	Gauge height (m)	Flow (megalitres/day)	Is constraints work considering these sorts of flows?
Major	19 September 1975	12.29	382,112	No
Major	17 May 1974	11.29	142,269	No
Moderate	21 September 1993	10.57	80,229	No
Minor	7 September 2010	9.94	50,217	No
Minor	16 January 2011	9.77	45,807	No
Minor	11 June 1995	9.27	36,158	Yes
Below minor	24 September 1991	8.46	28,543	Yes

What flows are being considered

Constraints work is investigating flow rates of between 25,000 and 40,000 ML/d (e.g. 7.9–9.5 m at the Murchison gauge, station 405200) (Table 11 and as indicated by the shaded box on Figure 35).

These would be overbank flows up to around the minor flood level range. At below minor flood level, river levels are not high enough to trigger emergency management or flood warnings from the Bureau of Meteorology. At minor flood level flows, there is some inconvenience. Low-lying areas next to rivers and creeks start to get inundated, requiring the removal of stock and equipment. Minor roads may be closed and low-level bridges submerged (see also ‘What is the Constraints Management Strategy?’).

Constraints work is **not** considering flows at moderate or major flood levels. Flows significantly higher than the minor flood level are damaging and disruptive, and outside the bounds of active river management. Constraints work is collecting information about what effects river flows have at different places along the Goulburn River, but only flows up to the minor flood level range.

Table 11 Comparison of flows footprints for the Mitchellstown to Kialla subreach and flood categories at the Murchison gauge

Measure	Flow footprints being looked at for the Mitchellstown to Kialla subreach (that include the flow contribution of tributaries)			Murchison gauge, Minor flood level ¹	Murchison gauge, Moderate flood level ¹	Murchison gauge, Major flood level ¹
	25,000	30,000	40,000			
Flow rate (megalitres/day)	25,000	30,000	40,000	33,130	60,410	89,280
e.g. Gauge height (m) at Murchison	7.9	8.6	9.5	9.0	10.2	10.7

¹ Bureau of Meteorology, noting that flood categories are linked to specific gauges. As you move away from the gauge, the river situation can be quite different from what is being recorded at the gauge.

The range of overbank flows that constraints work is looking at occurred more frequently in the past. Although Goulburn Weir provides a small amount of flood mitigation capacity (limited operating range due to needing to be kept at near full supply level), the hydrographic record shows that flows in the range that constraints is investigating have occurred almost 10 times since 1979. They are the type of flow that people in the region may have experienced in recent years (e.g. flows less than the 45,807 ML/d in January 2011).

What these flows look like

Linking a gauge reading at Murchison with the actual flow upstream or downstream is not always accurate, because of the effect of tributaries inflows and localised rainfall run-off. To assist MDBA to understand how landholders and community assets could be affected by different flows, flow footprint maps were developed to help visualise the flows.

Flow footprint maps were created using hydraulic models to show how flows of different sizes move down the river and spread across the landscape. Flow footprint maps let you look at what is likely to get wet for different-sized river flows.

When interpreting the maps, it is important to bear in mind that they are from a model of a generalised event, not a real event. Therefore, some caution should be used when interpreting the 'typical flow' footprints presented in this report. They are not intended to mimic real flow events, but be an initial representation of what could get wet for a flow of a particular size.

Figure 36 shows flow footprint maps for 20,000 and 30,000 ML/d (includes Lake Nagambie), and Figure 37 shows flow footprint maps for 25,000, 30,000 and 40,000 ML/d (includes Murchison).

The maps show that Lake Nagambie is not really affected by 20,000 and 30,000 ML/d flows, with little change to the area that gets wet. There is, however, inundation upstream near Mitchellstown in the network of wetlands in the Tahbilk Lagoon Conservation Reserve. Further work is needed to determine if water in the Tahbilk lagoons has any effect on limiting access for private landholders, as well as access by visitors to a number of significant wineries nearby.

Downstream of Goulburn Weir, flows from 25,000 to 40,000 ML/d steadily increase the area of near-riverbank land that gets wet. Most of this is native vegetation in streamside reserves along the Goulburn River. The township of Murchison is not affected by the range of flow footprints that constraints work is investigating. However, low-lying properties, farmland, fishing spots and camping areas may start to be affected at the flows we are looking at.

Feedback from local councils and landholders was that the flow footprint maps looked about right. However, the number of people from this area who have viewed the flow footprint maps is quite limited. MDBA encourages other residents to review the maps to check their accuracy and identify any inundation effects we may be missing.

