Goulburn River Seasonal Watering Proposal 2024-2025

GOULBURN BROKEN
CATCHMENT MANAGEMENT AUTHORITY

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Photo: the lower Goulburn River at Yambuna exhibiting high river flows (Photo by GBCMA).

It should be noted that specific reference to funding levels in this document are for indicative purposes only. The level of Government investment in this plan is contingent on budgets and government priorities.

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Document Control

STATUS	VERSION	AUTHOR	DATE	DESCRIPTION
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Draft /	2.0	Daniel Lovell	27/02/2024	Draft seasonal watering proposal for review
Final	3.0	Daniel Lovell	17/04/2024	Final incorporating feedback

1 CONTEXT

The GB CMA is pleased to provide a draft of the 2024-Goulburn River Seasonal Watering Proposal – for your review and comment. This seasonal watering proposal outlines the Goulburn Broken Catchment Management Authority's priorities for the use of water in the Goulburn River in 2024/25, as required under section 192A of the Water Act 1989.

The purpose of this Goulburn River Seasonal Watering Proposal is to:

- identify the environmental water requirements of the Goulburn River in 2024/25 under a range of climate and consumptive water delivery scenarios; and
- inform the development of environmental water priorities in the VEWH's Seasonal Watering Plan.

The proposal is informed by current ecological conditions, scientific studies and reports that identify the flow regimes required to meet the ecological objectives of the Goulburn River.

You may notice that the format of this Seasonal Watering Proposal is different to previous years. VEWH has amended the Seasonal Watering Proposal guidelines in 2024-25 and reduced the length of the document, whilst still retaining the key information to outline what environmental flows may be delivered during 2024-25, the rationale for the planning of these and a summary of engagement that occurred, as well as the associated risk management.

This proposal considers annual environmental water management under a range of possible climate and corresponding water resource availability scenarios for 2024/25 ranging from extremely dry to wet. Given antecedent conditions including high storage levels and watering actions achieved in 2023/2024, prioritisation of the environmental watering actions for 2024/25 have been based around the following principles;

1. Maintain or re-establish lower bank vegetation over summer and autumn following floods and prolonged high flows.
2. Due to likely high tributary flows, utilise Eildon releases to meet Reach 1 objectives and allow water to pass through to the lower Goulburn in winter and spring.
3. Maximise platypus breeding success by providing nesting cues, especially in the mid Goulburn as anecdotal evidence is a loss of breeding following 2 years of flooding.
4. Increasing habitat by connecting low lying floodplain features in the mid Goulburn.
5. Achieve fish outcomes – improve Murray and Trout cod populations, cue Golden and Silver perch spawning and attraction into the river.

Due to high volumes of Environmental water available the priority watering actions that could be met are the same under each climate/water resource scenario as outlined in the table below:

Summary of potential environmental watering actions provided under each water resource scenario

Priority	Compliance point; Eildon, Murchison, McCoys	Potential environmental watering actions	Scenario 1 – Extreme dry (99% PoE)	Scenario 2 – Dry (90% PoE)	Scenario 4 – Average (50% PoE)	Scenario 5 – Wet (10% PoE)
1	Murchison McCoys	Provide a year round low flow 600 – 1,000 ML/day in reach 4 and 5 for habitat diversity and sustaining the system	Y	Y	Y	Y
2	Eildon	Provide a year round variable low flow of 400-2,000 ML/day to reach 1.	Y	Y	Y	Y
3a	Murchison McCoys	Provide a 2024 winter fresh to reach 4-5 of (>7,300 ML for 4-5 days) up to 10,000 ML/day in May - August for channel forming, and platypus nesting cues.	Y	Y	Y	Y
3b	Eildon	Provide a winter fresh to reach 1 of >8,000 ML/d (or as high as possible) for 5-10 days between late July and late August to connect low lying wetlands and provide a nesting cue for platypus.	Y	Y	Y	Y
4	Murchison McCoys Eildon	Provide a spring fresh (>7,300 ML for 7 days) up to 10,000 ML/day in September - October to prime the system for lower bank vegetation establishment and maintenance.	Y	Y	Y	Y
5	Murchison McCoys	Provide a year round standing order for freshes up to 6,000 ML/day from Goulburn Weir to maintain water quality, protect the banks and provide natural variability	Y	Y	Y	Y
6	Murchison McCoys	Provide an autumn fresh (>5,700 ML for 2-5 days) between March and May 2024 for lower bank vegetation reinvigoration and maintenance and/or fish migration outcomes.	Y	Y	Y	Y
7	Eildon	Provide up to three freshes in reach 1 of >5,000 ML/d for 5-10 days between May and November to mimic natural flow variability and connect wetlands.	Y	Y	Y	Y
8	Murchison McCoys	Provide higher baseflows or freshes up to 6,000 ML/day between May and November to pass Reach 1 freshes or mimic natural variability through the length of the Goulburn River.	Y	Y	Y	Y
9	Murchison McCoys	Provide 2025 winter fresh >7,300 ML/day or as high as possible in May - August for channel forming, and platypus nesting cues. Aim to use a natural fresh and provide most of the event from rainfall runoff with minimal releases from Lake Eildon.	Y	Y	Y	Y
10	Murchison McCoys	Provide a late spring fresh (>6,600 ML for 1 day) between October and December for native fish spawning	Y	Y	Y	Y

2 SYSTEM OVERVIEW

Waterway Manager: Goulburn Broken Catchment Management Authority

Storage Manager: Goulburn-Murray Water

Environmental Water Holder: Victorian Environmental Water Holder (including the Living Murray Program) and Commonwealth Environmental Water Holder

Land Manager:

Proportions of water entitlements in the Goulburn basin held by private users, water corporations and environmental water holders on 30 June 2020

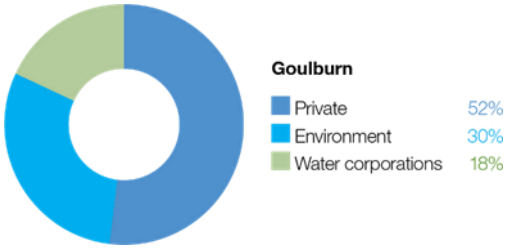


Figure 1: Water entitlements in the Goulburn system.

The Goulburn is Victoria's largest river basin, covering over 1.6 million ha or 7.1 percent of the state (Figure 5.4.1). The Goulburn River flows for 570 km from the Great Dividing Range upstream of Woods Point to the Murray River east of Echuca. It is an ancient, iconic river rich with environmental, cultural and recreational values.

There are several environmental water holders in the Goulburn system. The Commonwealth Environmental Water Holder (CEWH) holds the largest volume, and the use of Commonwealth Water Holdings is critical to achieving outcomes in the Goulburn River, as well as priority environmental sites further downstream. Water for the environment held on behalf of the Living Murray program may assist in meeting objectives in the Goulburn system enroute to icon sites in the Murray system (see subsection 1.4.2). Water held by the VEWH in the Goulburn system is primarily used to meet environmental objectives in the Goulburn River and the Goulburn wetlands, but it can also be used to support ecological objectives at downstream sites along the Murray River and in South Australia.

The construction and operation of Lake Eildon and Goulburn Weir have significantly altered the natural flow regime of the Goulburn River. Water harvesting during wet periods, and releases to meet irrigation and other consumptive demands during dry periods, means that flow below these structures is typically low in winter/spring and high in summer/autumn. This is the reverse of the natural seasonal flow pattern. Land use changes and the construction of small dams and drainage schemes have further modified the Goulburn River's flow regime. Levees and other structures prevent water from inundating the floodplain and filling many of the natural wetlands and billabongs. Several tributaries, including the Acheron, Yea and Broken rivers join the Goulburn River downstream of Lake Eildon and can add some flow variation on top of the river's regulated flows.

Large floods that cause the Goulburn River's storages to fill and spill are also important for the overall flow regime and its associated environmental values.

The priority environmental flow reaches in the Goulburn River are downstream of Goulburn Weir (reaches 4 and 5), which are collectively referred to as the lower Goulburn River. The mid-Goulburn River extends from Lake Eildon to Goulburn Weir (reaches 1 to 3). From early spring to late autumn, large volumes of water are delivered from Lake Eildon to Goulburn Weir to supply the irrigation system. During that period, flow in the mid-Goulburn River is usually well above the recommended environmental flow targets. Deliveries of water for the environment have the most benefit in the mid-Goulburn River (especially in reach 1 immediately downstream of Lake Eildon) when releases from Lake Eildon are much lower than natural, generally this is over winter and spring where releases for irrigation are low.

Environmental flow targets in the lower Goulburn River can sometimes be met by the coordinated delivery of operational water being transferred from Lake Eildon to the Murray River. These inter-valley transfers (IVTs) occur during the irrigation season between spring and autumn and may meet environmental flow objectives without the need to release water for the environment. IVTs in the Goulburn River can significantly exceed the environmental flow recommendations for summer and early autumn and can damage bank vegetation and erode the riverbanks. A new Goulburn to Murray trade rule and operating plan was introduced in 2022-23 to try to prevent further damage to the lower Goulburn River from prolonged high flow over summer and autumn. Wet conditions between 2021-22 and 2023-24 have meant only small volumes of IVT's have been delivered from the Goulburn system, and therefore the impact of the new trade rules and operating plan on environmental assets is yet to be fully assessed.

