

Department of Climate Change, Energy, the Environment and Water

Prerequisite policy measures

NSW annual evaluation and review 2023–24

30 June 2025





Acknowledgement of Country

Department of Climate Change, Energy, the Environment and Water acknowledges the traditional custodians of the land and pays respect to Elders past, present and future.

We recognise Australian Aboriginal and Torres Strait Islander peoples' unique cultural and spiritual relationships to place and their rich contribution to society.

Artist and designer Nikita Ridgeway from Aboriginal design agency – Boss Lady Creative Designs, created the People and Community symbol.

Prerequisite policy measures

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Abbreviations

Abbreviation	Description
BMEWA or BMA	Barmah-Millewa Environmental Water Allowance or Barmah-Millewa Allowance
CEWH	Commonwealth Environmental Water Holder
CPHR Group (formerly BCS)	Conservation Programs, Heritage, and Regulation Group in the NSW Department of Climate Change, Energy, the Environment and Water (formerly Biodiversity, Conservation and Science (BCS) Group). Note that the Group was called BCS during the 2023–24 water year for which this report is about. The name CPHR came into effect on 6 January 2025. Therefore, in this report the agency may be referred to as BCS or CPHR.
DCCEEW	Australian Government Department of Climate Change, Energy, the Environment and Water
DPE	NSW Department of Planning and Environment (now NSW DCCEEW)
EEWD Project	Enhanced Environmental Water Delivery Project
EHG	Environment and Heritage Group (now CPHR Group)
EoS or EOS or ES	End of System
ESFT	End of System Flow Target
EWA	Environmental Water Allowance
EWAG	Environmental Water Advisory Group
EWC	Environmental Water Committee (Tier 1)
EWHS	Environmental Water Holders (includes DCCEEW CPHR Group and CEWH)
EWIG	Environmental Water Improvement Group
EWOT	Environmental Water Ordering Tool
E-water	Environmental water
GDA	Great Darling Anabranch
GL	Gigalitre (one thousand million litres)
GS	General Security (water licence)
HEW	Held Environmental Water

Abbreviation	Description
KEQ	Key Evaluation Question (as part of the evaluation framework)
LD	Lower Darling
MAA	Murray Additional Allowance
MDBA	Murray–Darling Basin Authority
MIL	Murray Irrigation Limited
ML	Megalitre (one million litres)
MLS	Menindee Lakes System
NBAEW	Northern Basin Active Environmental Water
NSW	New South Wales
NSW DCCEEW	NSW Department of Climate Change, Energy, the Environment and Water
PEW	Planned Environmental Water
PPMs	Prerequisite Policy Measures
RMIF	River Murray Increased Flow
RMO	River Murray Operations
SA	South Australia
SAL	Supplementary Access Licence
SCBEWC	Southern Connected Basin Environmental Watering Committee
SO&O	Specific Objectives and Outcomes (as listed in Section 2 of the MDBA Basin Officials Committee Objectives and outcomes for river operations in the River Murray System (O&O) document)
TLM	The Living Murray (water licence)
VIC	Victoria
Water Group	Water Group in the NSW Department of Climate Change, Energy, the Environment and Water
WLWG	Water Liaison Working Group

Preface

This report is the fifth annual review and evaluation (annual review) of prerequisite policy measures (PPMs) implementation in NSW. It examines the PPMs environmental watering actions and implementation processes within NSW jurisdiction during the 2023–24 water year. Despite some of the Murray and Lower Darling events being combined NSW and Victorian events, this report is reporting on NSW only debited and return flow numbers. The evaluation component has been prepared as per the NSW PPMs Evaluation Framework.

During 2023–24, the delivery and debit of 754,595 ML of held environmental water (HEW) over 22 watering events in NSW resulted in 615,959 ML of return flows being recognised at the South Australian (SA) border. This is the largest volume of return flows from NSW protected to date. Total return flows recognised at the end of NSW tributaries (Lower Darling, Great Darling Anabranch, Murrumbidgee) totalled 371,654 ML. In addition to the HEW volumes debited above, 41,833 ML of HEW was debited as loss associated with operational water deliveries in the Wakool system. These volumes are NSW only and do not include Victorian water.

The key achievements for the use and improvement of PPMs in NSW during 2023–24 included:

- An environmental watering event in the Great Darling Anabranch that used 50,264 ML of HEW with 37,095 ML recognised as return flow to the SA border. This flow aimed to recruit and disperse flow pulse specialist native fish, provide water to native vegetation (such as non-woody, fringing river red gum, black box and lignum), provide ecosystem functions (such as, longitudinal connectivity, refuge and productivity), and to provide habitat and potential breeding for waterbirds.
- Environmental water deliveries in the Lower Darling used 59,497 ML of HEW with 37,960 ML of HEW return flows protected at the SA border. These deliveries aimed to provide native fish dispersal/condition (all species), provide spawning nesting and recruitment (flow pulse specialists i.e. Murray Cod), provide ecosystem functions, such as longitudinal connectivity, refuge habitat and small-scale productivity (transport of nutrients and carbon).
- The Murray multi-site and Murray River winter flow events used a total of 254,898 ML of HEW, resulting in a total of 212,089 ML of return flows recognised at the SA border. These deliveries aimed to provide native fish dispersal / condition (all species), pre-spawning, condition (flow pulse specialists), ecosystem functions through longitudinal connectivity along the Murray, and Edward-Wakool connectivity with low lying wetlands, hydraulic diversity and productivity and transport of nutrients and carbon, and native vegetation, in-channel woody and non-woody, wetland vegetation and low-level river red gum condition.
- Delivery of extra in-channel operational flows through the Wakool, Yallakool and Colligen Creeks, outside of River Murray Multisite deliveries, to meet environmental flow targets. The event saw 41,883 ML of losses associated with the operational water deliveries debited.
- A delivery of HEW downstream Stevens Weir of 37,373 ML, was made to meet fish dispersal outcomes, however no return flows were recognised for this event. This was due to a lack of an approved accounting arrangement that has now been addressed for the 2024-25 water year.

- River Murray in channel delivery via directed releases from Lake Victoria during unregulated flow conditions. The event saw 47,647 ML of environmental water debited and delivered to the SA border as return flows.
- Environmental watering events in the Murrumbidgee used 294,954 ML of HEW. From this, 280,738 ML were recognised as return flows at the SA border. These events provided a native fish pulse to increase lateral connectivity with low lying billabongs, creeks and lakes to maximise native fish movement opportunities into favourable habitats. The events also created a dispersal pulse in late November to maximise fish passage, larval dispersal and increase in stream habitat particularly in the lower reaches of the Murrumbidgee River.
- An environmental watering event in the Yanco and Billabong creeks delivered 8,405 ML of HEW. Return flows were protected to Darlot but not recognised at the SA border due to the attenuation of the flow not being factored into the new trial PPM arrangement (Appendix 6.1 *Yanco incremental loss method for e-water flows*). This has been addressed for the 2024–25 water year. This event provided a dispersal pulse as it passed down the Yanco Creek to maximise the dispersal of Trout Cod and Murray Cod larvae and juveniles, which successfully bred during the steady flows provided earlier during this event. Another purpose of the event was to trigger perch spawning and migration conditions as water temperatures reached the desired threshold in the weeks following the event.
- An environmental watering event in the Gayini Nimmie Caira that used 1,198 ML of HEW, with 430 ML as return flows at the SA border.

The delivery of PPMs in NSW has matured significantly with many environmental watering events occurring on an annual basis for the past five years. The accounting arrangements associated with these events have been embedded in the operating models enabling the provision of timely return flow data to environmental water holders. However, there are still new environmental watering events and associated accounting arrangements being trialled and some inefficiencies in the implementation of PPMs. This has resulted in no return flows being recognised for two watering actions in the Edward River and Yanco Creek, as mentioned above. New accounting arrangements for these watering events have now been approved in the 2024–25 water year.

The evaluation framework criteria of consistency, efficiency and effectiveness were used to assess the implementation of PPMs during the 2023–24 water year. All three criteria received a rating of ‘average’, which corresponds to ‘evidence of minimal positive performance, below expectation’. The ratings were based on mostly moderate performance indicator scores and neutral trends. There was one low rating for risk management due to a lack of documentation of the risk assessment process.

The average result is largely attributed to Water Group prioritising the development of new accounting arrangements to enable the recognition of additional return flows. This has resulted in less resourcing to progress recommendations from the previous annual reviews, which would have contributed to higher performance scores under the evaluation framework. These recommendations will be carried over for implementation in the 2024–25 and 2025–26 water year.

Summary of recommendations

The recommendations arising from the 2023–24 annual review report are outlined in Table 1.

Table 1: Recommendations of the 2023–24 annual review

2023–24 Recommendations		Arising from
R.1	WaterNSW to continue to work with environmental water holders to provide return flow data to South Australia.	KEQ 1
R.2	Water Group to develop and implement an annual risk assessment process to identify, document and mitigate risks for planned or likely PPMs events and maintain a risk register.	KEQ 1
R.3	CPHR to send directions for flow and accounting splits to WaterNSW's South Operations team email.	KEQ 2
R.4	CPHR to use iWas ordering system rather than manual order placing.	KEQ 2
R.5	CPHR to submit the final agreed version of the delivery instructions to WaterNSW, if there have been changes made through the event.	KEQ 2
R.6	Water Group to include travel times in the Great Darling Anabranh PPMs accounting arrangement.	KEQ 3
R.7	Water Group to collaborate with other agencies to streamline the PPMs implementation process, including fit-for-purpose water ordering, documentation of risks (including third party impacts) and mitigation measures, and reporting requirements.	Carried over from 2021–22 (in progress)
R.8	Water Group to collaborate with WaterNSW to develop a method for completing a post-event comparison of losses debited as per assumed use statement with 'actual' loss.	Carried over from 2021–22 (partially complete)
R.9	WaterNSW to provide return flows split by water holder for the Murray and Murrumbidgee floodplain water use estimates.	Carried over from 2022–23 KEQ 1 (partially complete)
R.10	Water Group to collaborate with WaterNSW and environmental water holders to develop a procedure for both annual planning and contingency planning for environmental watering deliveries.	Carried over from 2022–23 KEQ 2 (in progress)
R.11	Water Group to update the procedures manuals to clarify the accounting of air-space releases, rainfall rejection, Lowbidgee weir pool filling, piggybacking on translucency flows and recognition of return flows from supplementary access licences.	Carried over from 2022–23 KEQ 2 (in progress)

2023–24 Recommendations		Arising from
R.12	Water Group to develop a policy on PPMs from Menindee Lakes System when it is a NSW only resource.	Carried over from 2021–22 (in progress)
R.13	Water Group to determine assumed uses for directed releases in the Murrumbidgee and return flows from mid-Murrumbidgee and Lowbidgee wetlands.	Carried over from 2021–22 (in progress)
R.14	Water Group to progress a review of the procedures manuals and update as necessary to reflect new actions and the outcomes of recommendations.	Carried over from 2022–23 KEQ 5 (in progress)

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1 Introduction

Prerequisite policy measures (PPMs) are legislative and operational rule changes introduced as part of the Murray–Darling Basin Plan (Basin Plan). The measures are designed to support the effective and efficient use of held environmental water (HEW) in the Murray–Darling Basin southern connected system.

The Murray–Darling Basin Authority (MDBA) assessed PPMs as being in effect in NSW from 1 July 2019. MDBA’s PPMs assessment reports for all Basin states are available on the MDBA website: mdba.gov.au/water-management/basin-plan/key-elements-basin-plan/prerequisite-policy-measures

In NSW, PPMs are being implemented in the NSW Murray and Lower Darling and the Murrumbidgee regulated rivers. The NSW Government has adopted an adaptive management approach to support continuous improvement in PPMs implementation for held environmental water delivery in these river systems. More detailed information on the background and implementation of PPMs in NSW is available on the Water Group’s website:

water.dpie.nsw.gov.au/our-work/projects-and-programs/environmental-water-management-in-nsw/what-we-are-working-on-now/pre-requisite-policy-measures

This report presents the findings and recommendations from the annual review of the implementation of PPMs in NSW during the 2023–24 water year, from 1 July 2023 to 30 June 2024. The annual review is a key component of the NSW Government’s commitment to the ongoing implementation of PPMs under the adaptive management framework.

The review was conducted by the department with input from the Conservation Programs, Heritage, and Regulation Group (CPHR Group) in the NSW Department of Climate Change, Energy, the Environment and Water (formerly Biodiversity, Conservation and Science (BCS) Group), WaterNSW, Commonwealth Environmental Water Holder (CEWH) and MDBA.

The purpose of the annual review is to:

- support continuous improvement of PPMs processes to improve environmental water management, and
- provide transparency about the use of PPMs in the 2023–24 water year.

This annual review report focuses on environmental watering actions that use PPMs (that is, piggybacking or return flow recognition) under NSW jurisdiction only. The assessment of any multi-jurisdictional PPMs environmental watering actions undertaken during the water year is beyond the scope of this review.

This annual review report will be provided to the MDBA as part of NSW’s requirement under the Basin-wide Environmental Water Protection Strategy and Implementation Plan.

The annual review is not designed to assess environmental outcomes or benefits resulting from the PPMs watering actions. Reporting on the use of water for the environment and its outcomes is a matter for separate consideration by the environmental water holders and their respective agencies (see environment.nsw.gov.au/topics/water/water-for-the-environment/planning-and-reporting/water-for-environment-outcomes-2022-23 and environment.nsw.gov.au/topics/water/water-for-the-environment/planning-and-reporting/water-for-environment-outcomes-2023-24).

2 Requirements for the annual review

The matters for consideration in the annual review are set out in Section 5.2 of the Prerequisite Policy Measures: Procedures Manual for the NSW Murray and Lower Darling Regulated Rivers¹ and the Prerequisite Policy Measures: Procedures Manual for the Murrumbidgee Regulated River² ('the procedures manuals'). Table 2 below outlines the matters from the procedures manuals that this annual review is required to consider and the relevant section of this report that addresses those matters.

This 2023–24 annual review was conducted in accordance with these requirements, including consideration of reports provided by the river operator (WaterNSW) and environmental water manager (CPHR Group (formerly BCS)) that document the environmental watering actions undertaken using PPMs. These reports are the:

- WaterNSW's 'Annual Environmental Release River Operations Report' (Appendix 0) that documents the application of specific agreed and trial actions, the accounting of water delivery and transmission losses including a comparison of forecast and actual environmental water use, and
- CPHR Group's (formerly BCS) 'Annual Environmental Watering Statement' (Appendix 6.3) that details the watering events for the year including the sites targeted and environmental outcomes as well as any risks and mitigation measures and stakeholder consultation.

This annual review was conducted using the evaluation framework for PPMs implementation. This involves evaluating the implementation of PPMs against three key criteria: consistency, efficiency and effectiveness. Applying this framework provides the ability to track the functioning of PPMs over time.

¹https://water.dpie.nsw.gov.au/__data/assets/pdf_file/0006/549519/NSW-PPM-Procedures-Manual-for-the-NSW-Murray-and-Lower-Darling-Dec-2022.pdf

² https://water.dpie.nsw.gov.au/__data/assets/pdf_file/0007/549520/NSW-PPM-Procedures-Manual-for-the-Murrumbidgee-Regulated-River-Dec-2022.pdf

Table 2: Matters for consideration in the annual review and the corresponding section where they are addressed.

Section of this report	Matters for consideration
Section 3: Results	• The results and recommendations of the reporting elements provided by the river operator and environmental water manager. ◦ Appendix 6.2 Annual Environmental Release River Operations Report ◦ Appendix 6.3 Annual Environmental Watering Statement
Section 4.2: Consistency	• Whether general operational procedures were followed for the delivery of HEW via PPMs. • Any issues relating to PPMs raised through consultation with stakeholders in the valley.
Section 4.3: Efficiency	• Whether the current PPMs actions and the associated supporting measures provide for the efficient use of held environmental water. • Whether there are sufficient mitigation measures in place and whether they have been effective (including the mitigation of risks to third parties). • Reporting on the implementation of improvements from the previous review, including consideration of recommendations provided by the PPMs Working Group.
Section 4.4: Effectiveness	• Whether the current PPMs actions and the associated supporting measures provide for the effective use of held environmental water. • Whether the actions and associated supporting measures should be expanded, modified, or remain unchanged. • Any proposals for variations or new actions and/or supporting measures that may be brought forward by the river operator or the environmental water holder.

3 PPMs actions undertaken in NSW in 2023–24

3.1 2023–24 resource summary

The 2023–24 water year was the second warmest on record and it was the driest start to spring³. Rainfall was average in the southern part of NSW while it was largely below average for the northern parts of NSW⁴.

Water for the environment was delivered to enhance river and wetland connectivity to support native vegetation, waterbird and frog species, native fish migration and recruitment. In 2023–24, water for the environment deliveries and natural river flows inundated areas of floodplain wetland, including critical flood-dependent habitats within non-woody wetlands, lignum shrublands, river red gum forests and woodlands, and coolibah and black box woodlands.⁵

The 2023–24 water year began with major irrigation dams holding more than 90% of their full storage capacity on average but by the end of the 2023–24 water year, they had decreased to an average of about 75% capacity, with El Nino conditions prevailing from September 2023 to early 2024.

In the Murrumbidgee regulated system, all higher priority licence holders received their maximum 100% allocation and high security licence holders received their full 95% opening allocation on 1 July 2023. General security licence holders commenced the 2023–24 water year with a 37% allocation. Supplementary licence holders received 100% allocation (note that the use of water in supplementary access licence accounts is only available during periods of announced supplementary flow)⁶.

Similarly, in the NSW Murray regulated river, all higher priority licence holders received their maximum 100% allocations. High security licence holders received their full 97% opening allocation on 1 July 2023. General security licence holders commenced the 2023–24 water year with a 55% allocation⁷.

The Menindee Lakes system remained above the 640 GL threshold and hence a shared Murray resource, in accordance with the Murray–Darling Basin Agreement.

³ <http://www.bom.gov.au/climate/current/financial-year/aus/summary.shtml>

⁴ https://water.dpie.nsw.gov.au/__data/assets/pdf_file/0004/615082/WAS-statewide-regulated-rivers-20240701.pdf

⁵ <https://www2.environment.nsw.gov.au/topics/water/water-for-the-environment/planning-and-reporting/water-for-environment-outcomes-2023-24>

⁶ https://publications.water.nsw.gov.au/watergroupjspui/bitstream/100/495/1/Water_Allocation_Statement_-_Opening_Water_Allocations_2023-24_-_NSW_Regulated_River_Water_Sources_-_1_July_2023.pdf

⁷ https://publications.water.nsw.gov.au/watergroupjspui/bitstream/100/495/1/Water_Allocation_Statement_-_Opening_Water_Allocations_2023-24_-_NSW_Regulated_River_Water_Sources_-_1_July_2023.pdf

3.2 Summary of PPMs actions in 2023–24

During the 2023–24 water year, PPMs were used to enable directed releases and return flows across the Great Darling Anabranch, the Lower Darling River, the Murray River, the Edward-Kolety/Wakool River system, the Lake Victoria, the Murrumbidgee River, the Yanco-Billabong Creek system and Gayini-Nimmie Caira (Figure 1). Table 3 provides a summary of these events, and sections 3.3 to 3.10 provide further detail on each event.

Figure 1: Stretches of river (highlighted in green) where PPMs environmental watering actions occurred during the 2023–24 water year



Table 3: Summary of environmental watering and total debit and return flow volumes using PPMs for each river system and major environmental locations using PPMs in 2023–24⁸

Details	Lower Darling		Murray				Murrumbidgee		
	Great Darling Anabran	Lower Darling/ Baaka	River Murray Multi-Site	Edward-Wakool river system	Murray River Winter Flow (Apr-Jun 2024)	Lake Victoria directed release	Murrumbidgee Fish Flow	Yanco-Billabong Fish Flow	Gayini Nimmie Caira
Total volume of HEW ordered (as reported by WaterNSW) (ML) [^]	57,900 CEWH – 55,500 NSW GS – 2,400	61,981 TLM – 54,300 NSW GS – 7,681	335,636 TLM – 48,127 CEWH – 287,509	89,204	46,997 TLM – 8,000 CEWH – 19,497 RMIF – 19,500	47,647	331,766 TLM – 70,000 NSW GS – 25,452 CEWH – 236,314	14,700 CEWH – 14,700	3,000 CEWH – 3,000
Total volume of HEW debited (as reported by WaterNSW) (ML)	50,624 CEWH – 48,270 NSW GS – 2,354	59,497 TLM – 54,300 NSW GS – 5,198	207,961 TLM – 30,000 CEWH – 177,961	79,256 CEWH – 58,010 NSW GS – 21,246	46,937 TLM – 7,940 CEWH – 19,497 RMIF – 19,500	47,647 CEWH – 22,647 TLM – 25,000	294,954 TLM – 70,000 NSW GS – 21,170 CEWH – 203,784	8,405 CEWH – 8,405	1,198 NSW GS – 1,198
Return flow volume recognised (end of system) [§] (ML)	37,095	39,685	173,592 TLM – 14,746 [■]	-	38,497 TLM – 11,368 [■]	47,647	294,404	-	470

⁸ The volumes in Table 3 are NSW only and do not include any Victorian water delivered for these events.