Due to modelling assumptions, the maps did not capture the possible effect of the tributaries backing up (not being able to drain freely due to high Goulburn River levels). If work in the Goulburn proceeds, then additional modelling of potential inundation of land in tributaries should be included.

The accuracy of the maps is currently limited by the amount of data available to calibrate the hydraulic model. The maps should therefore be viewed as a first estimate, with more accurate mapping required.

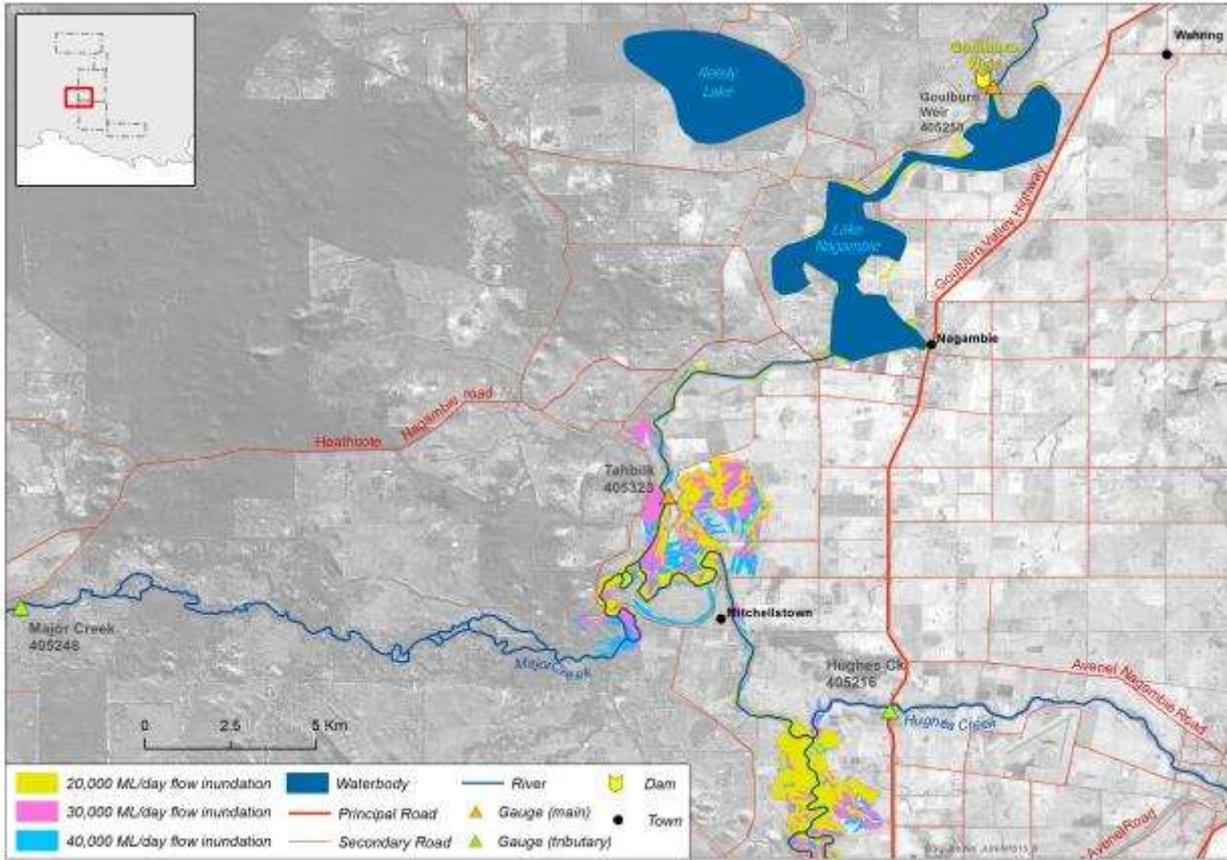


Figure 36 Flow footprints for flows of 20,000, 30,000 and 40,000 megalitres (ML)/day between Mitchellstown and Wahring