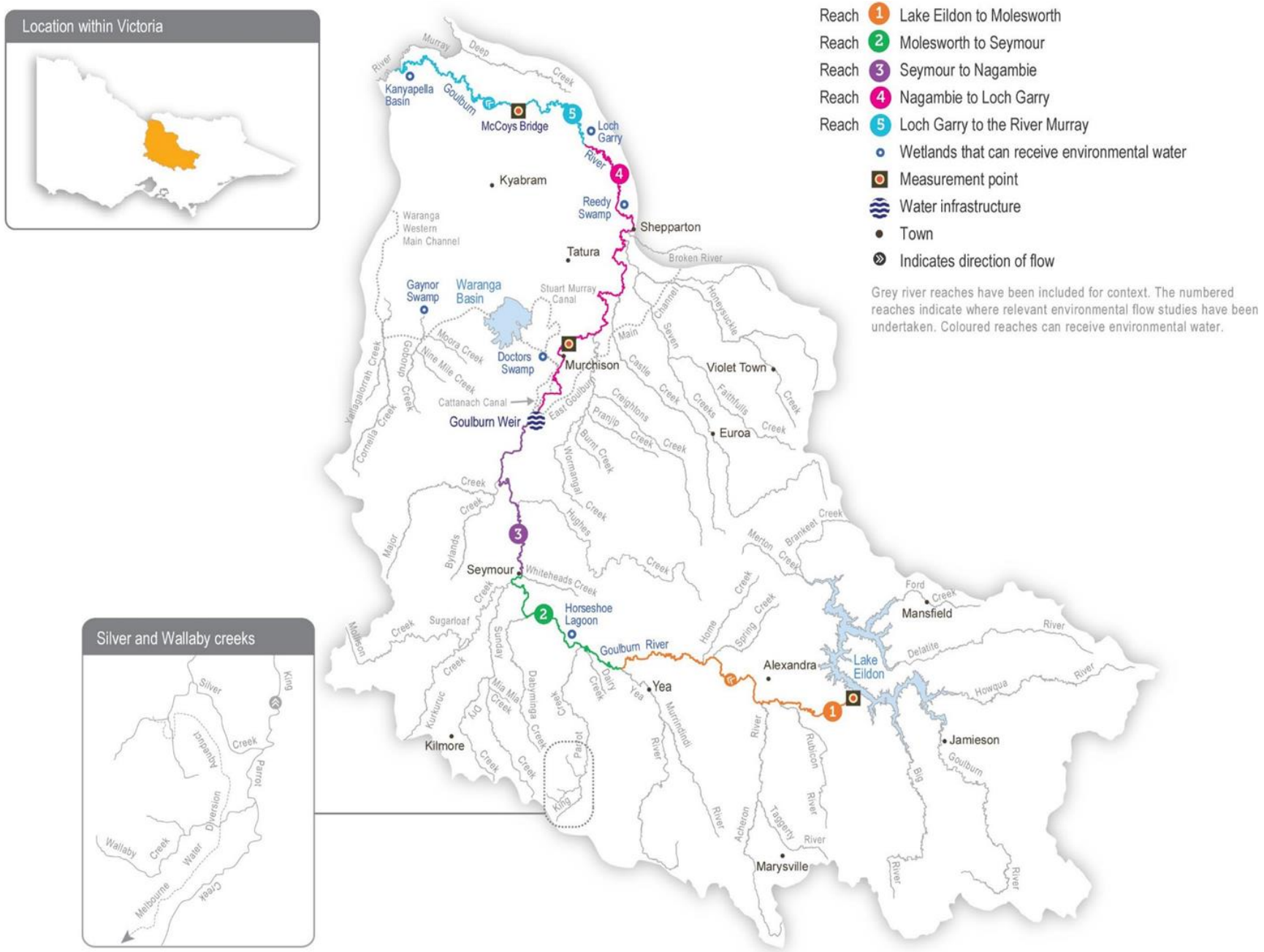


Figure 2: The Goulburn System

3 TRADITIONAL OWNER CULTURAL VALUES AND USES

The Goulburn River system flows through Taungurung and Yorta Yorta Country.

Each year, Goulburn Broken CMA consults with the Taungurung Land and Waters Council (TLaWC) and the Yorta Yorta Nation Aboriginal Corporation on plans for environmental watering in the Goulburn River. Consultation takes the form of both formal and informal discussions

Both, Taungurung Land and Waters Council and Yorta Yorta Nation Aboriginal Corporation are members of the Goulburn Environmental Water Advisory Group (GEWAG) and the Goulburn and Broken Operational Advisory Group (OAG). Both groups meet frequently throughout the year and share technical, operational, and other information such as recreational and cultural values to support environmental water management and decision making in the Goulburn River.

Developing environmental watering actions is a complex process involving scientists, the community and traditional owners and occur every 5 to 10 years. During this process both the Taungurung Land and Waters Council (TLaWC) and the Yorta Yorta Nation Aboriginal Corporation were consulted to capture how environmental watering actions support or interact with cultural values and uses. A brief summary of the consultation outcomes are below.

In early 2023, Goulburn Broken CMA met with the Taungurung water knowledge group Baan Ganalina (Guardians of Water) to discuss updated environmental flow recommendations for *Waring* (reaches 1 to 3 of the Goulburn River) as well as the 2023-24 Goulburn River watering priorities.

Baan Ganalina indicated the flows would help to reinstate a more natural water regime that better reflects the size, timing and variability of natural inflows to this part of the river, including off-channel areas.

> *"These flow recommendations will help support Waring (Goulburn River), which is such an important part of Taungurung identity. It's good to see how GBCMA have used peer reviewed articles to show the effects on important animals like platypus, and shared this knowledge. The river is a work in progress, but together with GBCMA we will continue to seek ways to heal Country despite the harm it has suffered. Baan Ganalina hope to see the proposed higher winter flows, and look forward to taking an ongoing role in monitoring their effects."*
>
> - Baan Ganalina, 2023

TLaWC communicated that the planned reach 1 to 3 baseflows and freshes for 2023-24 would have positive outcomes for Waring that align with Taungurung objectives and responsibilities to heal and care for Country. These flows will connect wetlands that support valued species at appropriate times. They will help to protect intangible and tangible cultural heritage and values, including traditional food and medicine plants. The flows will also support ongoing efforts by Taungurung and partner organisations to care for the river and its floodplain, including investigations into rehabilitating degraded significant sites.

In early 2023, Goulburn Broken CMA met with the Yorta Yorta Nation Aboriginal Corporation to discuss 2023-24 environmental watering priorities in the Goulburn River. The Yorta Yorta Nation Aboriginal Corporation indicated there is alignment between planned watering actions for *Kaiela* (reaches 4 and 5 of the Goulburn River) and the cultural and ecological values of the Yorta Yorta people. The planned flows will encourage native fish spawning activity, alleviate slumping of

culturally important sites (such as middens and scar trees) and will revive streamside vegetation which is important for food, fibre and medicine.

A Yorta Yorta representative contributed to the 2020 Kaiela Environmental Flows Study, which has influenced environmental flows in the lower Goulburn River since 2021-22.

Increasing the involvement of Traditional Owners in environmental water management and progressing opportunities towards self-determination in the environmental watering program is a core commitment of the VEWH and its agency partners. This is reinforced by a range of legislation and policy commitments, including the Water Act 1989, the Victorian Aboriginal Affairs Framework, the 2016 Water for Victoria, the 2022 Water is Life: Traditional Owner Access to Water Roadmap and in some cases other agreements, including under the Traditional Owner Settlement Act 2010.

Where Traditional Owners are more deeply involved in the planning and/or delivery of environmental flows for a particular site, their contribution is acknowledged in Table 5.4.1 with an icon. The use of this icon is not intended to indicate that these activities are meeting all the needs of Traditional Owners but is incorporated in the spirit of valuing that contribution.

Watering planned and/or delivered in partnership with Traditional Owners to support cultural values and uses

4 SOCIAL RECREATIONAL AND ECONOMIC VALUES AND USES

In planning the potential watering actions in Table 5.4.1, Goulburn Broken CMA considered how environmental flows could support values and uses such as:

- water-based recreation (such as boating, canoeing, fishing, gaming, hunting and kayaking)
- riverside recreation and amenity (for landholders and visitors)
- community events and tourism (such as paddling and boating businesses)
- socio-economic benefits (such as improving water quality for stock and domestic uses, irrigation diverters and water supply for settlements on the Goulburn River).

If the timing or management of planned environmental flows may be modified to align with a community benefit, this is acknowledged in Table 5.4.1 with the following icon.

	Watering planned to support angling activities

The Goulburn River provides numerous recreational and economic benefits. Environmental flows support native fish populations by providing fish passage and habitat and by encouraging fish migration and spawning, which in turn provides benefits for recreational anglers. Following community feedback, the timing of a targeted environmental flow events in September (mid Goulburn) and November/ December (lower Goulburn) is planned to reduce impacts on river access around the opening of different fishing seasons, benefitting anglers and local businesses.

5 ENVIRONMENTAL VALUES AND OBJECTIVES

The Goulburn River and its tributaries support a range of native fish (including golden perch, silver perch, Murray cod, trout cod, Macquarie perch, freshwater catfish), turtles, platypus and rakali (water rats). Aquatic vegetation, scour holes and woody debris within the channel provide high-quality habitat for adult and juvenile fish. River red gums are a dominant feature of the streamside zone along the length of the Goulburn River. These trees shade the river and provide habitat for many species, including the squirrel glider. Leaves that fall from the river red gums provide carbon that supports riverine food webs, and dead trees that fall into the river provide a surface for biofilms and waterbugs and habitat for fish. Birds (such as egrets, herons and cormorants) use trees along the river to roost and feed, while frogs benefit from shallow vegetated habitats at the edge of the river channel and in adjacent wetlands.

The Goulburn River system is an important conservation area for threatened species. Several wetlands in the Goulburn catchment are formally recognised for their conservation significance. Tributaries of the mid-Goulburn River between Lake Eildon and Goulburn Weir host some of the last remaining Macquarie perch populations in the Murray-Darling Basin, while freshwater catfish occur in lagoons connected to reach 3 of the Goulburn River. Citizen science monitoring programs indicate the mid-Goulburn River supports a strong population of platypus, which are now classified as vulnerable under Victoria's Fauna and Flora Guarantee Act 1988. Monitoring in recent years shows that environmental flows in the lower Goulburn River trigger golden perch and silver perch to spawn. However, the extent to which these spawning events contribute to populations locally and in the wider southern basin is unknown. Self-sustaining populations of Murray cod have been confirmed, and trout cod are extending their range in the lower Goulburn

River.