Details	Lower Darling		Murray				Murrumbidgee		
	Great Darling Anabran	Lower Darling/Baaka	River Murray Multi-Site	Edward-Wakool river system	Murray River Winter Flow (Apr-Jun 2024)	Lake Victoria directed release	Murrumbidgee Fish Flow	Yanco-Billabong Fish Flow	Gayini Nimmie Caira
			CEWH – 158,846 [■]		CEWH – 17,129 [■] RMIF – 10,000 [■]				
Return flow volume recognised (SA border) (ML)	37,095	37,960	173,592 TLM – 14,746 [■] CEWH – 158,846 [■]	-	38,497 TLM – 11,368 [■] CEWH – 17,129 [■] RMIF – 10,000 [■]	47,647	280,738	-	430
Further details	Section 3.3	Section 3.4	Section 3.5	Section 3.6	Section 3.5	Section 3.7	Section 3.8	Section 3.9	Section 3.10

[^] Order volumes are based on a pre-event estimate of environmental water use, however due to changing conditions this volume is usually revised over the course of the event.

[§] Note ‘End of System’ means end of the river where the water was released from and is not the same as the SA border end point.

[■] Return flows associated with specific licences were estimated at the bulk level at a monthly time step based on the distribution of percent of usage. This is unlikely to reflect actual return flows per licence. It does not account for travel time between ‘usage’ and ‘return flow’ when determining proportions. This method has been discussed with CEWH as the best current solution with the tools available. Return flows were not provided for all environmental watering events.

3.3 Great Darling Anabranch

During 2023–24, 50,624 ML of HEW was released from Lake Cawndilla and 37,095 ML of return flows were recognised at the South Australian border. These volumes were comprised of three environmental watering events targeting environmental outcomes in the Great Darling Anabranch (GDA) (Table 4).

The objectives of the environmental watering event were to provide:

- native fish: recruitment and dispersal of flow pulse specialists
- native vegetation: non-woody, fringing river red gum, black box and lignum
- ecosystem functions: longitudinal connectivity, refuge and productivity
- waterbirds: habitat and potential breeding.

The environmental site watered was the GDA (via directed releases from Lake Cawndilla when a shared resource).

The PPM action was a directed release from Menindee Lakes.

The assumed use/accounting method used was:

1. After adjusting for travel time, when the daily average flow passing the Tara Downs gauge (425054) is equal to or exceeds releases, no losses are to be applied, and the full volume of the environmental debit is recognised at the South Australian border.
2. After adjusting for travel time, when the daily average flow passing Tara Downs is less than releases, the flow at Tara Downs is reduced by a loss value and recognised at the South Australian border. The loss value applied is equivalent to the proportional daily loss that occurred between the Bulpunga gauge (425011) and Tara Downs.
3. After adjusting for travel time, when flows at Tara Downs reach 0 ML/day, no return flows are to be recognised.

Table 4: Overview of the environmental watering event that used PPMs in 2023–24 in the Great Darling Anabranch.

CPHR Group Event Number: <u>Event#1</u>	WaterNSW Event Number: <u>Event#1-PPM-GDA</u>	WaterNSW Event Number: <u>Event#2-PPM-GDA</u>	WaterNSW Event Number: <u>Event#3-PPM-GDA</u>
Delivery start date	1 July 2023	11 January 2024	20 June 2024
Delivery end date	11 December 2023	23 February 2024	30 June 2024
Total volume of environmental water debited as reported by WaterNSW	31,652 ML (CEWH)	16,618 ML (CEWH)	2,354 ML (NSW)
Return flow volume recognised (end of system)	31,084 ML (CEWH)	4,486 ML (CEWH)	1,525 ML (NSW)

CPHR Group Event Number: <u>Event#1</u>	WaterNSW Event Number: <u>Event#1-PPM-GDA</u>	WaterNSW Event Number: <u>Event#2-PPM-GDA</u>	WaterNSW Event Number: <u>Event#3-PPM-GDA</u>
Return flow volume recognised (SA border)	31,084 ML (CEWH)	4,486 ML (CEWH)	1,525 ML (NSW)
Losses	567 ML	12,132 ML	829 ML
Target daily flow rates and volumes.	Target daily flow rates and volumes. 1 July to 3 August = 50 ML/day (total of 1,700 ML). 4 August to 14 September = 100 ML/day (total of 4,200 ML). 15 - 30 September = 200 ML/day (total of 3,200 ML). 1 - 3 October = 250 ML/day; 4 - 6 October = 300 ML/day; 7 - 9 October = 350 ML/day (total of 2,700 ML). 10 - 17 October = 250 ML/day (total of 2,000 ML). 18 - 31 October = 350 ML/day (total of 4,900 ML). 1 - 23 November = 350 ML/day (total of 8,050 ML). 24 November - 17 December = 350 ML/day (Total 8,750 ML).	Target averaging 400 ML/day.	Target 400 ML, with drawdown over 8 days and maintain at 50 ML.
Actual daily flow rates / e-water component and volumes	See Figure 11 in Appendix 6.2.2.3.1	See Figure 12 in Appendix 6.2.2.3.2	See Figure 13 in Appendix 6.2.2.3.3

3.3.1 Underwriting losses associated with operational transfers from Lake Cawndilla

Novel arrangements were trialled in 2023–24, where during the period 11 December 2023 to 11 January 2024, when some of the MDBA’s operational call on water from Menindee Lakes was transferred from Lake Cawndilla down the Great Darling Anabranh. This event aimed to maximise Menindee drought reserves and provide multiple environmental benefits without creating third party impacts. In particular:

- Using operational releases from Lake Cawndilla to help meet Murray system demands increases the volume of water held in the upper lakes (Lake Wetherell and Lake Pamamaroo) when the combined Menindee Lakes volume drops below 480 GL and the lakes return to being a NSW only resource. Water stored in the upper lakes forms the NSW drought reserve whereas Lake Cawndilla has limited use for water supply in drought times.
- Operational transfers from Lake Cawndilla can contribute to environmental demands en route to the Murray. This reduces the need for environmental water holders to deliver the full volume of water required to achieve the same outcome. Transfers in the Anabranh are also likely to provide greater environmental benefit than if the same volume of water was to be added to existing operational releases in the lower Darling/Baaka.

The Anabranh is not recognised as a ‘flow path’ in the Murray–Darling Basin Agreement and has greater conveyance losses compared to the Lower Darling/Baaka. Alternative accounting arrangements were therefore needed to avoid impacting state water availability, including:

- making Lake Cawndilla releases 50:50 NSW:VIC, instead of 100% NSW; and
- estimating the increased conveyance associated with transfers down the Anabranh compared to Lower Darling/Baaka, with this increase to be covered by environmental water holders.

Table 5 below summarises the outcomes of the trial.

Table 5: Operational delivery from Lake Cawndilla trial.

Total releases from Lake Cawndilla (ML)	22,200
System transfer to the Murray River (ML)	4,500
Conveyance losses (ML)	17,700
Additional conveyance losses (ML)	16,194 (8,097 ML covered by VIC HEW and 8,097 ML covered by NSW HEW)

Key reflections from agencies highlighted through the MDBA's review of the trial included:

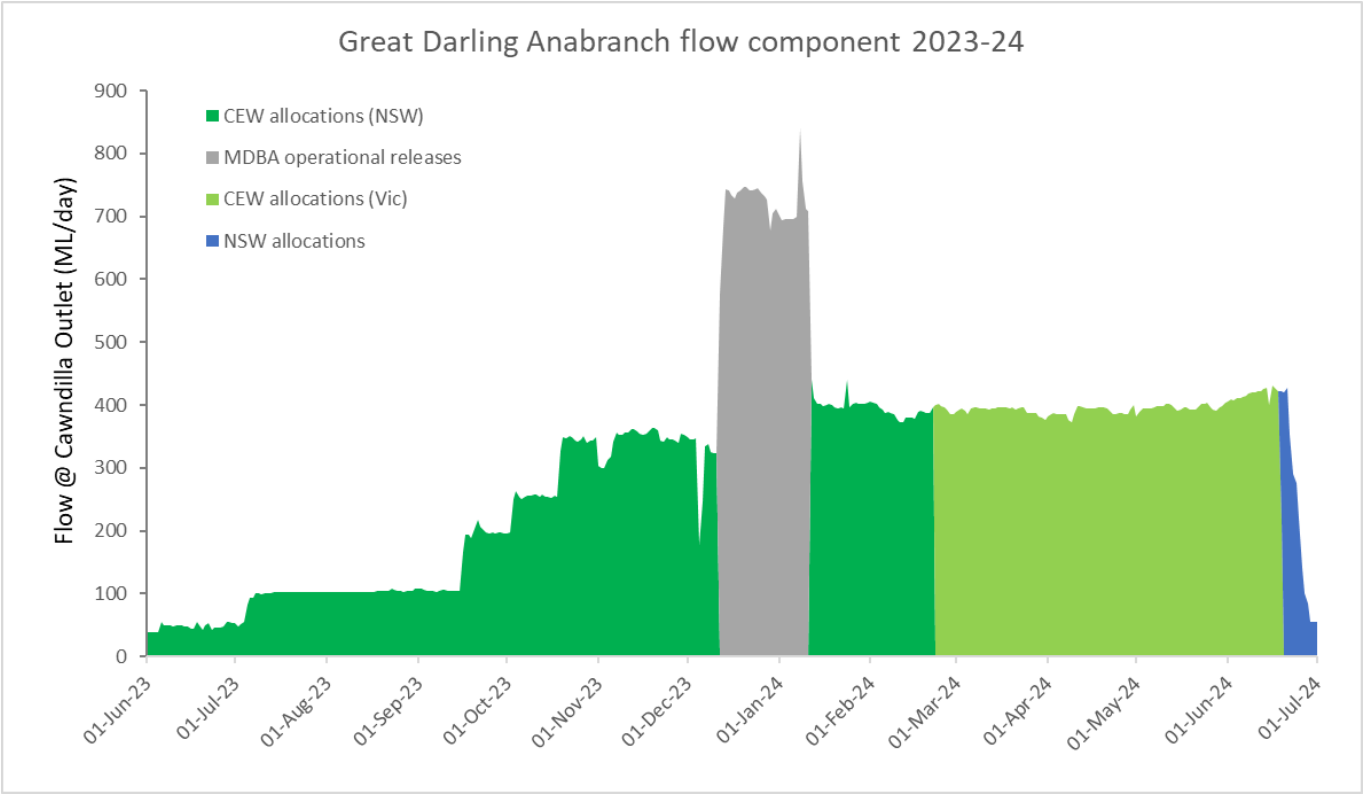
- Arrangements were novel, but were clear and worked well operationally, all agencies supported a further trial in 2024–25, subject to the Water Liaison Working Group (WLWG) agreement.
- Conveyance losses were higher than expected (~80%), and higher than losses during environmental watering in 2017 (~54%) – despite the GDA coming off the back of a flood event, with many parts of the system already inundated. Possible reasons for this include:

- Losses between the Cawndilla Outlet and Packers Crossing due to water entering Kangaroo and Packers Lakes (which were disconnected from the GDA in 2017 – before the regulators were removed as part of the Tandou water purchase).
 - Losses between Wycot and Tara Downs due to water entering Lake Nearie (and potentially other lower Anabranh lakes)
 - Increased evaporative losses due to the trial occurring over summer (December–January) compared to the 2017 event, which took place over summer-winter (February–June) – as well as increased evaporative losses associated with connected lakes
 - Higher proportional system losses associated with lower flows during the 2023–24 trial (up to 700 ML/day release from the Cawndilla outlet), compared to the 2017 watering event (1,000 to 1,400 ML/day released).
- PPM arrangements in relation to travel times within the GDA system may not be fit for purpose. For example, PPM arrangements have travel times of 12 days from release at Lake Cawndilla to Tara Downs in the lower GDA. During this event, travel times witnessed were closer to 30 days. In the 2017 event, with a dry system, it took 67 days before the flow connected with the Murray.
 - Stakeholder input (from Anabranh Water, coordinated by the CPHR Group) was invaluable throughout this process and is important to include for future releases. Feedback was broadly positive, though one consideration with extended periods of flow (>3-6 months) in the Anabranh is convenience of access to properties for shearing.
 - A cease to flow period may be required in the future following a flooding event to allow landowners to fully re-install blocking banks to lakes within the GDA system. This will need to be balanced with ecological objectives that may also be looking to be achieved.
 - More data is needed about the Anabranh system and how it operates, especially potential losses of future events, including those associated with connection between Kangaroo and Packers Lakes. The MDBA's Source model could potentially help predict expected losses in the future.

Additional considerations from an environmental water holder (EWH) perspective:

- During the trial, 16.2 GL environmental water was used to cover the additional conveyance losses of transferring water along the GDA to meet Murray system demands, compared to the lower Darling / Baaka. This is higher than the 12.8 GL volume of water that would have been needed to continue environmental releases of ~400 ML/day for the duration of the trial, however the operational release (22.2 GL total) also contributed to environmental benefits in the GDA en route to the Murray.
- As environmental water was used to cover additional losses during the trial, there were no return flows credited for the use of this water. However, given the high conveyance losses, return flows would have been minimal; flows at Tara Downs reduced to ~40-50 ML/day in March 2024, and may have reduced further without the higher releases from Lake Cawndilla that occurred during the trial.

Figure 2: Hydrograph of releases from Lake Cawndilla during the operational water delivery trial



3.4 Lower Darling/Baaka

The use of PPMs for four environmental watering events that released from Menindee Lakes down the Lower Darling (LD), used 59,497 ML and resulted in 37,960 ML of return flows being recognised at the South Australian border (see Event#1-PPM-LDR, Event#2-PPM-LDR, Event#3-PPM-LDR and Event#4-PPM-LDR in Table 6).

The objectives of the environmental watering actions were to provide:

- native fish: dispersal / condition (all species), spawning nesting and recruitment (flow pulse specialists i.e. Murray cod)
- ecosystem functions: longitudinal connectivity, refuge habitat, small-scale productivity (transport of nutrients and carbon)
- native fish: deliver higher baseflows to maximize recruitment outcomes for Murray cod and other river specialists & generalist native fish.

The environmental site watered was Lower Darling in-channel delivery (via directed releases from Menindee Lakes when a shared resource).

The PPM action was directed releases from Menindee Lakes via the Lower Darling River.

The assumed use/accounting method used was to use an incremental loss look-up table when the Murray River is in regulated conditions to calculate the return flow at Burtundy. Another incremental loss table is then applied for losses in the Murray to calculate the return flow at the SA border.

When the Murray River is in unregulated conditions, no loss rate is to be applied to return flows recognised at Burtundy.

Table 6: Overview of the environmental watering event that used PPMs in 2023–24 in the Lower Darling/Baaka.

CPHR Group Event Number: <u>Event#2</u>	WaterNSW Event Number: <u>Event#1-PPM-LDR</u>	WaterNSW Event Number: <u>Event#2-PPM-LDR</u>	WaterNSW Event Number: <u>Event#3-PPM-LDR</u>	WaterNSW Event Number: <u>Event#4-PPM-LDR</u>
Delivery start date	27 August 2023	8 October 2023	16 February 2024	20 June 2024
Delivery end date	26 September 2023	23 November 2023	29 May 2024	30 June 2024
Total volume of environmental water debited as reported by WaterNSW	10,891 (TLM)	14,023 (TLM)	29,385 (TLM) 2,924 (NSW)	2,274 (NSW)
Return flow volume recognised (end of system)	6,844 (TLM)	7,637 (TLM)	23,428 (TLM)	1,776 (NSW)
Return flow volume recognised (SA border)	6,798 (TLM)	7,593 (TLM)	21,879 (TLM)	1,690 (NSW)

CPHR Group Event Number: <u>Event#2</u>	WaterNSW Event Number: <u>Event#1-PPM-LDR</u>	WaterNSW Event Number: <u>Event#2-PPM-LDR</u>	WaterNSW Event Number: <u>Event#3-PPM-LDR</u>	WaterNSW Event Number: <u>Event#4-PPM-LDR</u>
Losses	There were losses of 4,047 ML in the Lower Darling River from Weir 32 to Burtundy. Further losses of 46 ML were recognised in the Lower section of the Darling River and Murray River to the SA Border.	There were losses of 6,386 ML in the Lower Darling River from Weir 32 to Burtundy. Further losses of 44 ML were recognised to the Murray River.	There were losses of 8,882 ML in the Lower Darling River from Weir 32 to Burtundy. Further losses of 1,548 ML were recognised to the Murray River.	There were losses of 498 ML in the Lower Darling River from Weir 32 to Burtundy. Further losses of 86 ML were recognised to the Murray River. Losses physically occurred in 2024–25 water year due to travel times but were associated with the 2023–24 delivery.
Target daily flow rates and volumes.	Averaging 550 ML/day at Weir 32 (baseflow 200 ML/day October) requiring 12,250 ML of environmental water.	Averaging 550 ML/day at Weir 32 (baseflow 200 ML/d October, 300 ML/d November) requiring 16,250 ML of environmental water.	Targeting 400-1,500 ML/day at Weir 32 with environmental water component making up the difference between base flow and the required target (NOTING: “The specific day to day flow target and volumes delivered from each lake outlet that make up the weir 32 e-flow target may change based on decisions made through the Menindee/Lower Darling Water Quality Working Group chaired by the Water Group.”) requiring a total volume of 21,162 ML (as per PPM instruction).	Targeting 400-1,500 ML/day at Weir 32 with environmental water component making up the difference between base flow and the required target (NOTING: “The specific day to day flow target and volumes delivered from each lake outlet that make up the weir 32 e-flow target may change based on decisions made through the Menindee/Lower Darling Water Quality Working Group chaired by the Water Group.”) requiring a total volume of 40,487 ML (as per PPM instruction).

CPHR Group Event Number: <u>Event#2</u>	WaterNSW Event Number: <u>Event#1-PPM-LDR</u>	WaterNSW Event Number: <u>Event#2-PPM-LDR</u>	WaterNSW Event Number: <u>Event#3-PPM-LDR</u>	WaterNSW Event Number: <u>Event#4-PPM-LDR</u>
Actual daily flow rates / e-water component and volumes	Actual daily flow rates and volumes averaging 551 ML/day at Weir 32 with an average of 351 ML/day environmental water, delivering 10,891 ML of environmental water.	Actual daily flow rates and volumes averaging 616 ML/day at Weir 32 (including a period where EWA was used on top of held environmental water and base flow), with an average of 362 ML/day environmental water, delivering 14,023 ML of environmental water.	Actual daily flow rates and volumes - undertaken in line with directions provided by the Menindee/Lower Darling water quality working group chaired by the Water Group.	Actual daily flow rates and volumes - undertaken in line with directions provided by the Menindee/Lower Darling water quality working group chaired by the Water Group and NSW environmental water managers. Total volume used 2,274 ML.

3.4.1 North-South Connectivity Trial

Recovery of water entitlements in the northern Basin has resulted in water remaining in the Barwon–Darling River which was previously extracted. Since late 2020, NSW has had procedures in place to protect this environmental water along the Barwon–Darling and into Menindee Lakes. This protected environmental water has been called Northern Basin Active Environmental Water (NBAEW). The NBAEW contributes an additional inflow to the Menindee Lakes which was not available prior to NSW’s adoption of the Active Management Procedures for the Barwon–Darling Rivers.

Following a request at the Basin Official Committee meeting in August 2023, MBDA have been leading the ‘Northern to southern Basin environmental flow protection (connectivity) trial’. The trial aims to protect NBAEW (held environmental water protected from extraction under the active management procedures in the northern Basin) through Menindee Lakes, instead of it being reshared to VIC and NSW licence holders under current arrangements.