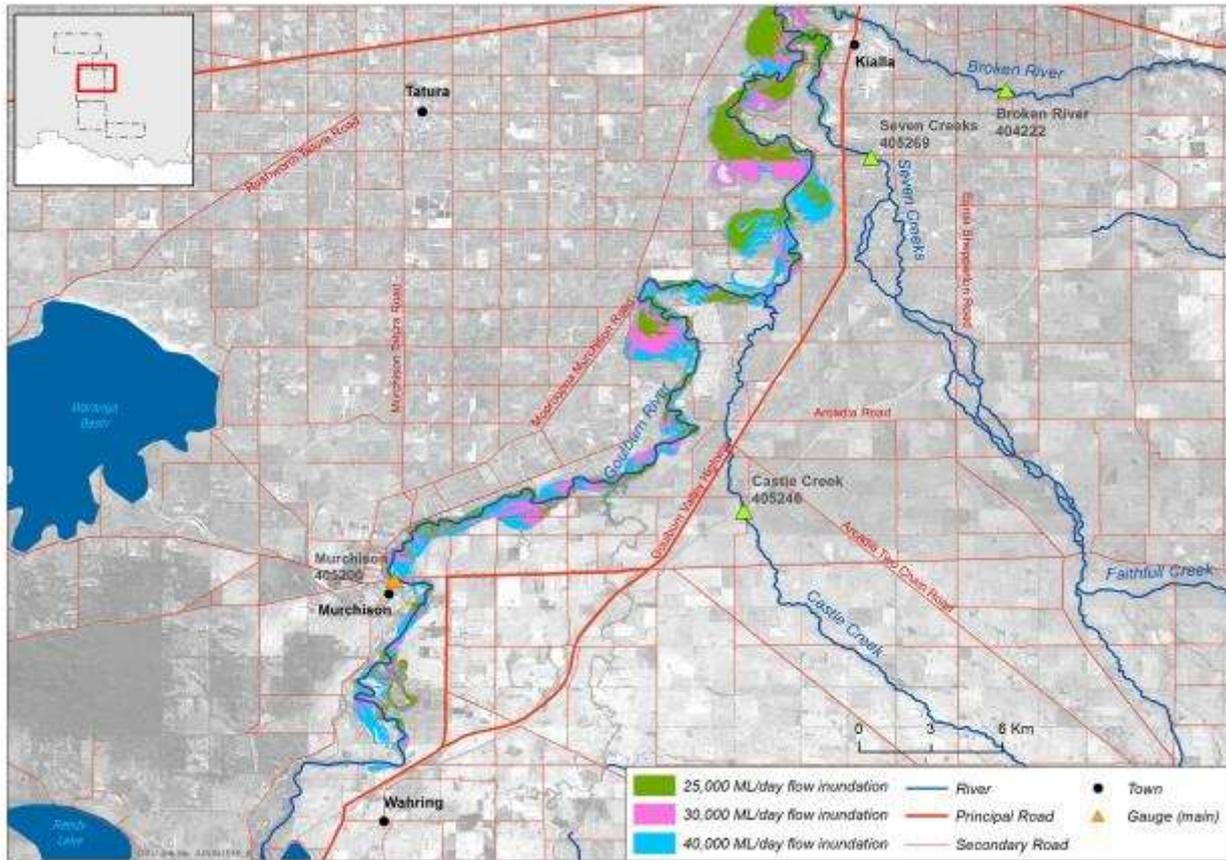


Figure 37 Flow footprints for flows of 25,000, 30,000 and 40,000 megalitres (ML)/day between Wahring and Kialla

Tributaries

The tributaries in the Goulburn have different characteristics and therefore different effects on the flow of the main Goulburn stem. Water Technology analysed historical flow data in the Goulburn River and its tributaries to provide a general, though incomplete, understanding of the tributaries in the Goulburn catchment. This information is summarised for each tributary below.

Hughes Creek

Hughes Creek has a catchment area of 471 km². The creek has one gauge at Tarcombe Road. This gauge has 29 years of instantaneous data, classified as 'good'. The mean daily flow for July–November is 379 ML/d (Figure 38). The creek contributes 5% of the Goulburn flow at Trawool. The 'peakiness' ratio value of the catchment is 21.03.