Environmental objectives in the Goulburn River	
	F1 - Increase the abundance, spatial distribution and size class diversity of key native fish species (i.e. Macquarie perch, Murray cod, Trout cod, Golden and Silver perch)
	G1 - Maintain natural channel form and dynamics (e.g. sediment diversity, rates of sediment transport and bank erosion rates) G2 - Increase instream physical habitat diversity by providing higher flows (velocities) to influence channel form (e.g. shallow and deep water habitats)
	PR1 – Increase self-sustaining populations of platypus
	T1 - Maintain self-sustaining populations of turtles
	CN1 - Provide sufficient rates of carbon and nutrient production and processing to support native fish and waterbug communities
	V1 - Increase the abundance of aquatic and flood-tolerant plants in the river channel and on the lower banks to provide shelter and food for animals and stabilise the riverbank V2 – Increase the abundance of aquatic and flood-tolerant plants in low lying and connected wetlands
	MI1 - Maintain abundant and diverse waterbug communities to support riverine food webs
	WQ1 - Provide higher flows to reduce water temperatures over summer, dilute small tributary blackwater events and nutrient runoff from human actives and thus minimise the risk of hypoxic blackwater.

6 ENGAGEMENT

There are two main audiences for engagement in the development of this proposal. The primary audience are the agencies involved in delivering the proposed flows. This includes Goulburn-Murray Water (GMW), the Victorian and Commonwealth Environmental Water Holders and the Murray-Darling Basin Authority (river operators and the Living Murray program).

The VEWH will use this proposal as the basis for developing their Seasonal Watering Plan. Water allocated is to be delivered in accordance with the plan and the plan is used to seek agreement from other water holders for the use of their water. Routine communication (videoconference, phone, email) will report on deployment of water under the plan.

The CEWH may allocate water to the Seasonal Watering Plan which is based on this proposal. Environmental water releases from the Goulburn River also assist in achieving further benefits at downstream environmental sites. Routine communication will be via the VEWH.

GMW is the key water delivery agency for this plan. When the final proposal for 2023/24 is agreed, communications with GMW will continue to manage environmental water orders and releases and informing GMW and their customers of the intended purpose.

MDBA (river operators) is responsible for calling out Inter-Valley Transfers (IVT). IVT orders are placed with GMW. However, regular communications (phone, email) throughout the year with the CMA will be aimed at delivering IVT in line with the 2022 operating rules and GMW's 2024/25 operating plan. As the operating plan is still in a draft state and not protected in legislative instruments there will be ongoing communication on implementation and review, operating rules and trade rules may impact on the delivery of IVT into 2023/24.

A Goulburn and Broken Operational Advisory Group was formally established by the VEWH in 2016 and is comprised of representatives from the VEWH, Goulburn-Murray Water, CEWH, Taungurung Land and Waters Council, MDBA and GBCMA. This group aims to provide a regular and coordinated forum to discuss the environmental water resource management planning and delivery in the Goulburn River and discuss how this impacts system scale coordination of consumptive and other environmental water.

The secondary audience of this proposal are those potentially affected by, or interested in, environmental flows but not directly involved in planning and delivery. This includes Parks Victoria, water users along the river, local government, Victorian Fisheries Authority, environment groups and the general public. The communication objective for these groups is to provide information about the decision to provide environmental flows and what it is trying to achieve. These communications are generally through media articles, emails, and potentially through presentations to special interest groups and direct engagement.

To assist with engaging the community, the GBCMA established a Goulburn Environmental Water Advisory Group (GEWAG) in 2012. The aim of the GEWAG is for community members and interest groups to provide feedback to the CMA on river health trends observed by landholders and river users and provide advice on planning environmental water use. The group comprises community members and representatives from key agency partners. Indigenous groups (Yorta Yorta Nation Aboriginal Corporation and Taungurung Land and Waters Council) have a seat in the group and are starting to attend the meetings on a regular basis. At times, limited resources have restricted their involvement and when this happens, they are consulted through separate meetings or discussions.

Table 1: Engagement undertaken in development of the Seasonal Watering Proposal 2024/25

Category	Partner/stakeholder	Engagement method	Engagement purpose
Community groups and Environment groups	Goulburn Valley Environment Group	GEWAG meeting on the 1/3/2024 (couldn't attend but received meeting notes) Direct engagement throughout 23/24 on watering actions Review of the draft proposal	Seek feedback on environmental water priorities for 2024/25 Incorporate feedback and observations on river condition into the SWP
Program Partners (Government Agencies)	Goulburn Murray Water VEWH CEWH Parks Victoria MDBA/TLM	GEWAG meeting on the 1/3/2024 Direct engagement Draft SWP sent for review and comment/endorsement	Seek input to development of proposal and ensure partners understand any issues in environmental water planning and provide feedback on any constraints to delivery
Recreational users and Local businesses	Trellys fishing and hunting Local ecotourism operator	GEWAG meeting on the 1/3/2024 Direct engagement throughout 23/24 on watering actions	Seek feedback on environmental water priorities for 2023/24 and observations of the river. Seek feedback on social and recreational use of the river

Landholders	Goulburn Environmental Water Advisory Group (GEWAG)	GEWAG meeting on the 1/3/2024 (not all members could attend but received meeting notes)	Seek feedback on e-flow priorities for 2024/25 Incorporate feedback and observations on river condition into the SWP
Traditional owners	Yorta Yorta	GEWAG meeting on the 1/3/2024 Direct engagement Draft SWP sent for review and comment/endorsement	Seek feedback on e-flow priorities for 2024/25 Incorporate feedback and observations on river condition and objectives into the SWP
	Taungurung	GEWAG meeting on the 1/3/2024 (couldn't attend but received meeting notes) Direct engagement Draft SWP sent for review and comment/endorsement	Confirm that new flow recommendations for reaches 1-3 are supported by the Taungurung Water Knowledge Group and did not require further amendment. Seek feedback on e-flow priorities for 2024/25 Incorporate feedback and observations on river condition and objectives into the SWP
Technical experts	Scientific leads from the CEWH Monitoring, Evaluation and Research Program – Goulburn River G-M trade rule review Scientific Advisory panel	Direct engagement through various sources including Flow-MER annual results workshop 15/2/2024.	Seeking advice from scientists on their observations from monitoring and adapting plans/objectives to these results Fish, Vegetation, Macroinvertebrates, Bank Condition

7 SCOPE OF ENVIRONMENTAL WATERING

Environmental Watering Requirements outlined in this seasonal watering plan are developed based on a strong history of scientific studies and reports on the Goulburn River. Each year the environmental watering actions which have been developed in these reports are modified to reflect seasonal conditions or monitoring/observations from scientists.

The Goulburn River Environmental Water Management Plan was completed in 2015 by the Goulburn Broken CMA (2015) and provides an overview of the long term environmental water management objectives. The following table lists these environmental objectives for the Goulburn River (GBCMA 2015).

A number of environmental flows studies have been undertaken for the Goulburn River. These are all listed in the references and include:

- Environmental Flow Recommendations for the Goulburn River below Lake Eildon (Cottingham et al 2003)
- Evaluation of Summer Inter-Valley Water Transfers from the Goulburn River (Cottingham et al 2007)
- Objectives for flow freshes in the lower Goulburn River 2010/11 (Cottingham et al 2010)
- Mid Goulburn River FLOWS study (Cottingham et al 2014a)
- Kaiela (Lower Goulburn River) Environmental flows study (University of Melbourne, 2020)

In 2018, some environmental flows objectives were reviewed as part of an investigation into IVT potential in the lower Goulburn River (Cottingham et al, 2018).

The Kaiela River (lower Goulburn) flows study (University of Melbourne, 2020) developed the latest suite of environmental flow recommendations using a slightly different method to the standard Victorian government method. The adopted method used a 'designer' flow approach and recognises that the Goulburn River is highly regulated and is no longer compatible with the 'natural flow paradigm' approach. Recommendations and ecological objectives from this report form the basis of environmental watering requirements for reaches 4 and 5 in this report.

Table 2: Potential Watering Actions in 2024-25

Potential environmental watering action	Expected watering effects	Environmental objectives
Lower Goulburn River - Reach 4 and 5 (Gauge 405200 Murchison and Gauge 405232 McCoys Bridge)		
Year round low flows (600 - 1000 ML/day in reaches 4 and 5) Dependent on seasonal conditions. Provide a variable baseflow of 600 - 1000 ML/day in reaches four and five all year.	• Provide slow, shallow habitat required for the recruitment of larvae/ juvenile fish and habitat for adult small-bodied fish • Provide deep-water habitat for large-bodied fish • Provide habitat and food for turtles • Submerge snags and littoral vegetation to provide habitat for fish and waterbugs and a substrate for biofilms to grow • Maintain habitat for aquatic vegetation and water the root zone of low- bank vegetation • Vary flow within a specified range to encourage planktonic production (for food), disrupt biofilms and maintain water quality • Low variable flows enable vegetation to establish to protect against notching and bank erosion	F1 T1 CN1 V1 MI1 WQ
Early spring fresh Deliver a fresh up to a peak flow of 10,000 ML/day (>7,300 ML for 7 days) between September and October. The magnitude of the fresh will be dependent on the proportion of natural flow and only exceed 9,500 ML/day if it is from natural flows. The spring fresh is the highest priority of freshes.	• Provide connectivity to off channel habitats and through the river for fish dispersal and greater food resources Improve macroinvertebrate habitat by scouring fine sediments. • Provide cues for fish movement and dispersal • Provide organic matter and carbon (e.g. leaf litter) to the channel • Increase moisture in bank soils and provide a source of propagules driving establishment of new plants and growth of existing ones. • Remove terrestrial vegetation, scour and transport fine sediments to maintain pools and bring in sediments to maintain instream complexity	F1 V1 & V2 CN1 MI1 G1 & G2
Winter fresh Provide a fresh up to 10,000 ML/day (or high as possible) between May - August. Minimum peak flow of 7,300 ML/day for 4 to 5 days Aim to use a natural fresh and provide most of the event from rainfall runoff and minimal releases from Lake Eildon	• Provide connectivity to off channel habitats and through the river for fish dispersal and greater food resources • Trigger lamprey migration in South Australia if delivered to the Lower Lakes during July and/or August. • Channel forming events scour bed sediments to maintain and maintain pools and change in-channel complexity • Provide cues for platypus to nest higher up the bank so they are not impacted by the spring fresh. • Provide organic matter and carbon (e.g. leaf litter) to the channel • Tributary and high flows are a source of sediment and propagules driving establishment of new plants. • Remove terrestrial vegetation and trigger the recruitment of semi-aquatic vegetation • Improve macroinvertebrate habitat by scouring fine sediments, improving habitat area and food availability	F1 G1 & G2 CN1 V1 & V2 MI1 PR1