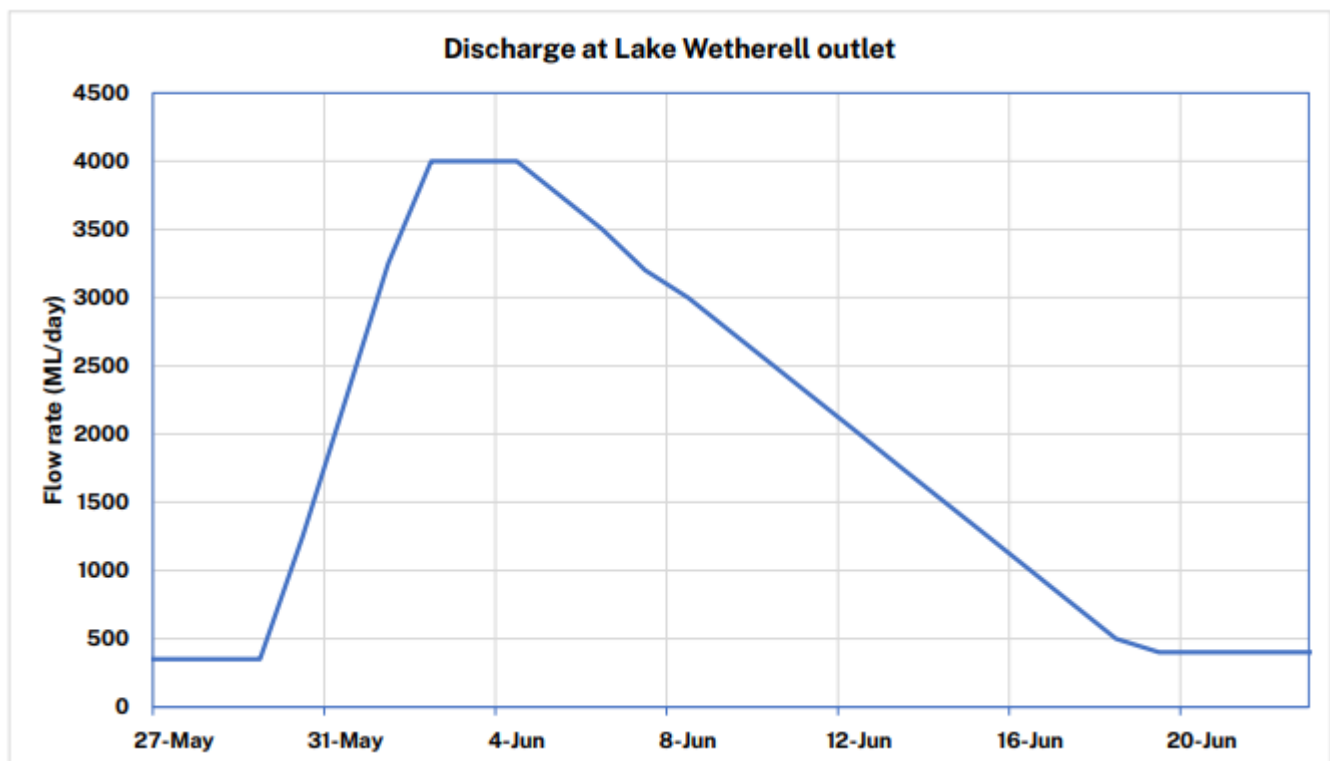
In May 2024, Basin states agreed to undertake the first trial to protect NBAEW. Basin states and the Commonwealth have agreed to run the trial under the following principles to guide decision making for the trial. The principles that were adopted for the first trial (these may change for future trials) are:

1. The held environmental water (HEW) component of the NBAEW is additional environmental water sourced from NSW tributaries that would not have flowed into Menindee Lakes prior to water recovery for the environment.
2. The HEW component of the NBAEW should be protected through the Menindee Lakes, with return flows delivered to downstream environmental sites, including to South Australia, after deduction of an assumed use to account for the incremental loss due to the higher flow in the river.

3. The water resource availability of each southern basin State should not be enhanced or diminished by this type of watering action.
4. Existing mechanisms should be used where they are fit for purpose, but new ideas that are simple to implement should be considered.

The release commenced on 29 May 2024. Discharge from the Lake Wetherell outlet was increased to the peak of 4,000 ML/day on 2 June 2024, remained at that level until 4 June 2024 and then gradually decreased back to 400 ML/day again on 19 June 2024. The minimum discharge required in the lower Darling River from May to October is 200 ML/day. Prior to the release, environmental water was being used to maintain a higher flow target of 400 ML/day at Weir 32 to assist basic ecosystem functions in the lower Darling River. The discharge from Lake Wetherell outlet is shown in Figure 3.

Figure 3: Discharge (ML/day) from Lake Wetherell outlet (station number 425996) (Source: WaterNSW)



The accounting of losses in the Lower Darling and Murray, associated with the release of the NBAEW from Menindee and delivery to the SA border, used the NSW PPM accounting arrangements. The NBAEW was released under a under the minimum flow condition on WaterNSW's works approval. As this release doesn't constitute HEW, it has been excluded from the total HEW debit and return flow volumes reported for the 2023–24 water year. Depending on the development of any enduring arrangements involving the use of the HEW licences, then the volumes released from Menindee that have originated from NBAEW may be considered for inclusion in subsequent years. Further information on the trial can be found at: water.dpie.nsw.gov.au/our-work/projects-and-programs/river-connectivity/northern-to-southern-basin-environmental-flow-protection-trial#northern-basin-connectivity-program

3.5 Murray multi-site and Murray River Winter Flow (April–June 2024)

Two multi-site watering events from Hume Dam to South Australia used NSW environmental water licences held by the Commonwealth Environmental Water Holder's (CEWH), The Living Murray (TLM) and NSW CPHR as well as River Murray Increased Flow (RMIF)) in the Murray regulated system.

During the Murray Multi-site events (Event#1, Event#2 and Event#3) a total of 207,961 ML of HEW was debited (177,961 ML for CEWH and 30,000 ML for TLM) and a total of 173,592 ML was recognised at the SA border (158,846 ML for CEWH and 14,746 ML for TLM).

During the Murray River Winter Flow event (Event#4 and Event#5) a total of 46,937 ML of HEW was debited (19,497 ML for CEWH; 7,940 ML for TLM and 19,500 ML for RMIF). A total of 38,497 ML was recognised at the SA border (17,129 ML for CEWH; 11,368 ML for TLM and 10,000 for RMIF).

Note, that the return flows associated with specific licences for both events were estimated at the bulk level at a monthly time step based on the distribution of percent of usage. This is unlikely to reflect actual return flows per licence. It does not account for travel time between usage and return flow when determining proportions. This method has been discussed with CEWH as the best current solution with the tools available.

The objective of the Murray Multi-site was to deliver flows in the Murray River at Doctors Point and downstream of Yarrawonga Weir to provide the following ecological outcomes as described in the NSW Murray-Lower Darling Long-term Environmental Watering Plan for the Hume to Yarrawonga and Yarrawonga to Barmah reach (and Edward-Wakool):

- native fish: dispersal / condition (all species), pre-spawning, condition (flow pulse specialists)
- ecosystem functions through longitudinal connectivity along the Murray and Edward-Wakool: connectivity with low lying wetlands, hydraulic diversity and productivity and transport of nutrients and carbon
- native Vegetation: in-channel woody and non-woody, wetland vegetation and low-level river red gum condition.

The objective of the Murray River Winter Flow was to deliver specific flows in the Murray River downstream of Yarrawonga Weir to provide the ecological outcomes for native fish — dispersal / condition (all species), pre-spawning, condition (flow pulse specialists) — as described in the NSW Murray-Lower Darling Long-term Environmental Watering Plan for the Hume to Yarrawonga and Yarrawonga to Barmah reach (and Edward-Wakool).

The environmental sites watered were Murray River and tributaries, and Millewa Forest.

The PPM action was directed releases from Hume Dam (when the intended flow at Yarrawonga is less than the maximum planned release as described in SO&O 3.1b).

The assumed use/accounting method used for:

- environmental water releases from Hume Dam to meet flow targets at Doctors Point and downstream from Yarrawonga Weir, as per the specific objectives and outcomes as described in the Objectives and Outcomes for River Operations in the River Murray System as published on the [MDBA website](#).

- directed releases from Hume Dam, assumed use for directed releases of held environmental water from Hume. Any change to the sequence of environmental water product/s used will be made through an email request from the Water Group.

Table 7: Overview of the environmental watering event that used PPMs in 2023–24 in the Murray Regulated River – Murray Multi-site event

CPHR Group Event Number: <u>Event#3</u>	WaterNSW Event Number: <u>Event#1-PPM-Hume Multisite</u>	WaterNSW Event Number: <u>Event#2-PPM-Hume Multisite</u>	WaterNSW Event Number: <u>Event#3PPM-Hume Multisite</u>
Delivery start date	14 August 2023	2 September 2023	13 October 2023
Delivery end date	15 August 2023	29 September 2023	2 December 2023
Total volume of environmental water debited as reported by WaterNSW (ML)	207,961 ML 177,961 ML – CEWH 30,000 ML – TLM		
Return flow volume recognised (SA border) (ML)	173,592 ML 158,846 [■] ML – CEWH 14,746 [■] ML – TLM		
Losses (ML)	There were losses of 34,369 ML in the Murray Valley from Hume to the SA Border.		
Target daily flow rates and volumes	Target a flow rate equivalent of 3.0 m at the Tocumwal gauge unless specified otherwise, with 1,000 ML/day downwards variability (at MDBA RMO discretion) in the flow rate provided to allow flexibility for operational decisions, using up to 335,636 ML.		
Actual daily flow rates / e-water component and volumes	See Figure 14 in Appendix 6.2.3.3.1		

■ Return flows associated with specific licences were estimated at the bulk level at a monthly time step based on the distribution of percent of usage. This is unlikely to reflect actual return flows per licence. It does not account for travel time between 'usage' and 'return flow' when determining proportions. This method has been discussed with CEWH as the best current solution with the tools available.

Table 8: Overview of the environmental watering event that used PPMs in 2023–24 in the Murray Regulated River – Murray River Winter Flow (April-June 2024)

CPHR Group Event Number: <u>Event#5</u>	WaterNSW Event Number: <u>Event#4-PPM-Hume Multisite</u>	WaterNSW Event Number: <u>Event#5-PPM-Hume Multisite</u>
Delivery start date	30 April 2024	14 June 2024
Delivery end date	16 May 2024	30 June 2024
Total volume of environmental water delivered (ML)	28,497 ML	18,440 ML
Total volume of environmental water debited as reported by WaterNSW (ML)	46,937 ML <i>19,497 ML – CEWH</i> <i>7,940 – TLM</i> <i>19,500 – RMIF</i>	
Return flow volume recognised (end of system) (ML)	38,497 ML <i>17,129 ML – CEWH</i> <i>11,368 – TLM</i> <i>10,000 – RMIF</i>	
Return flow volume recognised (SA border) (ML)	38,497 ML <i>17,129 ML – CEWH</i> <i>11,368 – TLM</i> <i>10,000 – RMIF</i>	
Losses (ML)	There were losses of 8,440 ML in the Murray Valley from Hume to the SA Border.	
Target daily flow rates and volumes	On the recession from operational flows to a winter base flow, draw down flows at a rate of 1,000 ML/day and hold at 4,000 ML/day until 30 June 2024. (Hold between 3,000 and 4,000 ML/day from 13 June 2024 to 30 June 2024). This flow can vary upwards to 4,500 ML/day.	
Actual daily flow rates / e-water component and volumes	See Figure 15 in Appendix 6.2.3.3.2	

3.6 Edward-Wakool

During the 2023–24 water year there were two events targeting the Edward-Wakool River system. These were operational water deliveries into Wakool, Yallakool and Colligen Creeks (the ‘Wakool’ event) to meet environmental flow targets and a second event delivering HEW from the Edward River Escape to meet a target flow downstream Stevens Weir (the ‘Edward River’ event).

The Wakool event targeted delivery of extra in-channel flows through the Wakool River system outside of River Murray Multisite deliveries using the Wakool seasonal loss allowance (Table 9). A total of 41,883 ML of HEW was debited as loss associated with the additional operational water deliveries. Return flows are not recognised from operational deliveries. HEW debit is for the loss associated with the delivery of additional operational water to meet environmental water targets.

The Edward River event debited a total of 37,373 ML HEW, however no return flows were recognised. This was because of the absence of an approved accounting arrangement. Whilst an ‘ad-hoc’ accounting arrangement was used during the 2021–22 water year to deliver return flows, it was not seen as fit-for-purpose. In addition, a lack of early communication between CPHR Group, WaterNSW, Water Group and the MDBA meant that the decision on whether to use the ‘ad-hoc’ arrangement did not occur prior to the event. This has been rectified for the 2024–25 water year with the approval and use of a new accounting arrangement in April 2025.

The PPM action was directed releases from Hume Dam — return flows from the Wakool System (when the intended flow at Yarrawonga is less than the maximum planned release as described in SO&O 3.1b).

Table 9: Overview of environmental watering events that used PPMs in 2023–24 – Edward-Wakool.

CPHR Group Event Number: <u>Event#4</u>	Wakool	Edward River
Delivery start date	1 December 2023	15 March 2024 & 1 May 2024
Delivery end date	31 May 2024	7 April 2024 & 23 May 2024
Total volume of environmental water debited as reported by WaterNSW (ML)	41,883 ML	37,373 ML
Return flow volume recognised (SA border) (ML)	Return flows are not recognised from operational deliveries. HEW debit is for the additional loss associated with the delivery of additional operational water to meet environmental water targets.	Return flows were not recognised at the end of system as there was no accounting arrangement in place for flows downstream of Stevens Weir. This has been rectified for the 2024–25 water year.
Losses (ML)	41,883 ML	No return flows were recognised, hence there were not losses calculated.

CPHR Group Event Number: Event#4	Wakool	Edward River
Target daily flow rates and volumes.	(see Figure 4, Figure 5 and Figure 6)	Target ranging from >800 ML/day to 1,800 ML/day between 15/03/2024 and 07/04/2024. Target ranging from 800 ML/day to 1,700 ML/day between 01/05/2024 and 23/05/2024.
Actual daily flow rates / e-water component and volume	(see Figure 4, Figure 5 and Figure 6)	Actual flows ranging from >989 ML/day to 1,789 ML/day between 15/03/2024 and 07/04/2024. Actual flows ranging from 1,005 ML/day to 1,892 ML/day between 01/05/2024 and 23/05/2024.

Figure 4: Wakool River flow components 2023–24

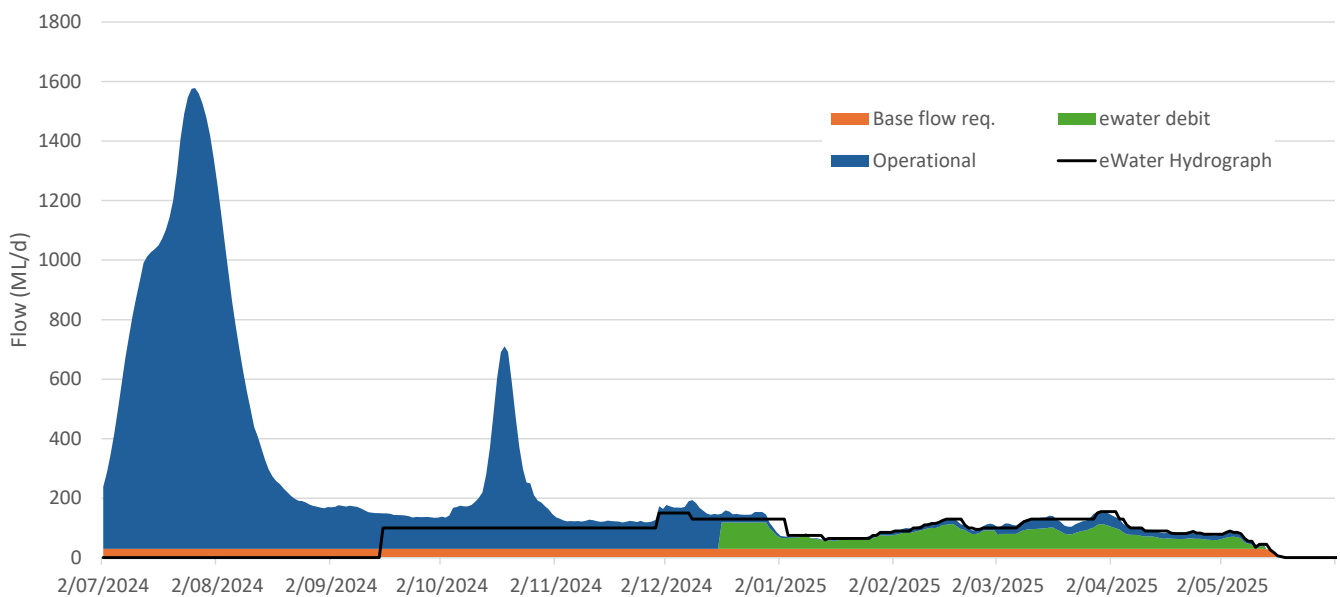


Figure 5: Yallakool River flow components 2023–24

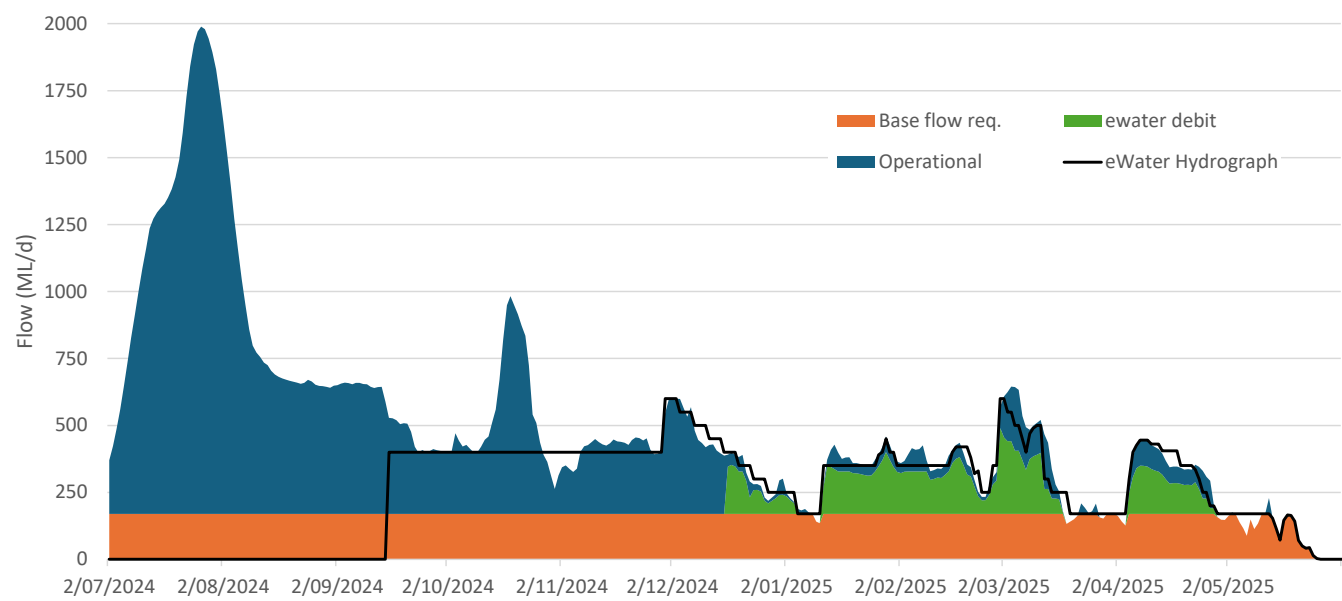
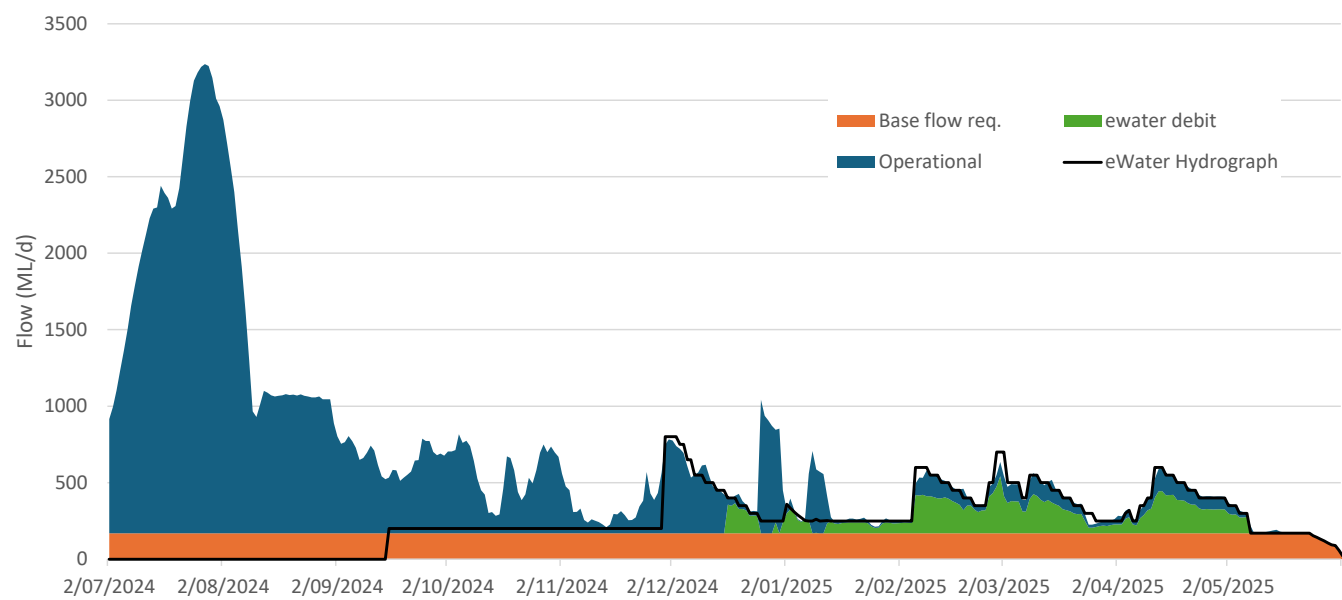


Figure 6: Colligen River flow components 2023–24



3.7 Lake Victoria Directed release

During the 2023–24 water year there was one directed release from Lake Victoria (Table 10). The event was in channel delivery in the Murray River via directed releases from Lake Victoria during unregulated flow conditions. A total of 47,647 ML was debited (22,647 ML for CEWH and 25,000 ML for TLM).