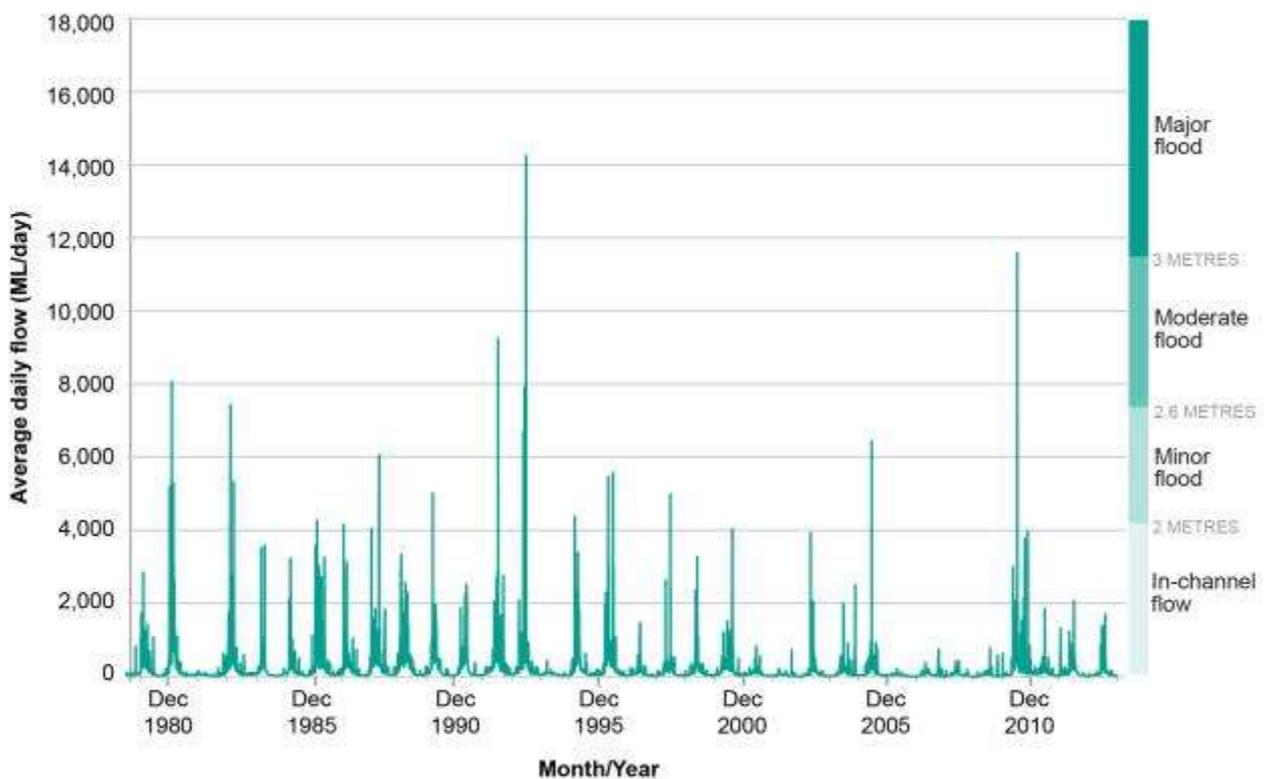


Figure 38 Average daily water flow in Hughes Creek at Tarcombe (gauging station 405228), December 1980 – December 2013

Major Creek

Major Creek has a catchment area of 282 km². The creek has one gauge at Graytown. This gauge has 33 years of instantaneous data, classified as 'good'. The mean daily flow for July–November is 71 ML/d. The 'peakiness' ratio value of the catchment is 59.19.

Pranjip Creek

Pranjip Creek has a catchment area of 787 km². The creek has one gauge at Moorilim. This gauge has 32 years of instantaneous data, classified as 'good'. The mean daily flow for July–November is 315 ML/d. The 'peakiness' ratio value of the catchment is 10.33.

Castle Creek

Castle Creek has a catchment area of 164 km². The creek has one gauge at Arcadia. This gauge has 33 years of instantaneous data, classified as 'good'. The mean daily flow for July–November is 75 ML/d. The 'peakiness' ratio value of the catchment is 15.53.

What could be affected by these flows

The following information about what might happen at different river levels is a guide only. Information has been sourced from community feedback, local flood guides and council reports, where available.

Below minor flood level — examples of areas affected by overbank flows below minor flood level include:

- localised flooding in some low-lying rural paddocks.

Minor flood level — examples of areas affected by overbank flows around minor flood level include:

- localised flooding in rural paddocks
- closure of some local roads and camping and fishing spots north of the Murchison Bridge.

What the community thinks about the suggested flows

There has not been enough communication of the flow footprint maps for MDBA to be able to determine if there is any tolerable level of inconvenience flooding and what mitigation measures are required in this subreach.

Flows of between 20,000 and 30,000 ML/d at Nagambie, and 25,000 and 40,000 ML/d at Murchison could be created by releases from Eildon Dam in combination with unregulated tributary flows. Tributary flows passing down the river could also potentially be topped up by temporarily stopping the transfer of water into Waranga Basin and allowing it to continue to move downstream of Goulburn Weir (noting that this would be outside of the irrigation season and that environmental water entitlements held in Eildon Dam would still be debited for any water used this way).

Limited MDBA consultation to date has provided some other key points in relation to considering any change to regulated river flows.

Many pumps are not far above summer irrigation flow levels. Moving pumps can be very difficult. Pumps are situated close to the river to maximise pumping



effectiveness and efficiency. Often it is more about protecting pumps in situ from being flooded rather than moving them.

Interruption to irrigation pumps is an issue; therefore, the proposed timing of environmental flows is important as well as getting enough advanced warning before they happen.