Potential environmental watering action	Expected watering effects	Environmental objectives
Ecological risk mitigation flows Maintain water quality and protect the banks from erosion or mimic natural variability A standing order will be placed with GMW to deliver freshes up to 6,000 ML/day	• Minimise the risk of bank erosion associated with mass failure from rapid drops in river levels • Minimise the risk of hypoxic blackwater after natural events • Reduce the risk of poor water quality harming aquatic biota • Transport and deposit seed, plant propagules and sediment on the riverbank • Provide organic matter and carbon (e.g. leaf litter) to the channel	WQ1 G1   CN1 V1  
Autumn fresh Provide an autumn fresh (>5,700 ML for 2 - 5days) between March and May	• Cue fish to move through the system allowing dispersal. Attract Golden and Silver perch to migrate into the Goulburn • Reinvigorate drying vegetation on the banks and provide some growth before the weather cools • Flush fine sediment and scour old biofilm from hard substrates to allow new biofilm growth and to improve food and habitat for macroinvertebrates • Scour and remove fine sediments to maintain instream habitat complexity	F1 G1   MI1 V1  
Late spring fresh for fish spawning between October and December provide a short duration fresh >6,600ML/day for 2 days and >1,500ML/day for around 14 days	• Stimulate spawning of Golden and/or Silver perch • Scour bed sediments to maintain pools and change in-channel complexity for improved habitat • Improve waterbug habitat and food availability by scouring fine sediments and biofilms from hard substrates	F1 G1   MI1  

Mid Goulburn River – reaches 1-3 (Gauge 405204 Goulburn River downstream Lake Eildon)		

Year round low flows
Provide variable base flow of 400 - 2,000ML/day) in reach one
 	
Variability pattern within channel bed to be informed by natural inflow pattern and operational practicalities
	• Maintain habitat for small-bodied native fish
	• Maintain adequate foraging habitat for platypus and reduce the risk of predation
	• Provide habitat and food for turtles
	• Wet and maintain riffles to provide habitat for biofilms and waterbugs
	• Additional benefits to reach 1 of the Goulburn River when the flow delivered is above 800 ML/day:
	  • scour fine sediment from the gravel bed and riffle substrate
	  • maintain existing beds of in-channel vegetation
	  • provide connection to off-stream wetland habitats, which increase food resources (waterbugs) available for fish and native animals
		F1 T1
		PR1 V1
		MI1 G1

Winter fresh Deliver the fresh peak flow of > 8,000 ML/day for 5 to 10 days between late July and August. Single flow rate held < 7 days. 1-3 weeks after any lower Goulburn tributary dominated fresh.	• Encourage female platypus to select a nesting burrow higher up the bank to reduce the risk of greater flow later in the year flooding the burrow when juveniles are present • Scour sediment and increase velocities to maintain pools and affect river channel form change (increase complexity). • Connect low lying off-channel habitats enabling organic matter exchange, providing access to temperature refuge and supporting lentic (still water) specialists such as small bodied native fish. • Optimise foraging conditions for platypus and turtles. • Maintain existing beds of submerged vegetation both in-channel and in connected wetlands by reducing unsubmerged exposure time • Increase habitat availability to support macroinvertebrate lifecycles	F1 T1 PR1 V1 & V2 MI1 G1 & G2
Spring fresh. Deliver the fresh 8000 ML/day (but not exceeding winter fresh) for 5 to 10 days between September and November. Single flow rate held < 7 days. But 1-3 weeks after any lower Goulburn tributary dominated fresh.	• Scour sediment and increase velocities to maintain pools and affect river channel form change (increase complexity). • Provide natural seasonality to support macroinvertebrate lifecycles. • Connect low lying off-channel habitats enabling organic matter exchange, providing access to temperature refuge and supporting lentic (still water) specialists. • Optimise foraging conditions for platypus and turtles. • Maintain existing beds of submerged vegetation both in-channel and in connected wetlands by reducing unsubmerged exposure time • Increase soil moisture in banks and connected wetlands to improve the condition of existing native vegetation	F1 T1 PR1 V1 & V2 MI1 G1 & G2
Variable winter/spring fresh(es) Up to 3 events per year greater than 5,000 ML/day for 5 to 10 days between May and November, Aim to reflect natural inflow cues.	• Maintain physical instream features e.g. scour holes. • Provide natural seasonality to support macroinvertebrate lifecycles. • Connect low lying off-channel habitats enabling organic matter exchange, providing access to temperature refuge and supporting lentic (still water) specialists. • Optimise foraging conditions for platypus and turtles. • Maintain existing beds of submerged vegetation both in-channel and in connected wetlands	F1 T1 PR1 V1 & V2 MI1 G1 & G2

8 SCENARIO PLANNING

8.1.1 Climatic outlook for 2023/24

The long term climate outlook for environmental water planning is difficult to determine. Consequently, the CMA uses allocation outlook scenarios provided by Goulburn-Murray Water to assist in scenario planning. Table 3 shows the outlook (based on historic river flows and inflows) into storages that has been used as a basis for scenario planning in this Seasonal Watering Proposal.

With good inflows in 2023/24 there are reserves in the Goulburn system that will provide for an opening allocation under all inflow conditions. Combined with allocations predicted to reach 100% early in the season there is also a large volume of environmental water carryover that will aid in delivering season watering priorities.

Table 3: Goulburn system outlook for 2024/25 seasonal determination of high reliability shares

Inflow Conditions	1 July 2024	15 August 2024	16 October 2024	17 February 2024
Wet	100%	100%	100%	100%
Above Average	91%	100%	100%	100%
Average	80%	100%	100%	100%
Below Average	73%	100%	100%	100%
Dry	68%	83%	100%	100%
Very Dry	66%	77%	95%	100%
Extreme Dry	64%	69%	75%	80%

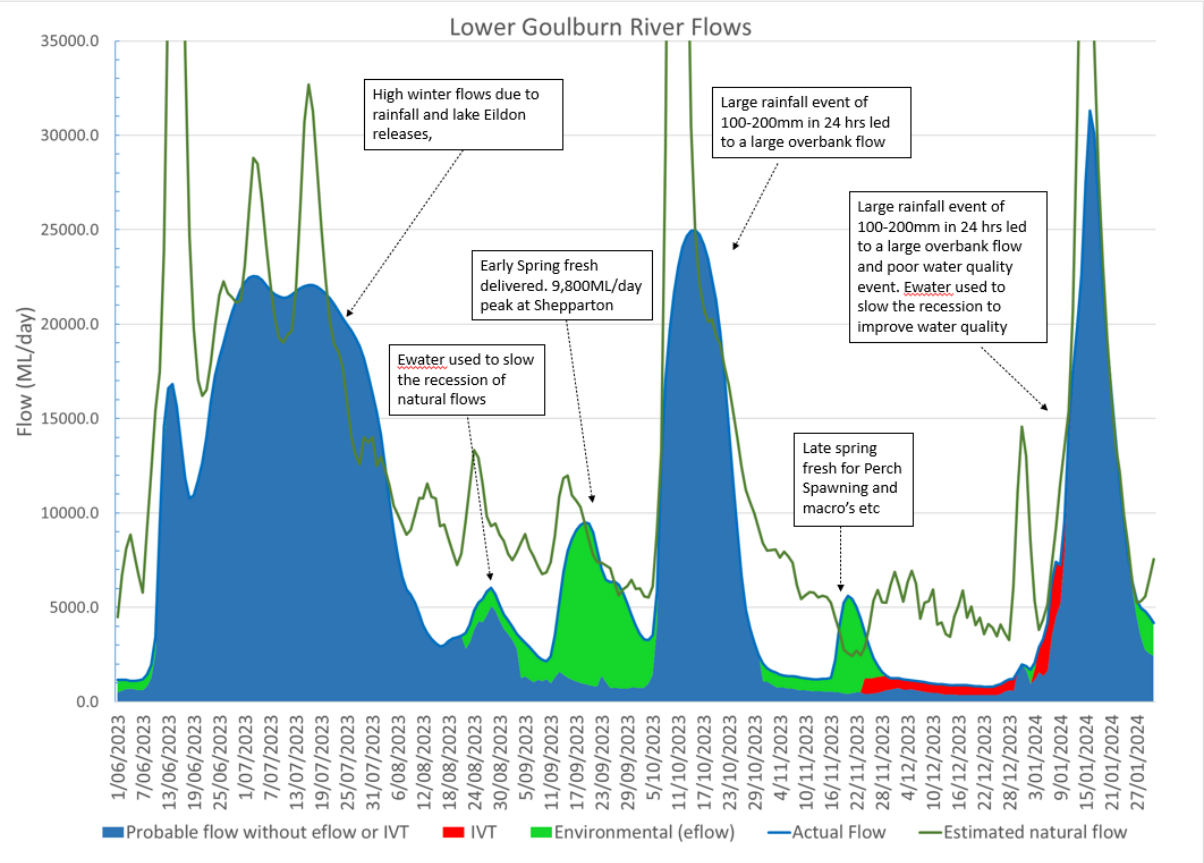
Source: GMW, 15 February 2024

A high-level scenario planning table focusing on use of water for the environment under the different inflow scenarios for 2024/25 is outlined in Table 5. Due to high volumes of Environmental water available, priority watering actions are the same under each climate/water resource scenario.

Delivery of Water for the Environment in the Goulburn River is complicated with operational water deliveries combined with Inter Valley Water Transfers to the Murray all affecting the flow regime and benefits/use of environmental water. A detailed scenario table which builds on seasonal watering priorities and considers potential implications of all water sources is provided in Appendix 1. As all watering priorities are the same for every inflow/climate scenario this table gives further insight into the complexities and likely flow regimes under different flow scenarios.

In 2024/25 with large volumes of water in storage the chances of spills from Eildon and Goulburn weir are high in all but the dry and extreme dry climate scenarios. Thus, there will be limited potential to deliver separate events for Reach 1 without impacting the lower reaches. Scientific advice is higher flows over the winter and spring period due to Reach 1 freshes passing through the lower Goulburn will likely have positive ecological implications as long as flows are variable (i.e. delivered as freshes).