The environmental site watered was the Murray River channel.

The PPM action was directed releases from Lake Victoria during unregulated flow conditions.

The assumed use/accounting method used was: NSW environmental water licences will be debited the volume of environmental release calculated according to SO&O 9.4, as advised each month by the MDBA. **The volume of the directed release is recognised at the South Australian border (that is, no assumed use required).** Water orders will be managed under Bulk Entitlement Delivery arrangements. The volume of that order, and any amendments, will be placed in the WaterNSW accounting system at the time they are placed with the MDBA by WaterNSW.

Table 10: Overview of environmental watering events that used PPMs in 2023–24 – Lake Victoria.

CPHR Group Event Number: <u>Event#6</u>	WaterNSW Event Number: N/A
Delivery start date	1 October 2023
Delivery end date	30 November 2023
Total volume of environmental water delivered (ML)	47,647 ML
Total volume of environmental water debited as reported by WaterNSW (ML)	47,647 ML 22,647 ML - CEWH 25,000 ML - TLM
Return flow volume recognised (SA border) (ML)	47,647 ML
Losses (ML)	No losses because what is released is debited and delivered to the SA border.
Target daily flow rates and volumes.	No target – total released volume accounted for in unregulated period.
Actual daily flow rates / e-water component and volume	6,072 ML on 1/10/2023 41,575 ML on 26/11/2023

3.8 Murrumbidgee

Five PPM environmental watering events were undertaken in the Murrumbidgee system from January 2023 to May 2024 (See PPM Event 2a, PPM Event 2b, PPM Event 2c, PPM Event 2d and PPM Event 2e, detailed in Table 11). A total of 294,954 ML of HEW from the Murrumbidgee storages was delivered and debited (203,784 ML for CEWH; 70,000 ML for TLM and 21,170 ML for NSW GS) and a total of 280,738 ML was recognised at the SA border during the 2023–24 water year.

The objective of the environmental watering events was to build up a native fish pulse to increase lateral connectivity with creeks and lakes to maximise native fish movement opportunities into favourable habitats. The secondary objective was to create a dispersal pulse in late November to maximise fish passage, larval dispersal and increase in stream habitat, particularly in the lower reaches of the Murrumbidgee River.

The PPM action was directed releases from storages/s to meet a target flow at downstream Balranald and recognition of HEW inflows from the Murrumbidgee River (return flows) in the River Murray.

The assumed use/accounting method used was: to debit additional releases from storage, calculated as the difference between the actual releases from storage and those that were estimated that would have been made without the environmental water order.

Orders were placed to the end of the Murrumbidgee system and losses for within channel deliveries are socialised to the delivery point as per all licenced deliveries, hence no losses were applied in the Murrumbidgee Regulated River.

Table 11: Overview of environmental watering events that used PPMs in 2023–24 in the Murrumbidgee.

CPHR Group Event Number: <u>Event#7</u>	WaterNSW Event Number: <u>PPM Event 2a</u>	WaterNSW Event Number: <u>PPM Event 2b</u>	WaterNSW Event Number: <u>PPM Event 2c</u>	WaterNSW Event Number: <u>PPM Event 2d</u>	WaterNSW Event Number: <u>PPM Event 2e</u>
Delivery start date	1 September 2023	15 November 2023	3 February 2024	28 February 2024	23 April 2024
Delivery end date	3 November 2023	1 January 2024	11 February 2024	22 April 2024	25 May 2024
Environmental sites watered	Murrumbidgee River downstream Darlington Point	Murrumbidgee River downstream Balranald Weir			
Total volume of held environmental water debited as reported by WaterNSW	294,954 ML 203,784 ML (CEWH) 70,000 ML (TLM) 21,170 ML (NSW GS)				

CPHR Group Event Number: <u>Event#7</u>	WaterNSW Event Number: <u>PPM Event 2a</u>	WaterNSW Event Number: <u>PPM Event 2b</u>	WaterNSW Event Number: <u>PPM Event 2c</u>	WaterNSW Event Number: <u>PPM Event 2d</u>	WaterNSW Event Number: <u>PPM Event 2e</u>
	127,073 ML (CEWH)	50,000 ML (TLM) 23,106 ML (CEWH)	13,206 ML (CEWH)	13,399 ML (CEWH) 11,170 ML (NSW GS)	20,000 (TLM) 27,000 (CEWH) 10,000 (NSW GS)
Return flow volume recognised (end of system)	127,073 ML	72,556 ML	13,206 ML	24,569 ML	57,000 ML
Return flow volume recognised (SA border)	122,769 ML	69,781 ML	13,091 ML	22,610 ML	52,487 ML
Losses to End of System	0 ML	550 ML	0 ML	0 ML	0 ML
Losses from End of System to SA border (i.e. the difference between return flow recognised at the end of system and return flow recognised at SA border)	4,304 ML	2,775 ML	115 ML	1,959 ML	4,513 ML
Target daily flow rates and volumes.	Target a steady flow rate of 4,500 ML/day at Darlington Point from early September until late November 2023. If flows drop below 3,500ML/day after the 15th of September, then target that flow rate as the	Target a peak flow rate of up to 6,000 ML/day at downstream Balranald Weir during late November 2023 for a period of around 3 days. Following the peak flows, manage a 15% recession rate until the flow reaches 1,300 -	Target a peak flow rate of up to 6,000 -7,000 ML/day at downstream Balranald Weir during February 2024 for a period of around 5 days. Following the peak flows, manage a 15% recession rate until Balranald	Target a flow rate of 500 ML/day at downstream Balranald Weir from the end of February for 3 weeks followed by an increase to 1,000 ML/day for 4 weeks, and a further increase to 1,500 ML/day from mid to the end of April.	Target a peak flow rate of 5,500 ML/day at downstream Balranald Weir for 5-10 days from approx. 1st May to 10th May. At the completion of the 5,500 ML/day flow peak, reduce to the End of System Target

CPHR Group Event Number: <u>Event#7</u>	WaterNSW Event Number: <u>PPM Event 2a</u>	WaterNSW Event Number: <u>PPM Event 2b</u>	WaterNSW Event Number: <u>PPM Event 2c</u>	WaterNSW Event Number: <u>PPM Event 2d</u>	WaterNSW Event Number: <u>PPM Event 2e</u>
	new minimum base flow. For all the flow rates specified, plus or minus 10% is acceptable. Maintain gates fully out of Beavers Creek for the period of the delivery.	1,400 ML/day at downstream Balranald Weir. Hold flows at 1,300-1,400 ML/day for up to 14 days (if required) to allow for steady river levels at Balranald prior to installation of the weir panels. Once the weir is in place reduced flows down to 500 ML/day with 15% recession rate. Maintain 500ML/day until 31st January. For all the flow rates specified plus or minus 10% is acceptable. Maintain gates fully out of Beavers Creek for the period of the delivery. Maintain gates fully out of Redbank Weir for as long as possible.	Weir is re-instated. For all the flow rates specified plus or minus 10% is acceptable. Maintain gates fully out of Beavers Creek for the period of the delivery.	At the completion of the 1,500 ML/day flow, reduce to the End of System Target Flow (ESFT) flow using a 15% rate of recession. For all the flow rates specified plus or minus 10% is acceptable.	Flow (ESFT) using a 15-20% rate of recession. For all the flow rates specified plus or minus 10% is acceptable.
Actual daily flow rates / e-water component and volume	See Figure 17 in Appendix 6.2.4.4.2	See Figure 18 in Appendix 6.2.4.4.3	See Figure 20 in Appendix 6.2.5.4.2	See Figure 21 in Appendix 6.2.5.4.3	See Figure 22 in Appendix 6.2.5.4.4

3.9 Yanco / Billabong

Two environmental watering actions using directed releases and return flows were undertaken in the Yanco/Billabong system from September 2023 to February 2024, detailed in Table 12. The first event was originally designed to use Planned Environmental Water (PEW) and hence, no return flows were applied. The event was amended to use HEW, with 3,759 ML debited however, because the accounting arrangement was still being developed, no return flows were able to be recognised.

The second event, that took place in February 2024, trialled a new accounting method the *Yanco incremental loss method for e-water flows* (Appendix 6.1). A total of 4,646 ML of HEW was delivered and debited. No return flow volume was recognised as the method developed did not account for the attenuation of flow. The attenuation of flows, resulted in the calculated return flows being greater than the end of system flow at Darlot, minus downstream deliveries and end of system target, hence WaterNSW were not able to recognise the calculated return flow volume. This accounting arrangement has been updated for the 2024–25 water year to account for the attenuation of flows, and return flows were recognised successfully. This new method will be included in the 2024–25 annual report.

The primary objective was to build up a dispersal pulse as it passes down the Yanco Creek to maximise the dispersal of Trout cod and Murray cod larvae and juveniles, which successfully bred during the steady flows provided earlier during this event. A secondary objective was to trigger perch spawning and migration conditions as water temperatures reached the desired threshold in the following weeks.

The environmental site watered was Yanco Billabong creek downstream of the Yanco offtake.

The PPM action was directed releases from storages/s to meet a target flow at downstream Yanco Offtake.

The assumed use/accounting method used was: debit additional releases from storage calculated as the difference between the actual releases from storage and those that are estimated would have been made without the environmental water order.

Table 12: Overview of environmental watering events that used PPMs in 2023–24 in the Yanco / Billabong.

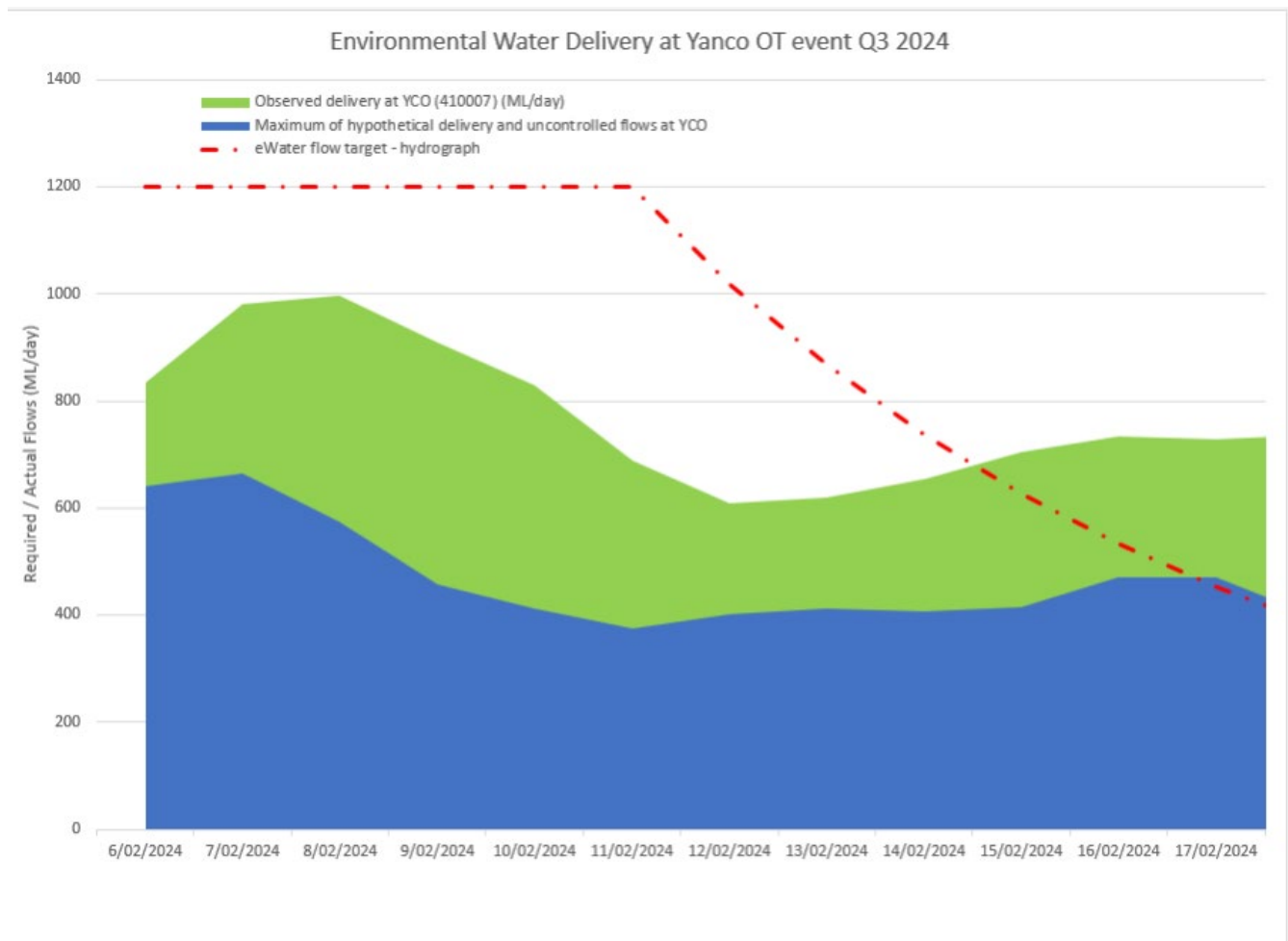
CPHR Group Event Number: <u>Event#8</u>	WaterNSW Event Number: <u>PPM Event 1a</u>	WaterNSW Event Number: <u>PPM Event 3</u>
Delivery start date	2 September 2023	6 February 2024
Delivery end date	6 December 2023	20 February 2024
Total volume of held environmental water delivered and debited as reported by WaterNSW	3,759 ML (CEWH)	4,646 ML (CEWH) 2,959 ML (Yanco Offtake) 1,687 ML (Coleambally Catchment Drain (CCD))
Return flow volume recognised (end of system)	No return flows recognised.	

CPHR Group Event Number: <u>Event#8</u>	WaterNSW Event Number: <u>PPM Event 1a</u>	WaterNSW Event Number: <u>PPM Event 3</u>
Return flow volume recognised (SA border)	No return flows recognised.	
Losses	N/A	
Target daily flow rates and volumes.	Target a steady flow rate of 600 ML/day at Yanco Offtake from 2nd September until 28 November 2023. Target a peak flow rate of 900ML/day at downstream Yanco Offtake from 28 November 2023 for a period of 7 days. Following the peak, manage a 15% recession rate until the flow reaches consumptive demand levels downstream Yanco Offtake. Operate Tarabah Weir to maximise flow down Yanco Creek and fish passage through weir. For all the flow rates specified plus or minus 10% is acceptable.	Target a peak flow rate of 1,000 - 1200ML/day at downstream Yanco Offtake from the 6th February 2024 for a period of 6 days. Following the peak, manage a 15% recession rate until the flow reaches consumptive demand levels downstream Yanco Offtake. Operate Tarabah Weir to maximise flow down Yanco Creek and fish passage through the weir. Target diversions of up to 300ML/day down the CCD for 9 days starting 7th February 2024. For all the flow rates specified plus or minus 10% is acceptable.
Actual daily flow rates / e-water component and volume	See Figure 16 in Appendix 6.2.4.4.1	See Figure 19 in Appendix 6.2.5.4.1

3.9.1 Yanco HEW event Feb 2024

HEW was delivered during early 2024 to the Yanco Offtake. The event hydrograph is shown in Figure 7.

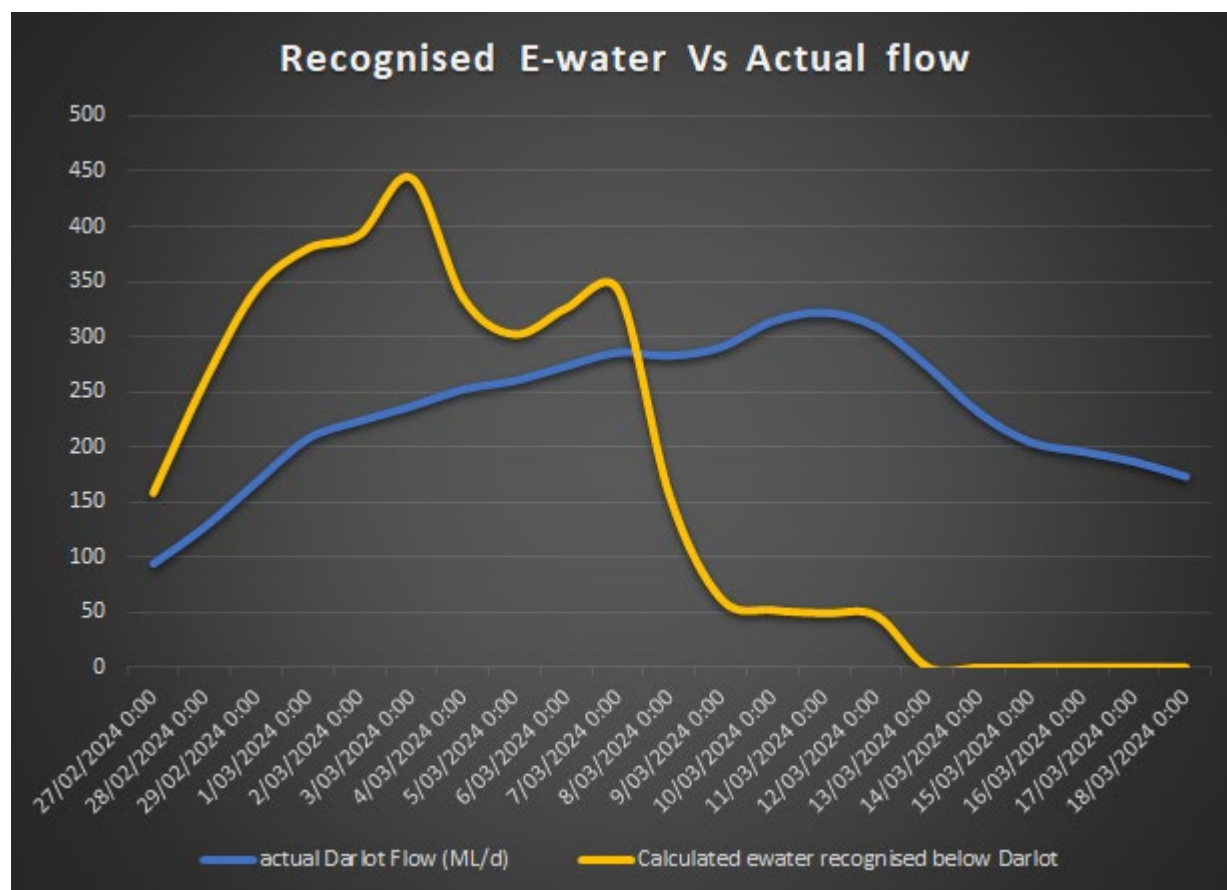
Figure 7: Early 2024 held environmental water event hydrograph for e-water delivery at Yanco Offtake



To calculate the return flow, the Yanco Creek incremental loss and return flow method for in-channel environmental water flows was used. This method applies a loss percentage to the HEW flow that is delivered on top of operational flows at Yanco Offtake and recognises the return flow (from this flow) at the end of the system (Darlot gauge on Billabong Creek).

Figure 8 (below) compares the calculated and actual HEW return flows at Darlot for the event. The yellow line (higher peaked line) shows the HEW return flow calculated using the incremental loss method. The blue line (lower peaked attenuated line) represents the actual HEW return flow at Darlot, that is, the gauged flow at Darlot minus the downstream irrigation orders and minus the Planned Environmental Water End of System (PEW EoS) target. The difference between the two is thought to be due to flow attenuation and higher extraction than was ordered and delivered by WaterNSW. Due to the discrepancy between the calculated HEW return flow (or hydrograph) and the flow reaching Darlot, no return flows were recognised for this HEW event.

Figure 8: Actual HEW return flows at Darlot (lower peaked attenuated blue line) versus expected HEW return flows at Darlot (higher peaked yellow line) from the early 2024 trial of HEW deliveries made to Yanco Offtake



3.10 Gayini Nimmie Caira

One environmental watering action using directed releases and return flows was undertaken in the Gayini Nimmie Caira for 3 days — 22 to 24 March 2024 (WaterNSW PPM Event #4) in Table 13.

The environmental site watered was Murrumbidgee river downstream Maude.

The PPM action was directed releases from storages/s to meet a target flow at downstream Maude.

The assumed use/accounting method was: debit additional releases from storage calculated as the difference between the actual releases from storage and those that are estimated would have been made without the environmental water order.

Table 13: Overview of environmental watering events that used PPMs in 2023–24 in Gayini Nimmie Caira.

CPHR Group Event Number: -	WaterNSW Event Number: <u>PPM Event 4</u>
Delivery start date	22 March 2024
Delivery end date	24 March 2024
Total volume of held environmental water delivered and debited as reported by WaterNSW (ML)	1,198 ML (NSW GS)
Return flow volume recognised (end of system)	470 ML
Return flow volume recognised (SA border)	430 ML
Losses	Losses between Maude Weir and Balranald = 728 ML. Losses between Balranald and SA border = 40 ML.
Target daily flow rates and volumes.	North Caira offtake regulator to remain fully opened during the ~10 day weir drawdown period until backflows from Bala cease (as measured at the Caira cutting gauging station) or the Maude weir pool reaches a level of 5.0 m (which-ever occurs first). For all the flow rates specified plus or minus 10% is acceptable.
Actual daily flow rates / e-water component and volume	See Figure 23 in Appendix 6.2.5.4.5

4 Evaluation of PPMs implementation processes

A framework to evaluate the performance of PPMs implementation in NSW was developed by the Water Group in March 2023. The framework was a recommendation of the 2019–20 and 2020–21 annual review reports and was designed to expand on the annual review requirements outlined in the procedures manuals. The framework was published in September 2023 on the department's website:

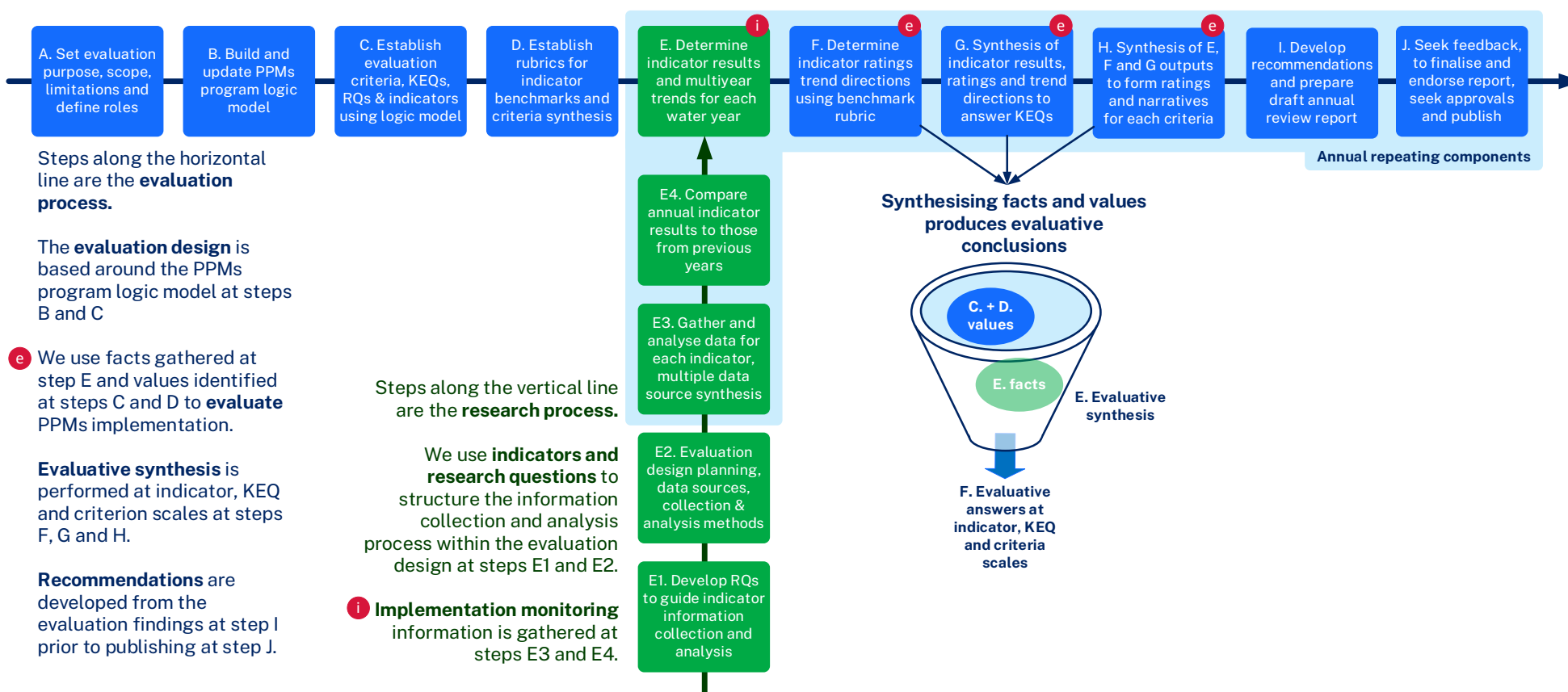
water.dpie.nsw.gov.au/our-work/projects-and-programs/environmental-water-management-in-nsw/what-we-are-working-on-now/pre-requisite-policy-measures

The purpose of the framework is to be objective, systematic and track the performance of PPMs implementation over time. The framework uses three key criteria of 'consistency', 'efficiency', and 'effectiveness'. These criteria reflect the requirements for environmental water protections as described in the Basin-wide Environmental Water Protection Strategy (adopted at Basin Officials Committee meeting 81 in 2021).

The framework structure shown in Figure 9 (below) is used to navigate the evaluation process. Evaluation steps E through to J were undertaken as part of this annual review. The framework uses a program logic model of PPMs procedures and broad knowledge of implementation processes as the basis for the selection of key evaluation questions (KEQs) and performance indicators (PIs). The evaluation framework sets five KEQs to be answered annually using a range of indicators as shown in Appendix 6.4.

The 2023–24 evaluation findings for each KEQ are summarised in Section 4.1. Results from the evaluation indicator analysis are provided in Appendix 6.5. The indicator results and KEQ findings informed the recommendations for this annual report.

Figure 9: Steps for PPMs process evaluation (extracted from the NSW PPMs Evaluation Framework)



4.1 Evaluation findings

The three evaluation criteria scored an ‘average’ rating for the 2023–24 water year, meaning minimal improvement in the implementation of the PPMs program. The criteria ratings were based on the mostly moderate ratings for performance indicators and neutral multi-year performance indicator trends (shown in Table 14). No performance indicators achieved a ‘high performance’ rating during the 2023–24 water year. The focus area that performed at a low level was ‘risk management’, this was due to the lack of documentation of risks.

Trends for the performance indicators were neutral, meaning they remained at moderate performance since 2022–25. No changes in 2023–24, despite additional resources dedicated to PPMs implementation was largely due to the focus of the work during 2023–24 being to ‘fill-the-gaps’ in the PPMs Procedures Manuals for all of the identified environmental watering events that do not have an agreed accounting arrangement for the recognition of return flows. Hence, work to improve existing arrangements and other PPM implementation matters were not prioritised.

The value-based rating for each performance indicator (shown in Table 14) was determined by comparing the evidence to the scoring guide (Appendix D of the [Evaluation Framework for PPMs](#)). The evidence included document reviews (reviews of reports provided by the river operators and environmental water holders) and information gathered from any clarifying interviews with relevant agencies or PPMs working group discussions.

Narrative results for each KEQ and key findings associated with each criterion are provided in the following sections.

Table 14: PPMs performance indicator rating summary 2023–24

Consistency performance indicators (KEQ 1 & 5)	Rating	Trends since PPMs started
PI 1a Roles and responsibilities	Moderate	➡ Neutral
PI 1b Roles and responsibilities	Moderate	➡ Neutral
PI 2a Information quality	Moderate	➡ Neutral
PI 3 Impediments or barriers	Moderate	➡ Neutral
Consistency	Average	➡ Neutral
Efficiency performance indicators (KEQ 2, 4 & 5)	Rating	Trends since PPMs started
PI 2b Information provision	Moderate	➡ Neutral
PI 4 Risk management	Low	➡ Neutral
PI 5 Adaptive response & improvement changes	Moderate	➡ Neutral
PI 7 Balance within risk management	Moderate	➡ Neutral
Efficiency	Average	➡ Neutral
Effectiveness performance indicators (KEQ 3 & 5)	Rating	Trends since PPMs started
PI 6 PPMs outcomes	Moderate	➡ Neutral
PI 8 PPMs Implementation	Moderate	➡ Neutral
Effectiveness	Average	➡ Neutral

4.2 Consistency

Consistency interpretation:

Whether the PPMs process was followed as intended and activities were implemented consistently to support return flows and piggybacking of environmental water; whether consistency improves through time.

To understand the degree of consistency of PPMs process implementation, identify constraints and barriers to implementation.

The implementation of PPMs during the 2023–34 water year received an average rating for consistency. During the 2023–24 water year most of the PPMs procedures were performed to support piggybacking and return flows of environmental water. Agencies demonstrated a clear understanding of their roles and were able to meet the fundamental responsibilities in the ordering and delivery of environmental water.

The key challenges for consistency were regarding the provision of information:

- Environmental water holders are still not receiving the return flows split by water holder for all systems.
- Despite return flow volumes being reported to NSW and CEWH water holders, this information is not being reported to South Australia.

A summary of indicator results is provided in Table 15 below.

Table 15: Evaluation result summary for implementation consistency

Consistency performance indicators (KEQ 1 & 5)	Rating	Trends since PPMs started
PI 1a Roles and responsibilities	Moderate	➡ Neutral
PI 1b Roles and responsibilities	Moderate	➡ Neutral
PI 2a Information quality	Moderate	➡ Neutral
PI 3 Impediments or barriers	Moderate	➡ Neutral
Consistency	Average	➡ Neutral

4.2.1 KEQ 1 – How consistently were PPMs implemented during the last water year and how did that compare to previous years?

In the 2023–24 water year, the key responsibilities for PPMs implementation were mostly fulfilled for the 22 watering events relying on PPMs that took place. This demonstrated agencies generally have a good understanding of their roles and requirements. Assumed use methods as per the Procedures Manual were applied for e-water deliveries in the GDA, the Lower Darling, the Murray River, the Wakool, and the Murrumbidgee. New accounting arrangements were trialled for the Yanco Creek (found to be insufficient) and Gayini Nimmie Caira watering events. Losses for the multi-site delivery in the Murray River and Lake Victoria were applied as per SO&O2.5.

Appendix 6.6 offers a summary of the operational procedures followed for actions in the 2023–24 water year. Crosses or ticks represent whether the procedure was implemented and is marked against the responsible agency/agencies only.

Across the requirements of the roles and responsibilities agreement:

- 11/11 requirements met for Planning (no change from 11/11 in 2022–23)
- 6/9 requirements met for Implementation and Accounting (no change from 6/9 in 2022–23)
- 8/12 requirements met for Adaptive management (no change from 8/12 in 2022–23)
- 3/3 requirements met for Consultation (no change from 3/3 in 2022–23)

Key gaps in responsibilities were a lack of reporting return flows by licence holder for all water sources and the provision of return flow data to South Australia, a lack of a collaborative risk assessment process and an agreed post-event accounting method.

These gaps have mostly been captured by the recommendations in the previous annual reviews. The delivery of return flow data has been included as a new recommendation to specifically refer to the provision of data to South Australia. Another new recommendation is for an annual risk assessment process to be undertaken by the PPMs Working Group. The process could better enable the identification and documentation of risks associated with planned or likely PPMs events, and the appropriate mitigation measures for each risk, including mitigating third party impacts.

4.2.2 KEQ 5 – How can the consistency of PPMs be improved?

Based on the 2023–24 review of the consistency of PPMs implementation, in addition to the recommendations carried over from the past annual reviews, it is recommended that NSW progress the recommendations outlined in Table 16 below.

Table 16: 2023–24 recommendations to improve the consistency of implementation

Recommendation	Arising from
Water Group to develop and implement an annual risk assessment process to identify, document and mitigate risks for planned or likely PPMs events	KEQ 1
WaterNSW to continues to work with environmental water holders to provide return flow data to South Australia.	KEQ 1

4.3 Efficiency

Efficiency interpretation:

Whether the implementation of the PPMs process was timely, activities could be easily implemented, how the process (and supporting arrangements) has improved over time

To understand whether the PPMs process is easy to follow and practical to implement across the agencies.

To identify possible improvements within the PPMs process and document for action through the PPMs adaptive management process; to understand issue size and agency perspectives.

The implementation of PPMs during the 2023–24 water year received an average rating for efficiency based on all moderate ratings and one low rating. Risk management retained a low performance rating despite risk assessment and mitigation measures being in place within internal WaterNSW and CPHR processes. This is due to a lack of documentation with regards to the consideration of risks during PPMs implementation. Further process improvements for the planning, ordering and accounting of environmental water deliveries are also required to improve efficiency.

Table 17: Evaluation result summary for implementation efficiency

Efficiency performance indicators (KEQ 2, 4 & 5)	Moderate	Trends since PPMs started
PI 2b Information provision	Moderate	➡ Neutral
PI 4 Risk identification	Low	➡ Neutral
PI 5 Adaptive response & improvement changes	Moderate	➡ Neutral
PI 7 Balance within risk management	Moderate	➡ Neutral
Efficiency	Average	➡ Neutral

4.3.1 KEQ 2 – Was the PPMs process implemented efficiently during the last water year and how did that compare to previous years?

PPMs were delivered somewhat efficiently during the 2023–24 water year. The feedback from WaterNSW on the inefficiencies related to the planning, ordering and accounting of environmental water deliveries are detailed in Table 18 below.

Table 18: River operator issues and recommendations for the 2023–24 water year.

Item	River operator issue	River operator recommendations
1	Water order process continued to frustrate all parties with the availability of water for delivery, the timeliness of amendments and the necessary feedback of actual use to the customers so that orders can be managed in real time.	The water orders must have all the elements as outlined in the Section 2.4.2 of NSW PPM Procedures Manual for the Murrumbidgee Regulated River (Nov 2022).
2	Directions for flow and accounting splits need to be delivered to the entire South Operations team. Direct emails to individuals of specific directions makes post event accounting and reporting difficult.	Include southoperations.team@waterNSW.com.au in all correspondence. Possibility of creating a SharePoint page/folder to track history, changes and final decisions made for each event.
3	Use of iWas ordering system rather than manual order placing	iWas would assist with tracking and final order placing rather than back and forth email tracking post event.
4	Planning	Clear annual planning foresight required by e-water holders (under different scenarios) to provide operators an opportunity to look at long-term forecasting. Planning needs to be less reactive.
5	Recognition of PPM deliveries in the Yanco Creek	Further work is required to recognise PPM deliveries in the Yanco Creek. Losses between Darlot and Boundary Bend on the Murray need to be accounted for.
6	Post event PPM direction review	When changes are agreed to the original PPM delivery instructions, e-water holder must submit the final agreed version to WaterNSW. Clear differences can be observed between the accounted flows and original PPM instruction.

Some of the above recommendations are already captured in the recommendations from the previous annual review. Items 2, 3 and 6 have been included as new recommendations.

The Enhanced Environmental Water Delivery (EEWD) project has designed a new Environmental Water Ordering Tool (EWOT) that will track orders and amendments using a D365 project software for water orders in the River Murray System. Pending successful implementation, this could be investigated for adoption in NSW in the future. This has potential to address the above items: 1, 2, 3 and 6.

4.3.2 KEQ 4 – Are adaptive management processes effective in improving PPMs implementation?

While significant progress on the recommendations from the 2022–23 water year was made to improve PPMs implementation, only 1 of the 9 recommendations were completed and progress was made on the other 8. This is a decrease from the previous year where 5 of the 10 recommendations were completed. This is because the focus of the work was to complete the outstanding accounting arrangements to enable return flows to be recognised for all the watering events identified in the Procedures Manuals. Table 19 shows the progress on the recommendations from the 2022–23 water year.

Table 19: Recommendations from the 2022-23 PPMs annual evaluation and review

2022-23	Recommendations	Status
R.1	Water Group to collaborate with other agencies to streamline the PPMs implementation process, including fit-for-purpose water ordering, documentation of risks and mitigation measures, and reporting requirements.	Carried over from 2021–22 In progress
R.2	Water Group to collaborate with WaterNSW to develop a method for completing a post-event comparison of losses debited as per assumed use statement with ‘actual’ loss.	Carried over from 2021–22 In progress
R.3	WaterNSW to provide return flows split by water holder for the Murray and Murrumbidgee floodplain water use estimates.	KEQ 1 In progress
R.4	Water Group to collaborate with WaterNSW and environmental water holders to develop a procedure for both annual planning and contingency planning for environmental watering deliveries.	KEQ 2 In progress
R.5	Water Group to create a central location for the latest versions of the accounting methods and grant access to the PPMs Working Group.	KEQ 2 Complete
R.6	Water Group to update the procedures manuals to clarify the accounting of air-space releases, rainfall rejection, Lowbidgee weir pool filling, piggybacking on translucency flows and recognition of return flows from supplementary access licences.	KEQ 2 In progress
R.7	Water Group to develop a policy on PPMs from Menindee Lakes System when it is a NSW only resource.	Carried over from 2021–22 In progress
R.8	Water Group to determine assumed uses for directed releases in the Murrumbidgee and return flows from mid-Murrumbidgee and Lowbidgee wetlands.	Carried over from 2021–22 In progress
R.9	Water Group to progress a review of the procedures manuals and update as necessary to reflect new actions and the outcomes of recommendations.	KEQ 5 In progress

The recommendations from the 2022–23 water year that were not completed are included in the recommendations for the 2023–24 water year (refer to Table 1).

4.3.3 KEQ 5 – How can the efficiency of PPMs be improved?

The recommendations from the review of the efficiency of PPMs during the 2023–24 water year are listed below in Table 20.

Table 20: 2023–24 recommendations to improve the efficiency of implementation

Recommendation	Arising from
CPHR to send directions for flow and accounting splits to WaterNSW's South Operations team email.	KEQ 2
CPHR to use iWas ordering system rather than manual order placing.	KEQ 2
CPHR to submit the final agreed version of the delivery instructions to WaterNSW, if there have been changes made through the event.	KEQ 2

4.4 Effectiveness

Effectiveness interpretation:

Whether the NSW PPMs implementation process is effective in providing a secure, operable, adaptive and transparent framework for the protection of held environmental water (PPMs do not currently apply to planned environmental water, except for RMIF).

To determine whether adaptive improvement processes are working; to inform recommendations for implementation design improvement; to identify opportunities to improve the PPMs process and refine related activities.

During 2023–24, the delivery of a total of 754,595 ML of held environmental water (HEW) in NSW resulted in 615,959 ML of return flows being recognised at the South Australian border. However, if return flows had also been recognised from the Yanco Creek and Edward River, then the total return flow volume would have been 661,737 ML. Hence, the effectiveness of PPMs in the 2023–24 water year could have been improved.

The performance indicator for PPMs outcomes retained a moderate rating as despite the largest volume of return flows being recognised to date, there is still some improvement needed to ensure return flows are recognised for all events.