Figure 4: Lower Goulburn flows for 2023/24 year to date



As shown in Figure 4, the last two years of flow in the Goulburn River have been dominated by high overbank flow events fed by rainfall runoff and spills from storage. Following severe catchment wide flooding in October 2022 there have been three overbank events in the Lower Goulburn including an unusual overbank event in January.

Environmental watering actions in the lower Goulburn River in 2024-25 will continue to focus on vegetation recovery after these impacts of prolonged flooding over several seasons. Overall vegetation cover on the mid and upper banks is looking good after unseasonal flooding in January 2024. However, ecological monitoring has found that vegetation cover is dominated by just a few inundation tolerant species, thus the focus for vegetation in 2024-25 will be on increasing species diversity on the banks.

The most important sequence of flows for bank vegetation in the lower Goulburn River is a spring fresh followed by low flows over summer. The target range for the low flow aims to inundate enough of the channel to support in-stream vegetation, while exposing the lower parts of the bank for sustained periods during the warmer growing season to avoid drowning streamside vegetation. This flow regime is also expected to help increase species diversity by allowing less inundation tolerant species to establish from seed banks in the deposits from the flooding events.

Water for the environment will also be particularly important for maintaining a minimum flow in reach 1 – immediately downstream of Lake Eildon – during winter, when there are no irrigation releases. In this reach, winter and spring freshes are needed to periodically wet higher parts of the

bank to enhance the growth and recruitment of native streamside vegetation and deter the growth of terrestrial species.

A year-round low flow and freshes may be fully or partially achieved with natural flows in the wetter planning scenarios, and operational releases (such as IVTs) may help meet environmental flow targets under the drier planning scenarios. Goulburn- Murray Water generally diverts a proportion of the natural high flow from Goulburn Weir into the Waranga Basin. These operational transfers can cause the flow rate in the lower Goulburn River to drop rapidly after a natural high-flow event, and water for the environment may be used as required to slow the recession of natural spills at Goulburn Weir to reduce the risk of bank slumping.

Although a lower priority for environmental watering in 2024-25, supporting native fish objectives will be targeted when possible. A prolonged sequence of high flows has built resilience in the Goulburn River and its with native vegetation thriving in the river channel and floodplain. Macroinvertebrate numbers have increased in both years but blackwater events have had a potential negative impact on fish populations. Monitoring results have indicated smaller numbers of small bodied fish and anecdotal evidence is that 2 years of high Eildon releases may have negatively impacted the success of platypus breeding in reach 1 of the Goulburn river. These conditions have influenced the prioritisation and scenarios for environmental watering actions in 2024/25. Delivering a winter fresh will provide platypus with required cues to build nests high enough on the bank to prevent nests being drowned though delivery of water for the environment and operational flows (<10,000ML/day).

Flow objectives for the small bodied fish align with the objectives for littoral and lower bank vegetation. Low flows generate the largest areas of slackwater over the summer period and provide habitat for small bodied fish to recruit and grow.

Golden and silver perch do not need to spawn every year to maintain good populations, but actions to improve native fish populations will be taken where possible. Late spring freshes are known to trigger spawning in the lower Goulburn River, and water for the environment may be used to deliver freshes in spring 2025 as long as their timing does not compromise the re-establishment of bank vegetation.

The final focus for environmental watering in the Goulburn River in 2024-25 will be to deliver multiple freshes in winter and spring in reach 1 to reinstate some natural flow variation and connect floodplain wetlands between reach 1 and reach 3. This will allow fish and platypus to access off-channel habitats for feeding and breeding.

This proposal considers annual environmental water management under a range of possible climate and corresponding water resource availability scenarios for 2024/25 ranging from extremely dry to wet. Given antecedent conditions including high storage levels and watering actions achieved in 2023/2024, prioritisation and delivery of the environmental watering actions for 2024/25 have been based around the following principles:

1. Maintain or re-establish lower bank vegetation over summer and autumn following floods and prolonged high flows.
    a. Scientific advice is that the best flow regime for bank vegetation is to deliver the early spring fresh and maximise the time of baseflows over summer and Autumn.

    b. To protect plants and new germinates, only deliver the late spring fresh if there is less than 1 week between the early spring fresh and the late spring fresh, or there has been 6 weeks of baseflows following the early spring fresh.

    c. Consider antecedent and bank vegetation condition in regard to the Autumn fresh. Mid an Upper Bank Vegetation should be fully grown and needing water and littoral vegetation should be established.

2. Due to likely high tributary flows, utilise Eildon releases to meet Reach 1 objectives and allow water to pass through to the lower Goulburn in winter and spring.

3. Maximise platypus breeding success by providing nesting cues, especially in the mid Goulburn as anecdotal evidence is a loss of breeding following 2 years of flooding.

    a. Deliver the winter fresh in reaches to provide cues for platypus.

4. Increasing habitat availability by connecting low lying floodplain features in the mid Goulburn.

    a. Deliver reach 1 objectives.

5. Achieve fish outcomes – improve Murray and Trout cod populations, cue Golden and Silver perch spawning and attraction into the river.

    a. Low flows over summer maximise habitat for small bodied fish and the potential for maximising population growth

    b. The spring fresh and summer baseflows are the highest priority watering actions for fish, in particular Murray and Trout Cod and small bodied fish.

    c. Delivering a late spring fresh and attractant flow in Autumn will aid in Perch population outcomes.

Table 5: Scenario Planning in 2024-25

Planning Scenario	**Drought (99% POE)**	**Dry 90% POE**	**Average 50% POE**	**Wet 10% POE**
Expected conditions	• No unregulated flow • Blackwater could be an issue over the warmer months. • IVT to be delivered at maximum rates under the Goulburn Operating arrangements	• One or two small, short duration freshes in winter/spring (perhaps up to 5,000 ML/day) and reasonable baseflows for half a month • Blackwater could be an issue over the warmer months • IVT to be delivered at maximum rates under the Goulburn Operating arrangements	• Likely spills through Goulburn Weir with one to three freshes (3,000 to 20,000 ML/day) and reasonable baseflows for most of the year likely flow targets will be provided for winter and spring by unregulated flow • Blackwater could be an issue over the warmer months • Not all IVT will be delivered but unregulated flows would cover baseflow needs.	• Overbank flows • Unregulated flow to provide the majority of flow over winter and spring and potentially into summer • Not all IVT will be delivered but unregulated flows would cover baseflow needs. • Blackwater could be an issue over the warmer months
Expected availability of Water for the environment	• **604 GL**	**754 GL**	**754 GL**	**754 GL**
Goulburn River Reach 1				
Potential environmental watering – tier 1 (high priorities)	Tier 1a (can be achieved with predicted supply)			
	• **Year-round low flow** • **Winter fresh** • **Variable winter/spring freshes** **Spring fresh**			
	Tier 1b (supply deficit)			
	• **N/A**	• **N/A**	• **N/A**	• **N/A**
Goulburn River Reaches 4 and 5				
Potential environmental watering – tier 1 (high priorities)	Tier 1a (can be achieved with predicted supply)			
	• **Year-round low flow** • **Winter fresh** • **Pass mid-Goulburn tributary flows and freshes in winter and spring**			

Planning Scenario	Drought (99% POE)	Dry 90% POE	Average 50% POE	Wet 10% POE
	• **Early spring fresh** • **Autumn fresh** • **Recession flow management** **Late spring fresh**			
	Tier 1b (supply deficit)			
	• **N/A**	• **N/A**	• **N/A**	• **N/A**
Potential environmental watering – tier 2 (additional priorities)	• **N/A**	• **N/A**	• **N/A**	• **N/A**
Possible volume of water for the environment required to achieve objectives	• 576 GL (Tier 1a) • 0 (Tier 1b) • 0 (Tier 2)	• 562 GL (Tier 1a) • 0 (Tier 1b) • 0 (Tier 2)	• 520 GL (Tier 1a) • 0 (Tier 1b) • 0 (Tier 2)	• 555 GL (Tier 1a) • 0 (Tier 1b) • 0 (Tier 2)
Priority carryover requirements for 2025-26	• 100 GL for Goulburn river baseflows over winter and spring, or use in the Winter 2025 fresh depending on climatic conditions.			

9 RISK MANAGEMENT

The risks associated with the delivery of the priority watering actions, the identified mitigation actions and the lead agency responsible for implementing the mitigation actions are listed in the table 6 below.

Table 6: Risk assessment of proposed water delivery

		Pre-Mitigation Risk					Residual Risk			
Risk category	**Risk description**	**Likelihood**	**Consequence**	**Risk Rating**	**Mitigation actions**	**Lead organisn. for action**	**Likelihood**	**Consequence**	**Risk Rating**	**Risk type** Static or Dynamic
Environment	Specified flow rates are insufficient to achieve the intended extent of wetland inundation or magnitude and duration of river flows, resulting in a failure to achieve planned environmental outcomes. Applicable for mid-Goulburn flow trials in 2023-24 (new actions), also applicable to post-flood environment. Much lower risk for Ovens.	Possible	Major	Medium	• Include contingency allowance in estimated watering requirements, based on previous event data, and consider a contingency in the duration of the event to achieve desired wetland inundation. • Monitor event (especially for deliveries to new sites or for previously untested events) and adjust flows as necessary, or terminate event if it becomes clear that insufficient water is available. • Identify and address constraints that may limit the flow rates for environmental deliveries.	CMA CMA CMA/GMW	Possible	Minor	Low	Static
Reputational	Specified flow rates are insufficient to achieve the intended extent of wetland inundation or magnitude and duration of river flows, resulting in a failure to achieve planned environmental outcomes and loss of community support.	Possible	Major	Medium	• Communications on the environmental benefits of watering actions. • Monitor event (especially for deliveries to new sites or for previously untested events) and adjust flows as necessary, or terminate event if it becomes clear that insufficient water is available. • Communicate the need for complimentary measures to optimise the benefits of environmental watering actions.	CMA	Unlikely	Minor	Low	Static