The performance indicator for PPMs implementation retained moderate rating despite the lack of post-event accounting. This is because most accounting arrangements are not yet due for review. The Lower Darling, Great Darling Anabranch and Murray River (from Boundary Bend) methods are all due for review in 2025.

Table 21: 2023–2024 evaluation result summary for implementation effectiveness

Effectiveness performance indicators (KEQ 3 & 5)	Moderate	Trends since PPMs started
PI 6 PPMs outcomes	Moderate	➡ Neutral
PI 8 PPMs Implementation	Moderate	➡ Neutral
Effectiveness	Average	➡ Neutral

4.4.1 KEQ 3 – How effective are PPMs in improving the use and accounting of environmental water?

In the 2023–24 water year, new accounting arrangements were being developed for the Werai Forest watering event, the Murrumbidgee multi-site watering event and as part of the review of the Wakool loss method. Work also started on resolving the policy issue of the recognition of return flows from Menindee Lakes, when it is a NSW only resource. During the 2024–25 water year there was a successful Werai watering event, this will be included in the annual report for that year.

During 2023–24, new accounting arrangements were trialled for delivery of return flows from the Yanco Creek off-take and Nimmie-Caira, and for operational deliveries down the Great Darling Anabranch to meet environmental watering targets. Due to issues with the Yanco Creek arrangement (detailed in section 3.9) no return flows were recognised at the SA border. The Yanco Creek accounting arrangement was updated and successfully applied in the 2024–25 water year, and hence a recommendation to complete this work has not been included in this report. There was a recommendation to improve the GDA PPM accounting method that arose from the trial (detailed in section 3.1.1) that has been included as a recommendation in this report.

Due to a lack of an accounting arrangement for deliveries downstream Edward River (when flows are below 2,700ML/d and not part of a directed release) no return flows were recognised for this watering event during 2023–24. A new accounting arrangement for the Edward River has been developed and approved in the 2024–25 water year and hence this has also not been included as a recommendation in this report.

4.4.2 KEQ 5 – How can the effectiveness of PPMs be improved?

The recommendations to improve the effectiveness of PPMs are included in Table 22 below. In addition, the Enhanced Environmental Water Delivery (EEWD) project is completing work on an accounting assurance framework (that is expected to support continued PPM implementation). This will look to improve the consistency of risk mitigation and calculation of return flows across the jurisdictions. This work will assist in improving the effectiveness of PPMs in NSW.

Table 22: 2023–24 recommendations to improve the effectiveness of implementation

Recommendation	Arising from
Include travel times in the Great Darling Anabranch PPMs accounting arrangement.	KEQ 3

5 PPM work plan and next steps

Water Group will progress recommendations from this evaluation and review via the PPMs work plan for the 2024–25 water year provided in Appendix 6.7. The NSW PPMs work plan is maintained by the Water Group. The PPMs Working Group are provided the opportunity to review the work plan at each working group meeting to identify and prioritise tasks. The tasks for PPMs implementation are distributed between members of the working group based on the roles and responsibilities of each agency, availability of resources and the priority identified in the work plan. Recommendations from the annual review are incorporated into the work plan and prioritised by the PPMs Working Group.

6 Appendices

6.1 Yanco incremental loss method for e-water delivery

The accounting arrangement for environmental water (e-water) deliveries down Yanco Creek and the recognition of return flows at Billabong Creek at Darlot is:

1. WaterNSW calculate a 'with e-water' scenario and a 'without e-water' scenario for flows at the Yanco Creek at Offtake (gauge site 410007).
2. The difference between the two scenarios is the additional e-water flow, which is debited from the Environmental Water Holder (EWH) account.
3. The volume of e-water that is to be recognised at Billabong Creek at Darlot and protected is calculated using the percentage loss lookup table (Table 23 for summer – to be conservative).
 - a. The losses down Yanco Creek can be calculated, by first identifying the loss percentage value that applies to the operational volume (the without scenario) at Yanco Creek at Offtake found on the left-hand vertical column of the look-up table and the additional e-water flow (calculated in Step 2) found along the second row of the look-up table.
 - b. This percentage value is then applied to the additional volume of e-water and then subtracted from that volume.
 - c. The remaining volume is the 'return flow' that is to be recognised at Billabong Creek at Darlot.
4. The Murray-Murrumbidgee incremental loss method (INT21/19998) is then applied to the return flow volume at Billabong Creek at Darlot for calculating the return flow volume at the South Australian border.
5. If e-watering is required from CCD, DC800, Coleambally Outfall Drain and Finely Escape, then the incremental loss look-up tables developed and described in this paper are to be used as an interim.
6. If inflows from Billabong Creek result in Billabong Creek becoming unregulated (that is, inflows exceed demand) downstream of the Yanco Creek / Billabong Creek confluence, then no losses are to be applied to the additional flows that are sent to Yanco Creek at Offtake for e-water.

Table 23: Yanco Creek at Offtake in-channel flows incremental loss percentage look-up table (for **summer**).

Incremental Loss (ML/day) between Yanco @ Offtake and Billabong @ Darlot due to the additional flow (e-water) at Yanco @ Offtake in SUMMER	Additional flow at Yanco @ Offtake for e-water (ML/day) ↓												
	100	200	300	400	500	600	700	800	900	1,000	1,100	1,200	1,300
Yanco @ Offtake Flow Range (i.e. operational flow without e- water) (ML/day) ↓													
0 - 100	53%	45%	40%	37%	34%	32%	30%	29%	27%	28%	28%	28%	29%
> 100 - 200	36%	34%	31%	29%	28%	26%	25%	24%	25%	25%	26%	27%	
> 200 - 300	31%	29%	27%	26%	24%	23%	23%	23%	24%	25%	26%		
> 300 - 400	26%	25%	24%	23%	22%	21%	22%	23%	24%	25%			
> 400 - 500	24%	23%	21%	21%	20%	22%	23%	24%	25%				
> 500 - 600	22%	20%	20%	19%	21%	23%	24%	26%					
> 600 - 700	18%	19%	18%	21%	23%	25%	26%						
> 700 - 800	19%	22%	24%	26%	27%								
> 800 - 900	18%	23%	26%	28%	29%								
> 900 - 1000	28%	30%	31%	32%									
> 1000 - 1100	31%	32%	33%										
> 1100 - 1200	33%	34%											
> 1200 - 1300	35%												

Note: the black outlined cells show an example case for maintaining environmental flow of 600 ML/day at the Offtake.

Table 24: Summary of accounting for recognising return flows from Yanco Creek at Billabong Creek at Darlot

Action	Delivery pathway	Debiting	Return flow method	Mitigation Measures
Recognition of return flows at Billabong Creek at Darlot (410134) from flows at Yanco Creek at Offtake (410007) and down Yanco Creek	From upper storage(s) to the Yanco Creek at Offtake site (410007). Estimated return flows are to be protected downstream, including delivery from Billabong Creek at Darlot (410134) to the South Australian border.	Debit the EWH the difference between the target environmental volume (i.e. the 'with e-water' scenario) at the delivery site and the volume that would've been at the delivery site without the e-water delivery (i.e. the 'without e-water' scenario).	Yanco Creek losses: The appropriate loss percentage as per the incremental loss percentage look-up table (Table 23) is applied to the e-water volume at Yanco Creek at Offtake. Murray losses: The Murray-Murrumbidgee incremental loss method (INT21/19998) is applied to the return flow volume at Billabong Creek at Darlot that has been calculated.	Daily debits are capped at the lesser of: - the target flow (±10%) MINUS the required operational flow, or - the observed flow MINUS the required operational flow.

The Water Group will work with WaterNSW on a post-event accounting methodology where the total applied losses calculated with this method are compared to the losses as per the WaterNSW operational spreadsheets. It is not possible to confirm the total 'actual' incremental loss without a water quality analysis to distinguish between the environmental and operational flow volumes e.g. 'seeding'. The issue of how to do a post-event review of the incremental loss method will be further explored by the Water Group in collaboration with WaterNSW.

6.2 WaterNSW Annual Environmental Release River Operations Reports

6.2.1 Annual Environmental Release River Operations Report – Lower Darling 2023–24

This report was prepared by WaterNSW in accordance with the reporting requirements described under Section 5.1 of the Prerequisite Policy Measures Procedures Manual for the NSW Murray and Lower Darling Regulated Rivers.

Table 25: WaterNSW's Lower Darling Annual Environmental River Operations Report 2023–24 approvals

Report prepared by	David Wood	Report approved by	Jonathan Belej
Position	Water Planning and Delivery Specialist South	Position	Manager Water Planning and Delivery South
Contact number	0429310422	Contact number	0436950529
Date prepared	04/11/2023	Date approved	11/11/2023

6.2.1.1 Environmental watering actions

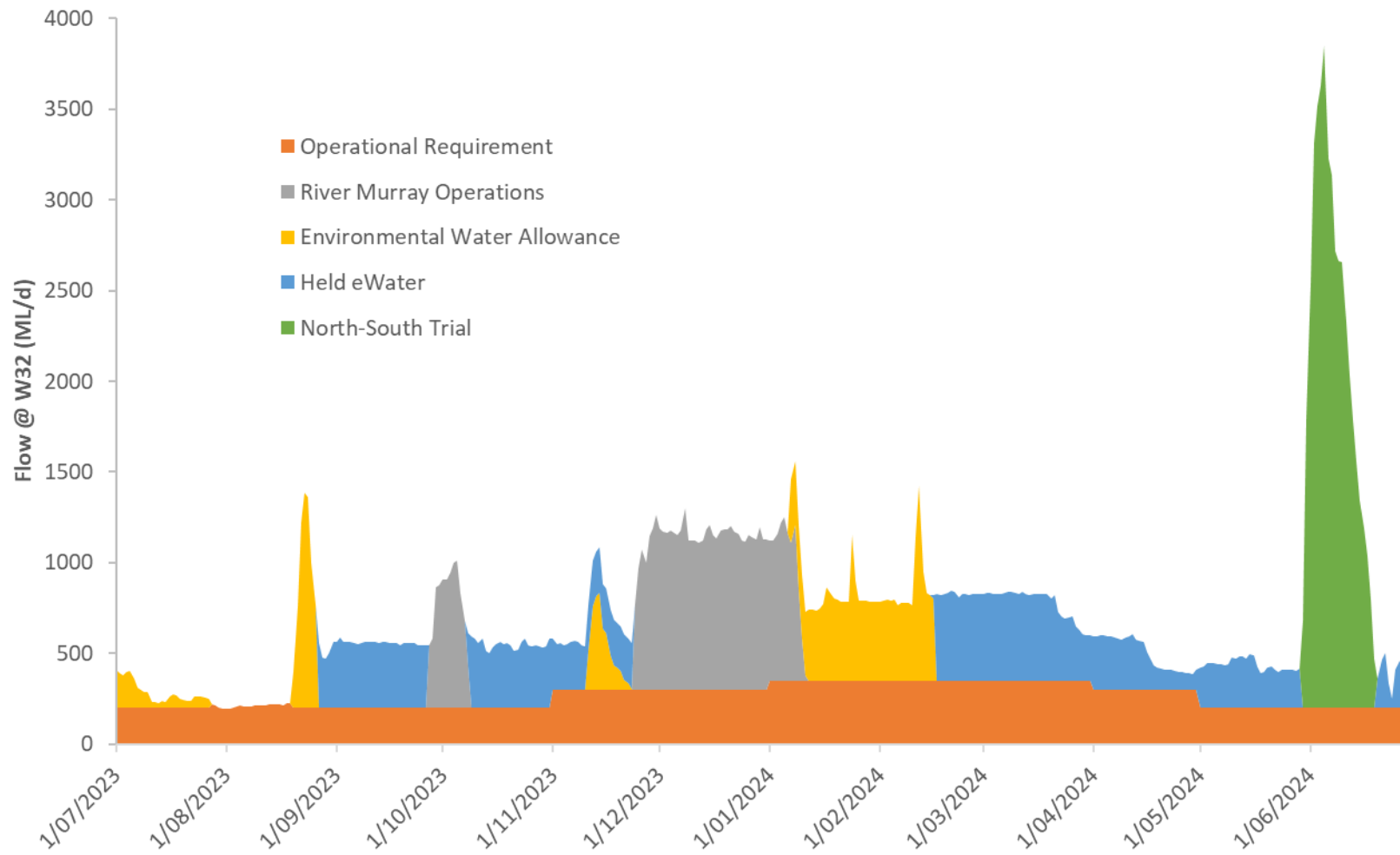
Table 26 provides an overview of the environmental water actions undertaken using PPMs in the 2023/24 water year.

Table 26: Summary of PPM watering actions in the Lower Darling in 2023/24

Name of environmental watering action	Event#1-PPM-LDR	Event#2-PPM-LDR	Event#3- PPM-LDR	Event#4- PPM-LDR
River system	Lower Darling River			
Type of PPM event	Directed releases from Menindee Lakes via the Lower Darling River			
General description of watering action	The objective is to deliver flows in the Lower Darling/Baaka to provide the following ecological outcomes as described in the NSW Murray-Lower Darling Long-term Environmental Watering Plan for the Weir 32 to downstream of Burtundy reach: - Native fish – dispersal / condition (all species), spawning nesting and recruitment (flow pulse specialists i.e. Murray Cod). - Ecosystem Functions – longitudinal connectivity, refuge habitat, small-scale productivity (transport of nutrients and carbon).		The objective is to provide the following ecological outcomes as described in the NSW Murray-Lower Darling Long-term Environmental Watering Plan for the Weir 32 to downstream of Burtundy reach: - Native fish – Deliver higher baseflows (BF2a–c) in sequence to maximize recruitment outcomes for Murray cod & other river specialists & generalist native fish. - Ecosystem Functions – longitudinal connectivity, refuge habitat, small-scale productivity (transport of nutrients and carbon)	
Start date	27/08/2023	08/10/2023	16/02/2024	20/06/2024
End date	26/9/2023	23/11/2023	29/5/2024	30/6/2024
Was this an agreed or interim action?	Agreed			

Name of environmental watering action	Event#1-PPM-LDR	Event#2-PPM-LDR	Event#3- PPM-LDR	Event#4- PPM-LDR
Delivery pathway	Residual held environmental water from the Lower Darling at Burtundy, recognised through to the South Australian border without regulation in Lake Victoria.			
Environmental site/s watered	Lower Darling in-channel delivery (via directed releases from Menindee Lakes when a shared resource).			
Total volume of water delivered (ML)	10,891 ML	14,023 ML	32,309 ML	2,274 ML
Accounting method used	When the Murray River is in regulated conditions, an incremental loss method will be applied to residual HEW from the Lower Darling recognised at Burtundy. When the Murray River is in unregulated conditions, no loss rate is to be applied to return flows recognised at Burtundy.			

Figure 10: All releases Lower Darling River at Weir 32 2023-2024



6.2.1.2 Water orders

Tables 27 to 29 provide an overview of the environmental water orders received for Prerequisite Policy Measures in the 2023–24 water year (including any order that was subsequently refused/rejected).

Further detail in Attachment A is provided as needed, including water orders and assumed use statements. If any water order using PPMs was refused, documentation and rationale supporting this decision is provided.

Table 27: Water orders received by WaterNSW in 2023–24 (excluding orders for Lower Darling EWA and North-South Connectivity Trial)- Event #1 Lower Darling River.

Order number	NSW 2023-2024 16/08/2023
Organisation submitting order	NSW-BCS
Date order was submitted	16/08/2023
Volume of order (ML)	12,250
Organisation delivering order	WaterNSW
Release date	19/08/2023
Form of water order submitted (e.g. Form A, email, verbal, other)	Email- PDF (PPM template)
List of supporting documents	D2024-125444 Lower Darling_Baaka Ewater order 16_Aug_2023

Table 28: Water orders received by WaterNSW in 2023–24 (excluding orders for Lower Darling EWA and North-South Connectivity Trial)- Event #2 Lower Darling River

Order number	NSW 2023-2024 05/10/2023	NSW 2023-2024 25/10/2023
Organisation submitting order	NSW-BCS	NSW-BCS
Date order was submitted	05/10/2023	25/10/2023
Volume of order (ML)	8,750	7,500
Organisation delivering order	WaterNSW	WaterNSW
Release date	07/10/2023	01/11/2023
Form of water order submitted (e.g. Form A, email, verbal, other)	Email- PDF (PPM template)	Email- word (PPM template)
List of supporting documents	D2024-125446 Lower Darling_Baaka Ewater order 05_Oct_2023	D2024-125448 Lower Darling_Baaka Ewater order 01_Nov_2023

Table 29: Water orders received by WaterNSW in 2023–24 (excluding orders for Lower Darling EWA and North-South Connectivity Trial)- Event #3 & #4- Lower Darling River

Order number	NSW 2023-2024 19/02/2024	NSW 2023-2024 09/05/2024
Organisation submitting order	NSW-BCS	NSW-BCS
Date order was submitted	19/02/2024	09/05/2024
Volume of order (ML)	21,162	40,487 (to completion of volume remaining on TLM licence)
Organisation delivering order	WaterNSW	WaterNSW
Release date	19/02/2024 (or when previous licence water ceases)	19/06/2024 to 01/07/2024
Form of water order submitted (e.g. Form A, email, verbal, other)	Email- PDF (PPM template)	Email- Word (PPM template)
List of supporting documents	D2024-125451 Lower Darling_Baaka Ewater instruction Q3V1 - 19 Feb 2024	D2024-125452 Lower Darling_Baaka Ewater instruction Q4V1 - 09 May 2024

6.2.1.3 Comparison of forecast and actual environmental water use

6.2.1.3.1 Event #1 – PPM Lower Darling River

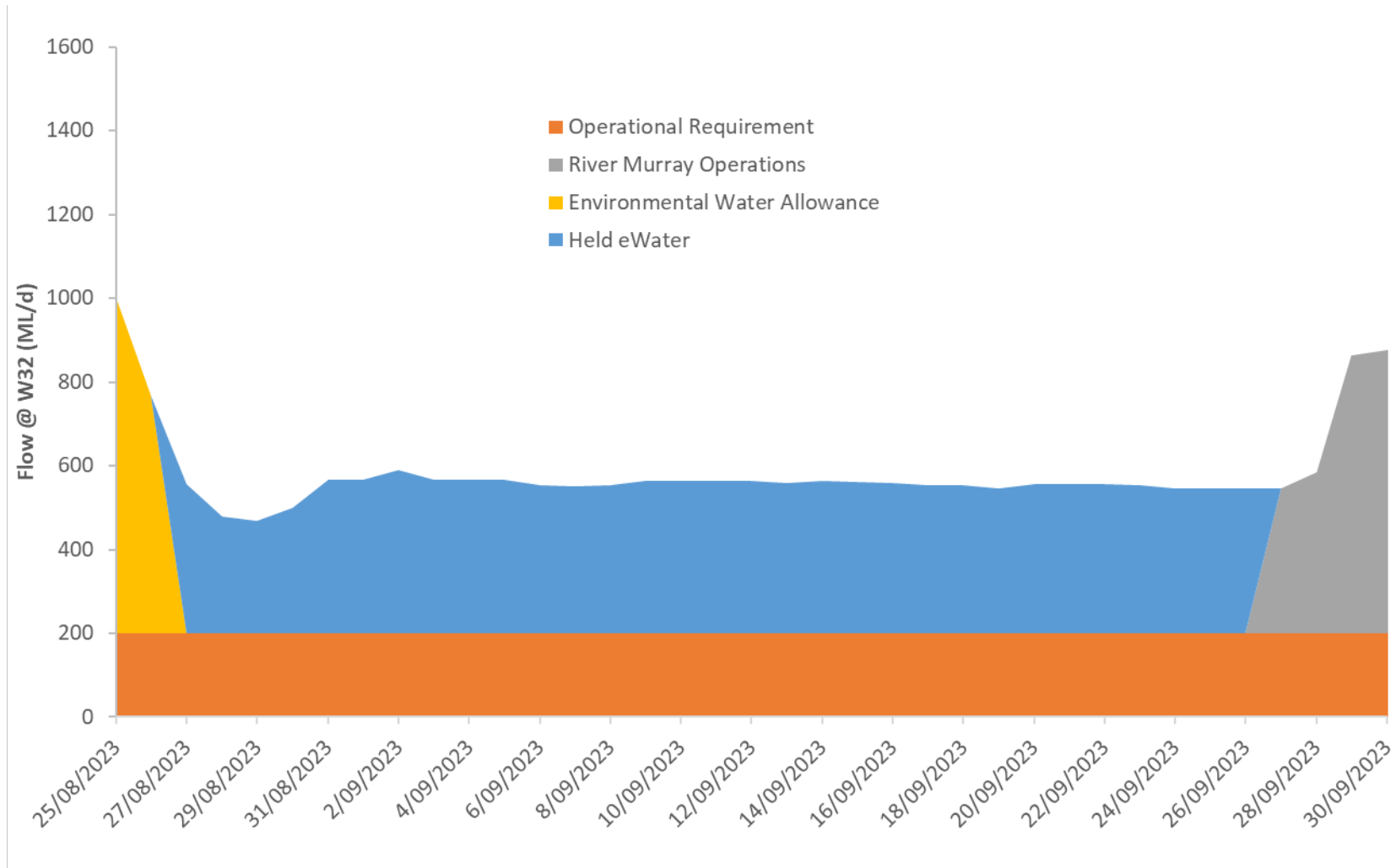
- Target daily flow rates and volumes
 - Averaging 550 ML/day at Weir 32 (baseflow 200 ML/d October) requiring 12,250 ML of environmental water.
- Actual daily flow rates and volumes
 - Averaging 551 ML/d at Weir 32 with an average of 351 ML/d environmental water, delivering 10,891 ML of environmental water (Figure 2).
- Forecast losses and actual losses (at an appropriate temporal scale for the event)
 - There were losses of 4,047 ML in the Lower Darling River from Weir 32 to Burtundy. Further losses of 46 ML were recognised in the Lower section of the Darling River and Murray River to the SA Border.
- Volume of environmental water debited (with corresponding licence numbers)
 - A total of 10,891 ML was debited from e-water licences.

Table 30: Comparison of forecast and actual environmental water use

Licence #	Order (ML)	Usage (ML)	Return flow (ML)
60AL582512	12,250	10,891	6,798

- Volume of water delivered from the Lower Darling to the Murray Valley that will be recognised as environmental water
 - 6,798 ML was delivered from the Lower Darling to Murray Valley, with the total volume being recognised at the SA Border.

Figure 11: Releases to Lower Darling River at Weir 32 during Event #1



6.2.1.3.2 Event #2 – PPM Lower Darling River

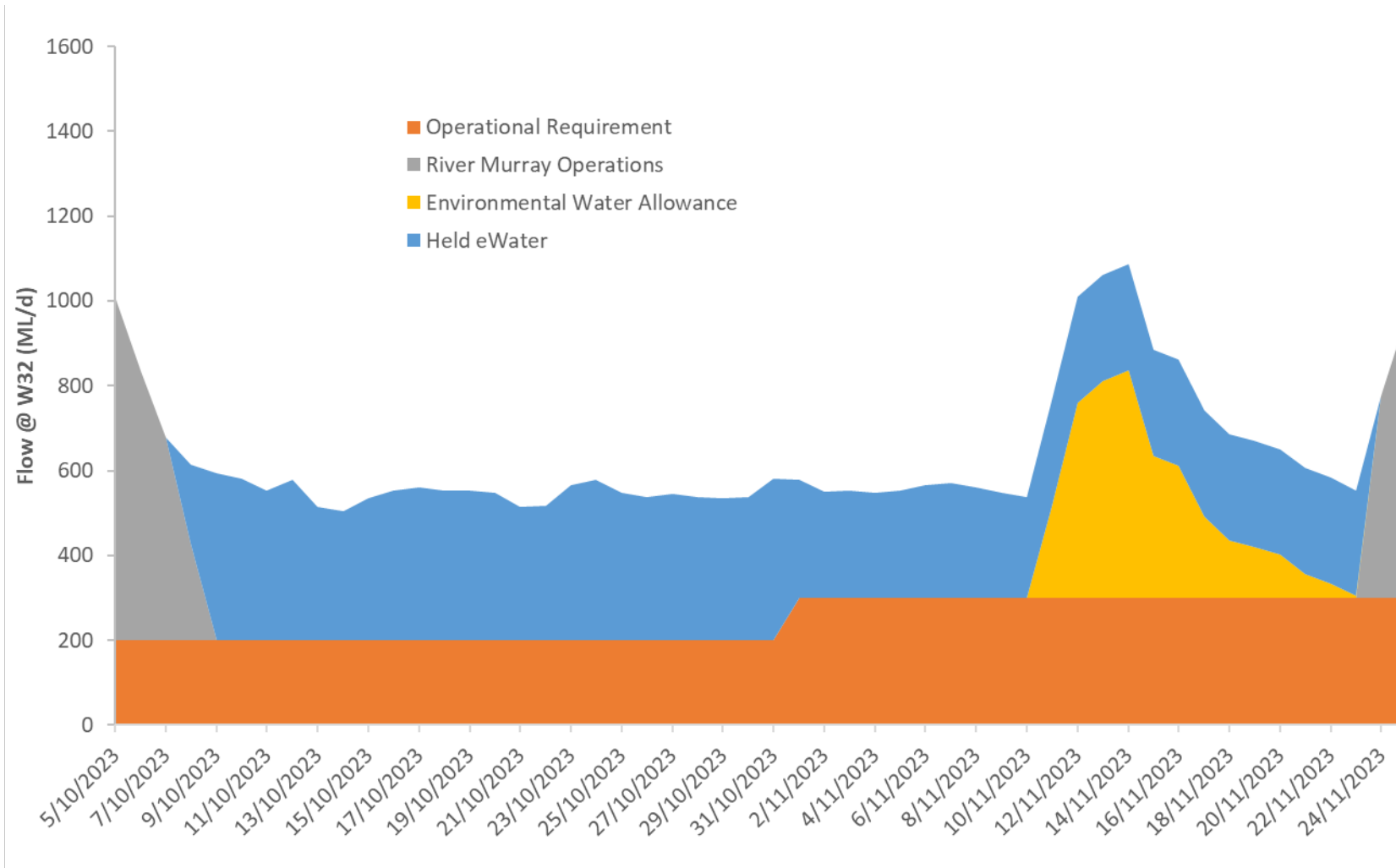
- Target daily flow rates and volumes
 - Averaging 550 ML/day at Weir 32 (baseflow 200 ML/d October, 300 ML/d November) requiring 16,250 ML of environmental water.
- Actual daily flow rates and volumes
 - Averaging 616 ML/d at Weir 32 (including a period where EWA was used on top of held environmental water and base flow), with an average of 362 ML/d environmental water, delivering 14,023 ML of environmental water (Figure 3).
- Forecast losses and actual losses (at an appropriate temporal scale for the event)
 - There were losses of 6,386 ML in the Lower Darling River from Weir 32 to Burtundy. Further losses of 44 ML were recognised to the Murray River.
- Volume of environmental water debited (with corresponding licence numbers)
 - A total of 14,023 ML was debited from e-water licences.

Table 31: Comparison of forecast and actual environmental water use

Licence #	Order (ML)	Usage (ML)	Return flow (ML)
60AL582512	16,250	14,023	7,593

- Volume of water delivered from the Lower Darling to the Murray Valley that will be recognised as environmental water
 - 7,593 ML was delivered from the Lower Darling to Murray Valley, with the total volume being recognised at the SA Border.

Figure 12: Releases to Lower Darling River at Weir 32 during Event #2.



6.2.1.3.3 Event #3 – PPM Lower Darling River

- Target daily flow rates and volumes
 - Targeting 400-1,500 ML/day at Weir 32 with environmental water component making up the difference between base flow and the required target (NOTING: “The specific day to day flow target and volumes delivered from each lake outlet that make up the weir 32 eflow target may change based on decisions made through the Menindee/Lower Darling Water Quality Working Group chaired by DCCEEW – Water.”) requiring a total volume of 21,162 ML (as per PPM instruction).
- Actual daily flow rates and volumes
 - Undertaken in line with directions provided by the Menindee/Lower Darling water quality working group chaired by DCCEEW – Water. Total volume used 32,309 ML (Figure 4).
- Forecast losses and actual losses (at an appropriate temporal scale for the event)
 - There were losses of 8,882 ML in the Lower Darling River from Weir 32 to Burtundy. Further losses of 1,548 ML were recognised to the Murray River.
- Volume of environmental water debited (with corresponding licence numbers)
 - A total of 32,309 ML was debited from e-water licences.

Table 32: Comparison of forecast and actual environmental water use

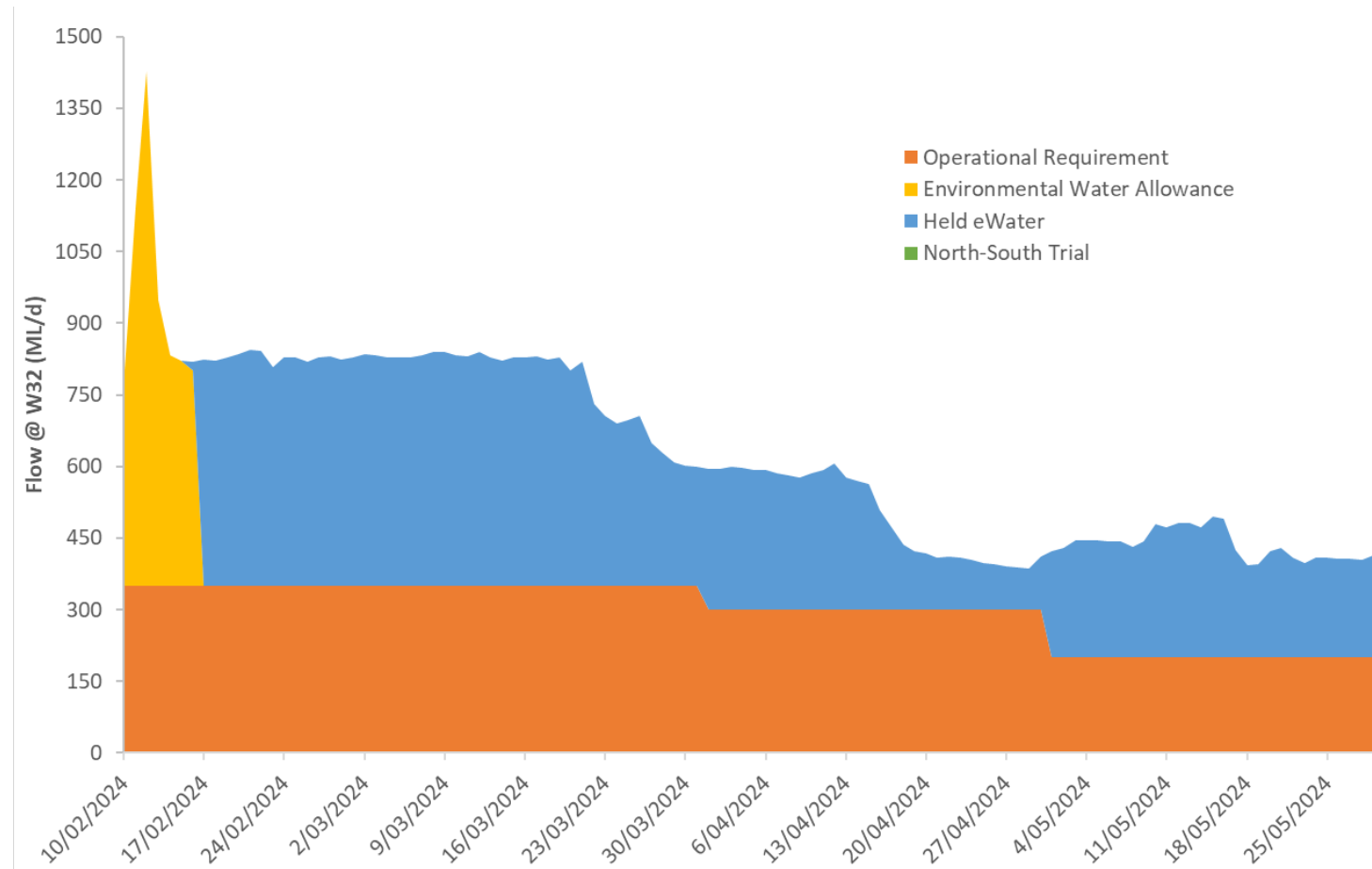
Licence #	Order (ML)	Usage (ML)	Return flow (ML)
60AL582512	21,162*	29,385	19,932
60AL583376	7,681	2,924	1,947
TOTAL	40,487 [#]	32,309	21,879

*Per PPM instructions; Use entire volume of TLM water available on 60AL582512 before switching to 60AL583376.

[#]As indicated in PPM instructions.

- Volume of water delivered from the Lower Darling to the Murray Valley that will be recognised as environmental water.
 - 21,879 ML was delivered to from the Lower Darling to Murray Valley, with the total volume being recognised at the SA Border.

Figure 13: Releases to Lower Darling River at Weir 32 during Event #3



6.2.1.3.4 Event #4 – PPM Lower Darling River

- Target daily flow rates and volumes
 - Targeting 400-1,500 ML/day at Weir 32 with environmental water component making up the difference between base flow and the required target (NOTING: “The specific day to day flow target and volumes delivered from each lake outlet that make up the weir 32 eflow target may change based on decisions made through the Menindee/Lower Darling Water Quality Working chaired by the Water Group.”) requiring a total volume of 40,487 ML (as per PPM instruction).
- Actual daily flow rates and volumes
 - Undertaken in line with directions provided by the Menindee/Lower Darling water quality working group chaired by DCCEEW – Water and NSW environmental water managers. Total volume used 2,274 ML (Figure 5).
- Forecast losses and actual losses (at an appropriate temporal scale for the event)
 - There were losses of 498 ML in the Lower Darling River from Weir 32 to Burtundy. Further losses of 86 ML were recognised to the Murray River. Losses physically occurred in 2024–25 water year due to travel times but were associated with the 2023–24 delivery.
- Volume of environmental water debited (with licence corresponding licence numbers)
 - A total of 2,274 ML was debited from e-water licences.

Table 33: Comparison of forecast and actual environmental water use

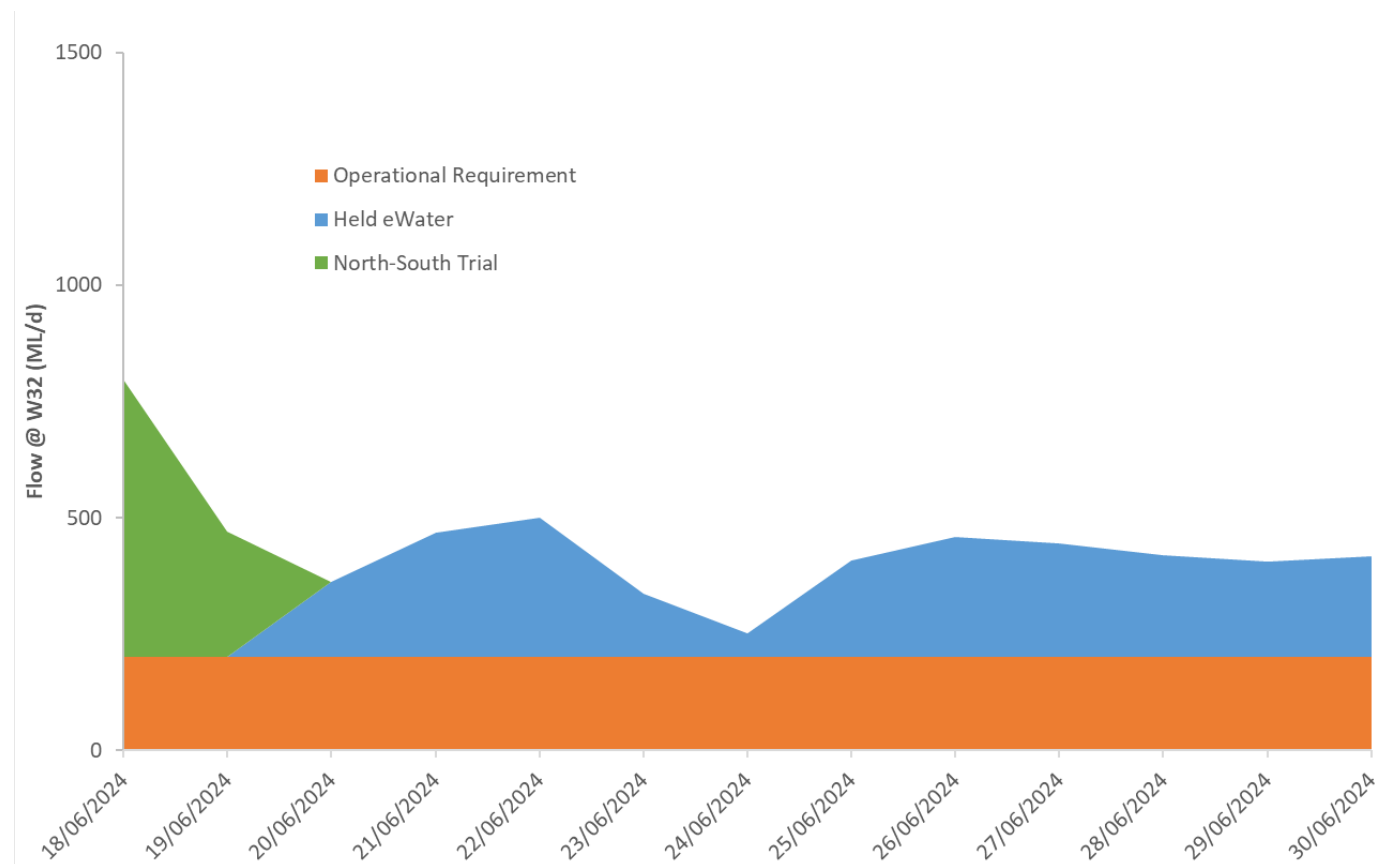
Licence #	Order (ML)	Usage (ML)	Return flow (ML)
60AL582512	54,600*	-	-
60AL583376	7,681	2,274	1,690
TOTAL	40,487 [#]	2,274	1,690

*Per PPM instructions; Use entire volume of TLM water available on 60AL582512 before switching to 60AL583376.

[#]As indicated in PPM instructions.

- Volume of water delivered from the Lower Darling to the Murray Valley that will be recognised as environmental water
 - 21,879* ML was delivered to from the Lower Darling to Murray Valley, with the total volume being recognised at the SA Border. All return flows physically occurred in the 2024–25 water year due to travel times but were associated with the 2023–24 release.
- * Confirmed with David Wood (WaterNSW) via email on 25 Feb 2025 that this value should read 1,690. It was copied and pasted in error as 21,879.

Figure 14: Releases to Lower Darling River at Weir 32 during Event #4.



6.2.1.4 Stakeholder consultation

Table 34 provides a summary of stakeholder consultation.

WaterNSW do not undertake stakeholder consultation as part of environmental water delivery. WaterNSW role is operational and is a key stakeholder of the environmental water holders. All stakeholder consultation regarding delivery of environmental water is undertaken by the environmental water holders.

Table 34: Summary of stakeholder consultation for e-watering events in Lower Darling for 2023–24

Date	Stakeholder forum/name	Environmental watering action/s discussed	Type of consultation (eg. Workshop, webinar, phonecall, letter, survey, public exhibition)	Summary of feedback	Stakeholder requests	List of supporting documents
Weekly / fortnightly online meetings	Lower Darling Water Quality Working Group- -NSW Department of Climate Change, Energy, the Environment and Water (multiple agencies) -NSW Fisheries -Local Councils -WaterNSW -EPA -CEWO -MDBA -DEW -Independent experts	Management of water and meeting environmental targets quality through operation releases.	Online meetings	Current river operations Water quality update Update on e-water use plans and critical ecological targets/water quality management. Confirmation of management actions	River ops and forecast update	Meeting minutes recorded

Date	Stakeholder forum/name	Environmental watering action/s discussed	Type of consultation (eg. Workshop, webinar, phonecall, letter, survey, public exhibition)	Summary of feedback	Stakeholder requests	List of supporting documents
Weekly	E-water catchup -NSW Department of Climate Change, Energy, the Environment and Water (e-water managers, e-water registrar) -Water NSW	E-water actions and retail accounting of e-water holdings	Online meetings	Water Accounting	Accounting updates	Per retail orders and watering instructions

6.2.1.5 Recommendations to improve future environmental watering actions

Table 35 provides a summary of key issues encountered in 2023–24 and recommendations for addressing these.