		Pre-Mitigation Risk					Residual Risk			
Risk category	**Risk description**	**Likelihood**	**Consequence**	**Risk Rating**	**Mitigation actions**	**Lead organisn. for action**	**Likelihood**	**Consequence**	**Risk Rating**	**Risk type** Static or Dynamic
Legal	Environmental releases, either on their own or potentially in combination with unexpected tributary inflows, cause unauthorised inundation of private land, resulting in impacts on landowner activities and assets.	Possible	Major	Medium	• Release plans designed to avoid exceeding operational thresholds or unauthorised flooding. • Monitor events and adjust releases to avoid overbank flows. This may include limiting deliveries to daylight hours only, where feasible and consistent with watering requirements. • Monitor forecast rainfall and tributary inflows and adjust releases to avoid overbank flows. • Monitor deliveries to new locations to build an understanding of flow patterns and inundation thresholds and adjust releases accordingly. - Investigations post flood to determine commence to flow of major erosion in the Mid Goulburn (and other systems as required) - Seek advice from storage operator of any known changes in bank levels and commence to flow levels	CMA CMA GMW/MDBA GMW/MDBA CMA CMA Storage operator	Unlikely	Moderate	Low	Static
Reputational	Public land and/or access routes into public land areas may be inundated by delivery of environmental water, leading to potential impacts on recreational opportunities for park users (e.g. access to boat ramps, fishing spots, firewood collection etc.). **Applies to lower Goulburn - rated for this site - no access roads impacted, but sandbars and beaches could be.**	Almost certain	Moderate	High	• Watering proposals to identify potential impacts. communication of planned events, access closures, alternative recreational opportunities and alternative access routes	CMA Land Manager	Almost certain	Minor	Medium	Static

		Pre-Mitigation Risk					Residual Risk			
Risk category	**Risk description**	**Likelihood**	**Consequence**	**Risk Rating**	**Mitigation actions**	**Lead organisn. for action**	**Likelihood**	**Consequence**	**Risk Rating**	**Risk type** Static or Dynamic
Environment	Environmental water deliveries may generate or mobilise BGA blooms, with adverse water quality and/or health impacts (including to people, livestock and pets), resulting in cessation of releases and environmental impacts.	Possible	Major	Medium	• Consider likelihood of initiating BGA blooms in event planning and amend as required to manage risk, including investigation alternate delivery paths - e.g. lower outlets/offtakes, or non-delivery (e.g. as per 2022 for lower Broken creek) • Land managers or water corporation implement a risk-based monitoring program during environmental watering events, and where issues are identified, activate BGA response processes. **Notes: Parks Victoria are currently writing a BGA risk management plan for Northern Victoria Region that considers the potential risk of environmental water events. This plan will outline proactive and reactive monitoring and management responsibilities that Parks Victoria commits to as a Local Waterway Manager for BGA. Adequate BGA resourcing is being considering as part of this plan.* • Regional monitoring and advice on BGA status.	CMA / GMW Land Manager GMW GMW	Unlikely	Minor	Low	Static
Reputational	Environmental water management activities may conflict with or not complement water based recreational objectives, leading to loss of community support for activities. Highest risk at Goulburn River (for river/creek sites) - rated accordingly.	Almost certain	Moderate	High	• Communicate benefits of environmental water management to the broader community and engage with recreational user peak bodies. • Engage with local recreational user groups to inform them of environmental water management activities and the underlying rationale. • Adjust events or actions to reduce/avoid impact where practical without reducing environmental outcomes.	VEWH CMA CMA Land Manager VEWH	Possible	Minor	Low	Static

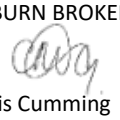
		Pre-Mitigation Risk					Residual Risk			
Risk category	**Risk description**	**Likelihood**	**Consequence**	**Risk Rating**	**Mitigation actions**	**Lead organisn. for action**	**Likelihood**	**Consequence**	**Risk Rating**	**Risk type** Static or Dynamic
					• Communicate alternate recreational opportunities. • Enhance community understanding of water system operations and entitlement frameworks (water literacy).					
Legal	Failure to recognise cultural heritage issues at a site targeted for watering may result in necessary permits and approvals not being obtained, leading to prosecution and fines.	Possible	Moderate	Medium	• Undertake desktop reviews and site assessments with archaeologists, traditional owners and land managers, to identify approval needs and contingency measures. • Obtain any necessary formal approvals/permits and implement required actions. - Seek necessary resources to undertake approvals and assessments	CMA	Unlikely	Minor	Low	Dynamic
Reputational	Inability to demonstrate outcomes achieved through environmental watering activities may lead to a loss of public/political support for activities	Possible	Major	Medium	• Rationalise and refocus current monitoring programs (e.g. Wetmap) to better identifying outcomes. • Seek additional funds to address gaps in monitoring programs and knowledge. • Communicate the benefits of environmental watering and monitoring results (Note: It may not be possible/affordable to address all monitoring gaps, so this risk may still be rated as medium after mitigation actions.) *Residual risk for 2023-24 reflects recent high flows experience - some community nervousness, general acceptance of ewater benefits*	DELWP VEWH CMA	Possible	Minor	Low	Static

		Pre-Mitigation Risk					Residual Risk			
Risk category	**Risk description**	**Likelihood**	**Consequence**	**Risk Rating**	**Mitigation actions**	**Lead organisn. for action**	**Likelihood**	**Consequence**	**Risk Rating**	**Risk type** Static or Dynamic
Environment	Environmental deliveries improve conditions for non-native species (e.g. carp, invasive species, feral horses) and over-abundant native species (e.g. kangaroos, Red Gum encroachment) leading to adverse environmental impacts. Particular issue in Goulburn River (risks of carp migration into system has impacted flows proceeding - likely to happen regardless), but applicable to all river systems.	Likely	Moderate	Medium	• Study/understand life history of species and develop high level management strategies. • Develop and implement site specific management strategies aimed at eradication/control of existing populations (e.g. carp management strategy, willow removal program, water-lily spraying program, feral animal programs). - Implement pest reduction efforts prior to delivery of water, to ensure increases in populations remain within "tolerable" levels, e.g. consider adjusting timing and magnitude of flows, and check in with fish ecologists *(Note: This risk is still rated as **medium** after mitigation actions. Still the case for 2023-24 - ecologist advice has recently prevented autumn fresh in Goulburn systems)*	DELWP CMA/Land Manager	Likely	Moderate	Medium	Static
Environment	Environmental watering actions trigger non-targeted environmental responses (e.g. bird breeding) causing unintended consequences (or lost opportunities) for other environmental values. Can't think of likely examples for rivers/creeks: Risk only relevant to wetlands sites - residual risk rating to be assessed at Delivery Plan phase.	Likely	Moderate	Medium	• Undertake monitoring and communicate these issues as they arise and apply adaptive management and review of delivery plans. • Consider including contingency allowance in delivery plan water volumes to complete breeding events.	CMA	Possible	Minor	Low	Dynamic
Reputational	Sections of the community perceives (incorrectly) that high river flows are due to environmental releases in dry conditions, leading to a	Possible	Moderate	Medium	• Communications to inform the community on the drivers/reasons for high flows in river systems, especially under dry scenarios	System operator & CMA	Unlikely	Minor	Low	Dynamic

		Pre-Mitigation Risk					Residual Risk			
Risk category	**Risk description**	**Likelihood**	**Consequence**	**Risk Rating**	**Mitigation actions**	**Lead organisn. for action**	**Likelihood**	**Consequence**	**Risk Rating**	**Risk type** Static or Dynamic
	loss of support for watering activities.				*- residual risk based on 23-24 conditions*					
Reputational	Under dry conditions, community expectations of the extent of environmental watering that can be achieved are not met, leading to a loss of support for environmental watering actions. Note - e-water deliveries may be constrained in 22-23 due to high consumptive avail.	Possible	Moderate	Medium	• Communications to inform the community on the limits of environmental water holdings and the extent of actions possible under dry conditions. *Note that public concern in this regard may be heightened as a result of the Menindee 2019 fish death events.* *- residual risk based on 23-24 conditions*	CMA	Unlikely	Minor	Low	Dynamic
Safety	Negative community sentiment in relation to government decisions/actions creates a safety risk for staff involved in environmental watering actions **This is state wide risk, but may not apply in all systems - the risk rating will reflect local risk levels*	Possible	Moderate	Medium	- ensure staff are alerted to warnings about violent members of public - Strategic Communication of benefits of e-water and concern over safety to wider public (with co-ordination between partners) - ensure safe operational procedures for staff are followed	All	Unlikely	Minor	Low	Static
Environment	High operational and consumptive water demands lead to reduced access for environmental deliveries, with the result that target flows/volumes cannot be achieved, impacting on environmental outcomes Note: Consumptive water en route may achieve some outcomes in Goulb, but limiting e-water from the	Likely	Moderate	Medium	• Event planning will seek to avoid peak demand periods, and events will be monitored and adjusted as necessary. - Ensure SCBEWC multi-site planning includes operational demands in its planning for downstream sites • System operators to provide longer term forecasts for future consumptive demands as an input to planning watering proposals • Develop longer term agreements on river capacity access for	CMA and GMW VEWH GMW/MDBA VEWH	Possible	Minor	Low	Dynamic

		Pre-Mitigation Risk					Residual Risk			
Risk category	**Risk description**	**Likelihood**	**Consequence**	**Risk Rating**	**Mitigation actions**	**Lead organisn. for action**	**Likelihood**	**Consequence**	**Risk Rating**	**Risk type** Static or Dynamic
	Goulburn has d/s implications for environmental outcomes at downstream Victorian sites in the Murray system, as well as the Murray River and Lower Lakes				environmental deliveries, with interim processes for capacity sharing at bulk level *- residual risk based on 23-24 conditions*					
Environment	Delivery of e-water actions leads to overall flows (in conjunction with consumptive deliveries) to exceed environmental tolerances, resulting in environmental harm.	Likely	Minor	Low	- Apply adaptative management to spring fresh planning including consideration of antecedent conditions, and use a risk based approach to balancing potential benefits and potential harms - Implementation of Goulburn to Murray trade rule and associated flow limits	GB CMA GMW	Possible	Minor	Low	

10 APPROVAL, ENDORSEMENT AND CONSENT

WATERWAY MANAGER APPROVAL OF THE SEASONAL WATERING PROPOSAL
I, the authorised representative of the agency shown below, approve the Seasonal Watering Proposal for the Goulburn system in 2024-25. SIGNED FOR AND ON BEHALF OF GOULBURN BROKEN CATCHMENT MANAGEMENT AUTHORITY Signature of authorised representative:  Name of authorised representative: Chris Cumming Position of authorised representative: CEO Date: 19/04/2024

ENDORSEMENT OF THE SEASONAL WATERING PROPOSAL

I, the authorised representative of the agency shown below, approve the Seasonal Watering Proposal for the Goulburn system in 2024-25.

Role	Endorsing partner	Representative Role	Status Date	Notes/Comments
Water Corporation	Goulburn-Murray Water	Andrew Shields River Operations Manager	☒ Endorsed. Date: 08/04/2024	*NA*
Land Manager	Parks Victoria	Kane Weeks Regional Director – Northern Victoria	☒ Endorsed. Date: 17/04/2024	*NA*
Traditional Owner	Yorta Yorta Nation Aboriginal Corporation	First name Surname Title	☒ Endorsed. Date: 16/04/2024	*NA*
	Taungurung Land and Waters Council	Voytek Lapinski Water Program Manager	☒ Endorsed. Date: 19/04/2024	*NA*

CONSENT TO USE OF CONTENT

Role	Endorsing partner	Delegate Role	Content	For use in the		Notes
				Seasonal Watering Proposal	Seasonal Watering Plan	
Traditional Owner	Yorta Yorta Nation Aboriginal Corporation	First name Surname Title	Chapter 3	☒ Consent provided. Date: 16/04/2024	☒ Consent provided. Date: 16/04/2024	*NA*
Traditional Owner	Taungurung Land and Waters Council	Voytek Lapinski Water Program Manager	Chapter 3	☒ Consent provided. Date: 19/04/2024	☒ Consent provided. Date: 19/04/2024	*NA*

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12 APPENDICES

12.1 Appendix 1

Delivery of Water for the Environment in the Goulburn River is complicated with operational water deliveries and Inter Valley Transfers to the Murray all affecting the flow regime and the opportunities to use environmental water. A detailed scenario table which builds on seasonal watering priorities and considers potential implications of all water sources is provided in Appendix 1. As all watering priorities are the same for every inflow/climate scenario this table gives further insight into the complexities and likely flow regimes under different flow scenarios8

The 2024 winter fresh is separated as individual events for the mid and lower Goulburn Rivers so that a stand alone fresh can be delivered in Reach 1 for platypus nesting cues if the reach 4/5 event is delivered using tributary flows or at an earlier time.

Table 6: Scenario Planning in 2024-25

Reaches 1, 4 and 5	Scenario 1 Drought 99% POE	Scenario 2 Dry 90% POE	Scenario 3 Below average 70% POE	Scenario 4 Average 50% POE	Scenario 4 Wet 10% POE
Expected river conditions	No unregulated flow Blackwater could be an issue over the warmer months	One or two small, short duration freshes in winter/spring (perhaps up to 5,000 ML/day) and reasonable baseflows for half a month Blackwater could be an issue over the warmer months	Likely spills through Goulburn Weir with one or two freshes (3,000 to 20,000 ML/day) and reasonable baseflows for a few months.	Likely spills through Goulburn Weir with one to three freshes (3,000 to 20,000 ML/day) and reasonable baseflows for most of the year likely flow targets will be provided for winter and spring by unregulated flow Blackwater could be an issue over the warmer months	Overbank flows Unregulated flow to provide the majority of flow over winter and spring and potentially into summer
	Bulk entitlement minimums will be delivered 400 ML/day at McCoys from July – October 350 ML/day at McCoys from November – June 250ML/day d/s Lake Eildon to June 2023 (high inflow trigger) then 120ML/day				
Expected water allocations	80% HRWS allocation	100% HRWS allocation	100% HRWS allocation	100% HRWS Storage management likely with a chance of Eildon spilling Add LRWS?	100% HRWS Eildon dam will spill/storage releases Add LRWS?
Expected water availability from water holders *	CEWH – 254 GL TLM – 44 GL VEWH – 24 GL	CEWH –318 GL TLM – 45 GL VEWH – 25 GL	CEWH –318 GL TLM – 45 GL VEWH – 25 GL	CEWH –318 GL TLM – 45 GL VEWH – 25 GL	CEWH –318 GL TLM – 45 GL VEWH – 25 GL

Reaches 1, 4 and 5	Scenario 1 Drought 99% POE	Scenario 2 Dry 90% POE	Scenario 3 Below average 70% POE	Scenario 4 Average 50% POE	Scenario 4 Wet 10% POE
Forecast carryover from 23/24	CEWH, TLM and VEWH combined 350 GL	CEWH, TLM and VEWH combined 366 GL	CEWH, TLM and VEWH combined 366 GL	CEWH, TLM and VEWH combined 366 GL	CEWH, TLM and VEWH combined 366 GL
Total water available from water holders	604GL	754 GL	754 GL	754 GL	754 GL
Demands	50 GL has been set aside for deliveries to the Broken Creek and Lower Goulburn Wetlands from CEWH/VEWH Goulburn entitlement in every scenario				
Assumed IVT available	400 GL+	400 GL+	400 GL+	400 GL+	400 GL+
Assumed IVT water deliveries to support Goulburn River environmental outcomes	It assumed that the default monthly volumes of IVT delivered for the year. These volumes are assumed to meet nearly all of the baseflow volume requirements for the year	It assumed that the default monthly volumes of IVT delivered for the year. These volumes are assumed to meet nearly all of the baseflow volume requirements for the year	It assumed that the default monthly volumes of IVT delivered for the year. These volumes are assumed to meet nearly all of the baseflow volume requirements for the year	It assumed that the default monthly volumes of IVT delivered for the year. These volumes are assumed to meet all of the baseflow volume requirements for the year. However it's likely that in this scenario not all IVT will be delivered but unregulated flows would cover baseflow needs.	It assumed that the default monthly volumes of IVT are delivered for the year. These volumes are assumed to meet all of the baseflow volume requirements for the year. However it's likely that in this scenario not all IVT will be delivered but unregulated flows would cover baseflow needs.
Environmental objectives	In addition to the environmental objectives 1. Maintain or re-establish lower bank vegetation over summer and Autumn following floods and prolonged high flows. 2. Due to likely high tributary flows, utilise Eildon releases to meet Reach 1 objectives and allow water to pass through to the lower Goulburn in winter and spring. 3. Maximise platypus breeding success by providing nesting cues, especially in the mid Goulburn as anecdotal evidence is a loss of breeding following 2 years of flooding 4. Increasing habitat by connecting low lying floodplain features in the mid Goulburn. 5. Achieve fish outcomes – improve Murray and Trout cod populations, cue Golden and Silver perch spawning and attraction into the river.				
Priority watering actions	Teir 1a				
1	Provide a year round baseflow of 600 - 1000 ML/day in reach four and five for habitat diversity and sustaining the system (41GL) – primarily provided by IVT	Provide a year round baseflow of 600 - 1000 ML/day in reach four and five for habitat diversity and sustaining the system (37GL) – primarily provided by IVT	Provide a year round baseflow of 600 - 1000 ML/day in reach four and five for habitat diversity and sustaining the system (48GL) – primarily provided by IVT	Provide a year round baseflow of 600 - 1000 ML/day in reach four and five for habitat diversity and sustaining the system (48GL) – primarily provided by IVT or unregulated flow	Provide a year round baseflow of 600 - 1000 ML/day in reach four and five for habitat diversity and sustaining the system (48GL) – primarily provided by IVT or unregulated flow

Reaches 1, 4 and 5	Scenario 1 Drought 99% POE	Scenario 2 Dry 90% POE	Scenario 3 Below average 70% POE	Scenario 4 Average 50% POE	Scenario 4 Wet 10% POE
2	Provide a year round variable baseflow of 400-2,000 ML/day to reach 1. Assume all use re-captured and not spilt, loss allowance. (50 GL)	Provide a year round variable baseflow of 400-2,000 ML/day to reach 1. Assume all use re-captured and not spilt, loss allowance. (50 GL)	Provide a year round variable baseflow of 400-2,000 ML/day to reach 1. Assume a small volume spilt. (50 GL)	Provide a year round variable baseflow of 400-2,000 ML/day to reach 1. (75 GL)	Provide a year round variable baseflow of 400-2,000 ML/day to reach 1. (100 GL)
3a	Provide 2024 winter fresh to reach 4-5 of (>7,300 ML for 4-5 days) up to 10,000 ML/day in June- July for channel forming, and platypus nesting cues. (95GL)	Provide 2024 winter fresh to reach 4-5 of (>7,300 ML for 4-5 days) up to 10,000 ML/day in June- July for channel forming, and platypus nesting cues. Aim to use a natural fresh and provide most of the event from rainfall runoff with minimal releases from Lake Eildon. (95GL)	Provide 2024 winter fresh to reach 4-5 of (>7,300 ML for 4-5 days) up to 10,000 ML/day in June- July for channel forming, and platypus nesting cues. Aim to use a natural fresh and provide most of the event from rainfall runoff with minimal releases from Lake Eildon. (50GL)	Provide 2024 winter fresh to reach 4-5 of (>7,300 ML for 4-5 days) up to 10,000 ML/day June- July for channel forming, and platypus nesting cues. Aim to use a natural fresh and provide most of the event from rainfall runoff with minimal releases from Lake Eildon. Some unregulated flow will contribute to the event. (50GL)	Provide 2024 winter fresh to reach 4-5 of (>7,300 ML for 4-5 days) up to 10,000 ML/day in June- July for channel forming, and platypus nesting cues. In this scenario its likely that unregulated flow will contribute significantly to, or exceed the event magnitude. (0GL)
3b	Provide a winter fresh to reach 1 of >8,000 ML/d (or as high as possible) for 5-10 days between June and July to connect low lying wetlands and provide a nesting cue for platypus. Likely to coincide with the reach 4 and 5 fresh, depending on delivery timing and required volume released from Lake Eildon. Otherwise, this will be delivered as a separate winter fresh that can be re-harvested in Waranga Basin or passed through the lower Goulburn River (0GL)	Provide a winter fresh to reach 1 of >8,000 ML/d (or as high as possible) for 5-10 days between June and July to connect low lying wetlands and provide a nesting cue for platypus. Likely to coincide with the reach 4 and 5 fresh, depending on delivery timing and required volume released from Lake Eildon. Otherwise, this will be delivered as a separate winter fresh that can be re-harvested in Waranga Basin or passed through the lower Goulburn River (0GL)	Provide a winter fresh to reach 1 of >8,000 ML/d (or as high as possible) for 5-10 days between June and July to connect low lying wetlands and provide a nesting cue for platypus. Likely to coincide with the reach 4 and 5 fresh, depending on delivery timing and required volume released from Lake Eildon. Otherwise, this will be delivered as a separate winter fresh that can be re-harvested in Waranga Basin or passed through the lower Goulburn River (0GL)	Provide a winter fresh to reach 1 of >8,000 ML/d (or as high as possible) for 5-10 days between June and July to connect low lying wetlands and provide a nesting cue for platypus. If things play out like the last few seasons, despite the early start this is likely to be delivered as a separate winter fresh from reach 4 and 5, and can be re-harvested in Waranga Basin or passed through the lower Goulburn River (0GL)	Provide a winter fresh to reach 1 of >8,000 ML/d (or as high as possible) for 5-10 days between June and July to connect low lying wetlands and provide a nesting cue for platypus. Likely to be delivered as a separate winter fresh from reach 4 and 5, and spilt or passed through the lower Goulburn River. (34GL)

Reaches 1, 4 and 5	Scenario 1 Drought 99% POE	Scenario 2 Dry 90% POE	Scenario 3 Below average 70% POE	Scenario 4 Average 50% POE	Scenario 4 Wet 10% POE
4	Provide an early spring fresh to reach 4-5 (>7,300 ML for 7 days) up to 10,000 ML/day in September and October to prime the system for lower bank vegetation establishment and maintenance. Its expected that the Reach 1 spring fresh will be covered in this event as Eildon releases will make up the majority of flows (145GL)	Provide an early spring fresh to reach 4-5 (>7,300 ML for 7 days) up to 10,000 ML/day in September and October to prime the system for lower bank vegetation establishment and maintenance. Its expected that the Reach 1 spring fresh will be covered in this event as Eildon releases will make up the majority of flows (145GL)	Provide an early spring fresh to reach 4-5 (>7,300 ML for 7 days) up to 10,000 ML/day in September and October to prime the system for lower bank vegetation establishment and maintenance. Aim to use a natural fresh and provide the majority of the event from rainfall runoff and minimal releases from Lake Eildon. Assume one quarter from natural flow. Its possible that the Reach 1 spring fresh will be covered in this event as Eildon releases will make up the majority of flows. If not a separate spring fresh will be delivered to reach 1 (as high as possible, but not exceeding the winter fresh discharge) for 5-10 days between September and November (102GL)	Provide an early spring fresh to reach 4-5 (>7,300 ML for 7 days) up to 10,000 ML/day in September and October to prime the system for lower bank vegetation establishment and maintenance. It is assumed that the spring fresh will be met by a natural fresh and ewater will be used to extend or slow the recession. A separate fresh is required to meet reach one objectives but Its likely that an event may not be able to be delivered due to high unregulated flows and flow capacity constraints. (73GL)	Provide an early spring fresh to reach 4-5 (>7,300 ML for 7 days) up to 10,000 ML/day in September and October to prime the system for lower bank vegetation establishment and maintenance. It is assumed that the spring fresh will be met by a natural fresh and ewater will be used to extend or slow the recession. A separate fresh is required to meet reach one objectives but Its likely that an event may not be able to be delivered due to high unregulated flows and flow capacity constraints. (73GL)
5	Provide a year round standing order for freshes up to 6,000ML/day from Goulburn Weir to maintain water quality, protect the banks, provide natural variability. (0 GL)	Provide a year round standing order for freshes up to 6,000ML/day from Goulburn Weir to maintain water quality, protect the banks, provide natural variability. (0 GL)	Provide a year round standing order for freshes up to 6,000ML/day from Goulburn Weir to maintain water quality, protect the banks, provide natural variability. (25 GL)	Provide a year round standing order for freshes up to 6,000ML/day from Goulburn Weir to maintain water quality, protect the banks, provide natural variability. (25 GL)	Provide a year round standing order for freshes up to 6,000ML/day from Goulburn Weir to maintain water quality, protect the banks, provide natural variability. (30 GL)
6	Provide an autumn fresh (>5,700 ML for 2-5 days) between March and May for lower bank vegetation reinvigoration and maintenance and/or fish migration outcomes. *NOTE: this fresh will only be delivered depending on flow and vegetation condition over the summer period* (30GL)	Provide an autumn fresh (>5,700 ML for 2-5 days) between March and May for lower bank vegetation reinvigoration and maintenance and/or fish migration outcomes. *NOTE: this fresh will only be delivered depending on flow and vegetation condition over the summer period* (30GL)	Provide an autumn fresh (>5,700 ML for 2-5 days) between March and May for lower bank vegetation reinvigoration and maintenance and/or fish migration outcomes. *NOTE: this fresh will only be delivered depending on flow and vegetation condition over the summer period* (60GL)	Provide an autumn fresh (>5,700 ML for 2-5 days) between March and May for lower bank vegetation reinvigoration and maintenance and/or fish migration outcomes. *NOTE: this fresh will only be delivered depending on flow and vegetation condition over the summer period but unlikely due to*	Provide an autumn fresh (>5,700 ML for 2-5 days) between March and May for lower bank vegetation reinvigoration and maintenance and/or fish migration outcomes. *NOTE: this fresh will only be delivered depending on flow and vegetation condition over the summer period but unlikely due to*

Reaches 1, 4 and 5	Scenario 1 Drought 99% POE	Scenario 2 Dry 90% POE	Scenario 3 Below average 70% POE	Scenario 4 Average 50% POE	Scenario 4 Wet 10% POE
				the high unregulated flows expected (60GL)	*the high unregulated flows expected* (60GL)
7	Provide up to three freshes reach 1 >5,000 ML/d for 5 – 10 days in May – November to mimic natural variability (0 GL)	Provide up to three freshes reach 1 >5,000 ML/d for 5 – 10 days in May – November to mimic natural variability (0 GL)	Provide up to three freshes reach 1 >5,000 ML/d for 5 – 10 days in May – November to mimic natural variability (0GL)	Provide up to three freshes reach 1 >5,000 ML/d for 5 – 10 days in May – November to mimic natural variability (0GL)	Provide up to three freshes reach 1 >5,000 ML/d for 5 – 10 days in May – November to mimic natural variability (0GL)
8	Provide (carryover) for baseflow of 1000 ML/day in July to September (23/24) for fish and macroinvertebrate habitat (50GL)	Provide (carryover) for baseflow of 1000 ML/day in July to September (23/24) for fish and macroinvertebrate habitat (50GL)			
9	Provide higher baseflows or freshes up to 6,000 ML/day between May and November in reach 4 & 5 to pass Reach 1 freshes or mimic natural variability through the length of the Goulburn River (30 GL) No events expected	Provide higher baseflows or freshes up to 6,000 ML/day between May and November in reach 4 & 5 to pass Reach 1 freshes or mimic natural variability through the length of the Goulburn River (20 GL) No events expected	Provide higher baseflows or freshes up to 6,000 ML/day between May and November in reach 4 & 5 to pass Reach 1 freshes or mimic natural variability through the length of the Goulburn River (50 GL)	Provide higher baseflows or freshes up to 6,000 ML/day between May and November in reach 4 & 5 to pass Reach 1 freshes or mimic natural variability through the length of the Goulburn River (50 GL)	Provide higher baseflows or freshes up to 6,000 ML/day between May and November in reach 4 & 5 to pass Reach 1 freshes or mimic natural variability through the length of the Goulburn River (15 GL)
10a	Provide a 2025 winter fresh >7,300 ML/day or as high as possible in May - August in all reaches for channel forming, and platypus nesting cues. (85GL)	Provide a 2025 winter fresh >7,300 ML/day or as high as possible in May - August in all reaches for channel forming, and platypus nesting cues (85GL)	Provide a 2025 winter fresh >7,300 ML/day or as high as possible in May - August in all reaches for channel forming, and platypus nesting cues (85GL)	Provide a 2025 winter fresh >7,300 ML/day or as high as possible in May - August in all reaches for channel forming, and platypus nesting cues (95GL)	Provide a 2025 winter fresh >7,300 ML/day or as high as possible in May - August in all reaches for channel forming, and platypus nesting cues (95GL)
11	Provide a late spring fresh (>6,600 ML for 1 days) between October and December for native fish spawning NOTE: this fresh will only be delivered if there is 8 weeks of baseflows of around 1000 ML/day or Lower bank	Provide a late spring fresh (>6,600 ML for 1 days) between October and December for native fish spawning NOTE: this fresh will only be delivered if there is 8 weeks of baseflows of around 1000 ML/day or Lower bank	Provide a late spring fresh (>6,600 ML for 1 days) between October and December for native fish spawning NOTE: this fresh will only be delivered if there is 8 weeks of baseflows of around 1000 ML/day or Lower bank vegetation has not	Provide a late spring fresh (>6,600 ML for 1 days) between October and December for native fish spawning NOTE: this fresh will only be delivered if there is 8 weeks of baseflows of around 1000 ML/day or Lower bank vegetation has not	Provide a late spring fresh (>6,600 ML for 1 days) between October and December for native fish spawning NOTE: this fresh will only be delivered if there is 8 weeks of baseflows of around 1000 ML/day or Lower bank vegetation has not

Reaches 1, 4 and 5	Scenario 1 Drought 99% POE	Scenario 2 Dry 90% POE	Scenario 3 Below average 70% POE	Scenario 4 Average 50% POE	Scenario 4 Wet 10% POE
	vegetation has not been inundated for less than a week (50GL)	vegetation has not been inundated for less than a week (50GL)	been inundated for less than a week (50GL)	been inundated for less than a week (50GL)	been inundated for less than a week (50GL)
Volume required	576 GL	562 GL	520 GL	520 GL	555 GL
Tier 2 actions					
	N/A	N/A	N/A	N/A	N/A

+ Based on conversations with GMW

* CEWH may have the opportunity to trade additional environmental water allocations from the Murray to meet Goulburn demands