Table 35: Summary of issues and recommendations for Lower Darling e-watering events in 2023–24

Environmental watering action	Issue	Agencies involved	Stakeholders involved	Recommendations	List of supporting documents
All events	Water order process requires improvements with regards to detail and timeliness.	NSW DCCEEW	NSW DCCEEW, CEWO, TLM	PPM instructions and retail water ordering should provide all required detail and be in place well in advance of start of event.	N/A
All events	Internal management of licences/carryover etc. not conducive to ordering to the end of water year/commencing following year not smooth	NSW DCCEEW	NSW DCCEEW	Ordering and licence management of e-water accounts need to be improved at policy level (allow accounts to be finalise after the end of the water year). Retails orders against total licence volumes are placed with WaterNSW at the start of each year and debited against events, based on e-water Managers instructions (PPM) monthly. Moves to wholistic licence management.	N/A
All events	E-water planning	NSW DCCEEW	NSW DCCEEW, CEWO, TLM	Clear annual planning foresight required by e-water holders (under different scenarios) to provide operators an opportunity to look at long-term forecasting. Planning needs to be less reactive.	N/A

Attachments

Attachment A – Water orders

- D2024-125444 Lower Darling_Baaka Ewater order 16_Aug_2023
- D2024-125446 Lower Darling_Baaka Ewater order 05_Oct_2023
- D2024-125448 Lower Darling_Baaka Ewater order 01_Nov_2023
- D2024-125451 Lower Darling_Baaka Ewater instruction Q3V1 - 19 Feb 2024
- D2024-125452 Lower Darling_Baaka Ewater instruction Q4V1 - 09 May 2024

Attachment B – Assumed Use Statements and evidence of other calculations used

- D2024-125443 Lower Darling Flow 2023-24-FINAL
- D2024-125442 2024-25 RMS BULK & Daily Accounts End June 2024
- D2024-056934 FINAL Summary of Lower Darling eWater delivery 2023-24

6.2.2 Annual Environmental Release River Operations Report – Great Darling Anabranh 2023–24

This report was prepared by WaterNSW in accordance with the reporting requirements described under Section 5.1 of the Prerequisite Policy Measures Procedures Manual for the Murrumbidgee Regulated River and the Prerequisite Policy Measures Procedures Manual for the NSW Murray and Lower Darling Regulated Rivers.

Table 36: WaterNSW's Great Darling Anabranh Annual Environmental River Operations Report 2023–24 approvals

Report prepared by	David Wood	Report approved by	Jonathan Belej
Position	Water Planning and Delivery Specialist South	Position	Manager Water Planning and Delivery South
Contact number	0429310422	Contact number	0436950529
Date prepared	26/07/2024	Date approved	11/11/2023

6.2.2.1 Environmental watering actions

Table 37 provides an overview of the environmental water actions undertaken using PPMs in the 2023–24 water year.

Table 37: Summary of PPM watering actions in 2023–24 for GDA

Name of environmental watering action	Event#1-PPM-GDA	Event#2-PPM-GDA	Event#3- PPM-GDA
River system	Great Darling Anabranh		
Type of PPM event	Directed releases from Cawndilla Lake via the Great Darling Anabranh		
General description of watering action	The objective is to deliver flows in the Great Darling Anabranh to provide the following ecological outcomes as described in the NSW Murray-Lower Darling Long-term Environmental Watering Plan (LTWP) for the 'Redbank and Tandou Creeks' and 'Darling Anabranh' reaches (LTWP Planning Units 18 & 19 respectively): • native fish: recruitment and dispersal of flow pulse specialists • native Vegetation: non-woody, fringing river red gum, black box and lignum • ecosystem functions: longitudinal connectivity, refuge and productivity • waterbirds: habitat and potential breeding.		
Start date	01/07/2023	11/01/2024	20/06/2024
End date	06/12/2023	23/02/2024	30/06/2024
Was this an agreed or interim action?	Agreed		
Delivery pathway	Menindee Lakes downstream to South Australian border, via the Great Darling Anabranh.		
Environmental site/s watered	Great Darling Anabranh (via directed releases from Lake Cawndilla when a shared resources).		

Name of environmental watering action	Event#1-PPM-GDA	Event#2-PPM-GDA	Event#3- PPM-GDA
Total volume of water delivered (ML)	31,651 ML	16,618 ML	2,354 ML
Accounting method used	i. after adjusting for travel time, when the daily average flow passing the Tara Downs gauge (425054) is equal to or exceeds releases, no losses are to be applied and the full volume of the environmental debit is recognised at the South Australian border, ii. after adjusting for travel time, when the daily average flow passing Tara Downs is less than releases, the flow at Tara Downs is reduced by a loss value and recognised at the South Australian border. The loss value applied is equivalent to the proportional daily loss that occurred between the Bulpunga gauge (425011) and Tara Downs iii. after adjusting for travel time, when flows at Tara Downs reach 0 ML/day, no return flows are to be recognised.		

6.2.2.2 Water orders

Table 38 provides an overview of the environmental water orders received for Prerequisite Policy Measures in the 2023–24 water year (including any order that was subsequently refused/rejected).

Further detail is provided in Attachment A as needed, including water orders and assumed use statements. If any water order using PPMs was refused, documentation and rationale supporting this decision are provided.

Table 38: Water orders received by WaterNSW in 2023–24 – Event #1 GDA

Order number	NSW 2023-2024 19/07/2023	NSW 2023-2024 18/09/2023	NSW 2023-2024 28/09/2023	NSW 2023-2024 10/10/2023	NSW 2023-2024 24/10/2023	NSW 2023-2024 22/11/2023
Organisation submitting order	NSW-BCS	NSW-BCS	NSW-BCS	NSW-BCS	NSW-BCS	NSW-BCS
Date order was submitted	19/07/2023	18/09/2023	28/09/2023	10/10/2023	24/10/2023	22/11/2023
Volume of order (ML)	3,000	9,100	11,800	18,700	26,750	35,500
Organisation delivering order	WaterNSW	WaterNSW	WaterNSW	WaterNSW	WaterNSW	WaterNSW
Release date	1/07/2023	1/07/2023	1/07/2023	1/07/2023	1/07/2023	1/07/2023
Form of water order submitted (e.g. Form A, email, verbal, other)	Email- word document (PPM template)	Email- PDF (PPM template)	Email- PDF (PPM template)	Email- Word (PPM template)	Email- Word (PPM template)	Email- Word (PPM template)

Order number	NSW 2023-2024 19/07/2023	NSW 2023-2024 18/09/2023	NSW 2023-2024 28/09/2023	NSW 2023-2024 10/10/2023	NSW 2023-2024 24/10/2023	NSW 2023-2024 22/11/2023
List of supporting documents	D2024-124882 Great Darling Anabranh Ewater order 19_July_2023 v1.0	D2024-124883 Great Darling Anabranh Ewater instruction 18_September_202 3 v1.0	D2024-124884 Great Darling Anabranh Ewater instruction 28_September_20 23 v1.0	D2024-124885 Great Darling Anabranh Ewater instruction 10 October 2023	D2024-124886 Great Darling Anabranh Ewater instruction 24 October 2023	D2024-124888 Great Darling Anabranh Ewater instruction 22 November 2023

Table 39: Water orders received by WaterNSW in 2023–24 – Event #2 GDA

Order number	NSW 2023-2024 18/01/2024
Organisation submitting order	NSW-BCS
Date order was submitted	18/01/2024
Volume of order (ML)	20,000
Organisation delivering order	WaterNSW
Release date	11/01/2024
Form of water order submitted (e.g. Form A, email, verbal, other)	Email- word document (PPM template)
List of supporting documents	D2024-124890 Great Darling Anabranh – Amended Environmental Water use instructions 18 January 2024

Table 40: Water orders received by WaterNSW in 2023–24 – Event #3- PPM GDA

Order number	NSW 2023-2024 18/06/2024
Organisation submitting order	NSW-BCS
Date order was submitted	18/06/2024
Volume of order (ML)	2,400
Organisation delivering order	WaterNSW
Release date	19/06/2024
Form of water order submitted (e.g. Form A, email, verbal, other)	Email- word document (PPM template)
List of supporting documents	D2024-124891 Great Darling Anabranh – Amended Environmental Water use instructions 18 June 2024

6.2.2.3 Comparison of forecast and actual environmental water use

6.2.2.3.1 Event #1 – PPM Great Darling Anabranh

- Target daily flow rates and volumes
 - 1 July to 3 August = 50 ML/day (total of 1,700 ML)
 - 4 August to 14 September = 100 ML/day (total of 4,200 ML)
 - 15 to 30 September = 200 ML/day (total of 3,200 ML)
 - 1 to 3 October = 250 ML/day; 4 to 6 October = 300 ML/day; 7 to 9 October = 350 ML/day (total of 2,700 ML)
 - 10 to 17 October = 250 ML/day (total of 2,000 ML)
 - 18 to 31 October = 350 ML/day (total of 4,900 ML)
 - 1 to 23 November = 350 ML/day (total of 8,050 ML)
 - 24 November to 17 December = 350 ML/day (Total 8,750 ML)
- Actual daily flow rates and volumes (Figure 1)
 - 1 July to 3 August = 48 ML/day (total of 1,621 ML)
 - 4 August to 14 September = 103 ML/day (total of 4,327 ML)
 - 15 to 30 September = 196 ML/day (total of 3,141 ML)
 - 1 to 3 October = 237 ML/day; 4 to 6 October = 252 ML/day; 7 to 9 October = 256 ML/day (total of 2,237 ML)
 - 10 to 17 October = 255 ML/day (total of 2,037 ML)
 - 18 to 31 October = 342 ML/day (total of 4,781 ML)
 - 1 to 23 November = 346 ML/day (total of 7,967 ML)
 - 24 November to 17 December = 326 ML/day (Total 5,540 ML) – Note: event ceased 10 December 2023

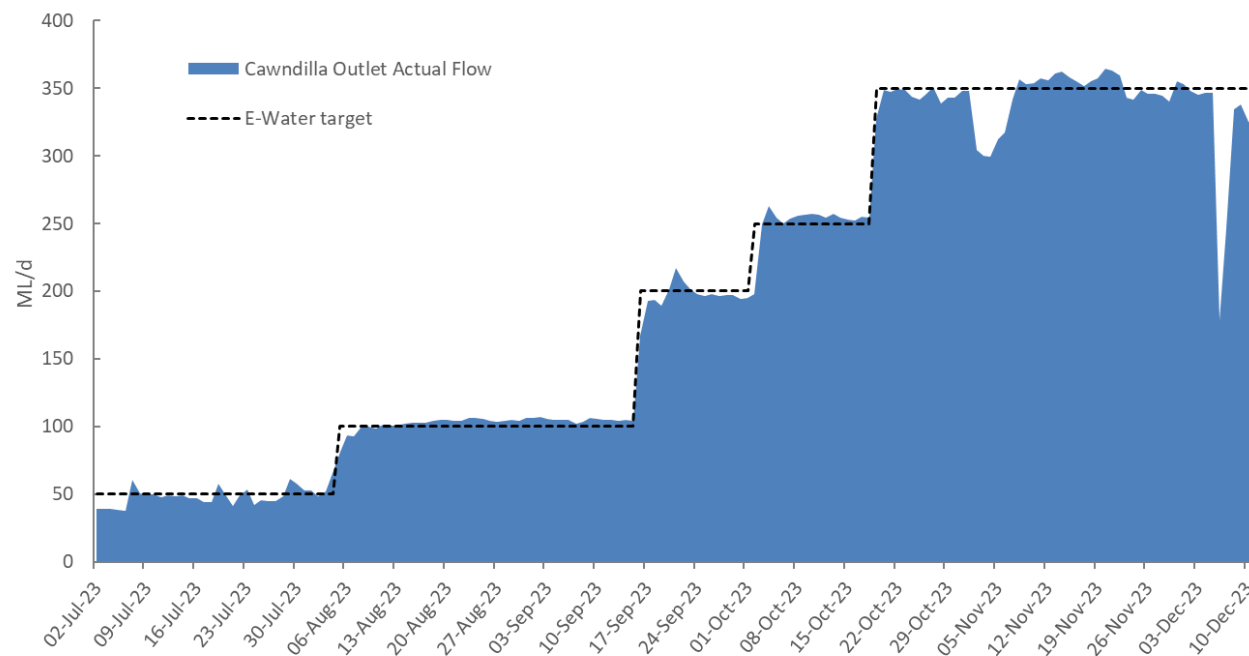
- Forecast losses and actual losses (at an appropriate temporal scale for the event)
 - There were losses of 567 ML in the Great Darling Anabranh for this event.
- Volume of environmental water debited (with corresponding licence numbers)
 - A total of 31,651 ML was debited from e-water licences.

Table 41: Comparison of forecast and actual environmental water use

Licence #	Order (ML)	Usage (ML)	Return flow (ML)
60AL583376	35,500	31,651	31,084

- Volume of water delivered from the Great Darling Anabranh to the Murray Valley that will be recognised as environmental water
 - 31,084 ML was delivered from the Great Darling Anabranh to the Murray Valley, with the total volume being recognised at the SA Border.

Figure 15: Environmental flows from Lake Cawndilla associated with Event #1



6.2.2.3.2 Event #2 – PPM Great Darling Anabranh

- Target daily flow rates and volumes
 - Averaging 400 ML/day until total volume exhausted (20,000 ML)
- Actual daily flow rates and volumes
 - Averaging 398 ML/d (total of 16,618 ML) (Figure 2)
- Forecast losses and actual losses (at an appropriate temporal scale for the event)
 - There were losses of 12,132 ML in the Great Darling Anabranh for Event #2.

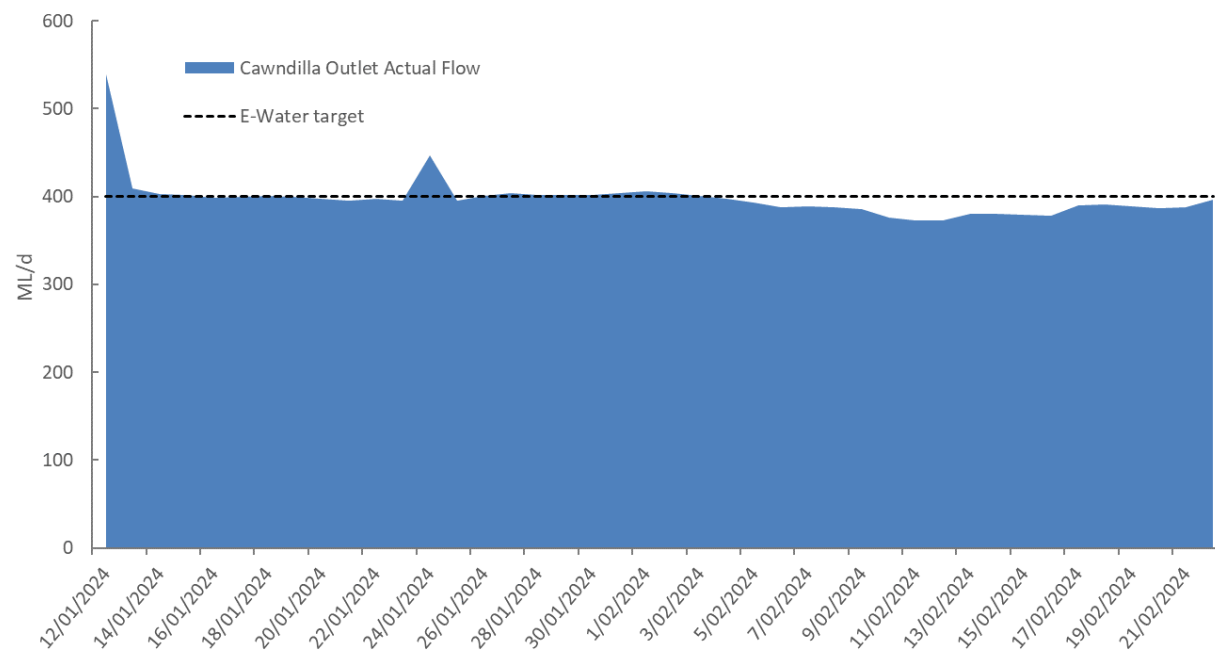
- Volume of environmental water debited (with corresponding licence numbers)
 - A total of 16,618 ML was debited from e-water licences.

Table 42: Comparison of forecast and actual environmental water use

Licence #	Order (ML)	Usage (ML)	Return flow (ML)
60AL583376	20,000	16,618	4,486

- Volume of water delivered from the Great Darling Anabranch to the Murray Valley that will be recognised as environmental water
 - 4,486 ML was delivered from the Great Darling Anabranch to the Murray Valley, with the total volume being recognised at the SA Border.

Figure 16: Environmental flows from Lake Cawndilla associated with Event #2



6.2.2.3.3 Event #3- PPM Great Darling Anabranh

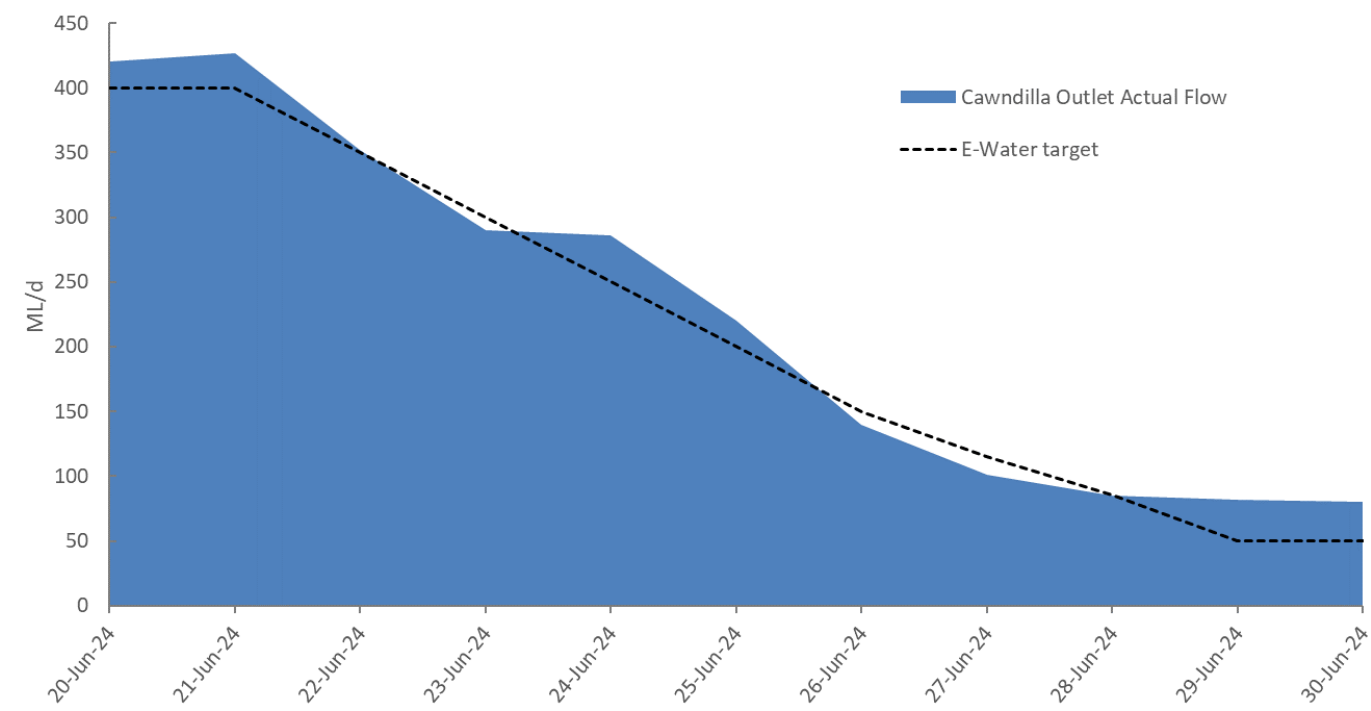
- Target daily flow rates and volumes
 - Target 400 ML, with drawdown over 8 days and maintain at 50 ML.
- Actual daily flow rates and volumes
 - Target flows and associated drawdown against planned hydrograph shown in Figure 13.
- Forecast losses and actual losses (at an appropriate temporal scale for the event)
 - There were losses of 829 ML in the Great Darling Anabranh for Event #3. Due to travel time, losses associated with this delivery occurred in 2024–25 (but are reported here to be consistent with the appropriate delivery year).
- Volume of environmental water debited (with corresponding licence numbers)
 - A total of 2,354 ML was debited from e-water licences.

Table 43: Comparison of forecast and actual environmental water use

Licence #	Order (ML)	Usage (ML)	Return flow (ML)
60AL583376	2,400	2,354	1,525

- Volume of water delivered from the Great Darling Anabranh to the Murray Valley that will be recognised as environmental water.
 - 1,525 ML was delivered from the Great Darling Anabranh to the Murray Valley, with the total volume being recognised at the SA Border. Due to travel time, all return flow associated with this delivery occurred in 2024–25 (but are reported here to be consistent with the appropriate delivery year).

Figure 17: Environmental flows from Lake Cawndilla associated with Event #3



6.2.2.4 Stakeholder consultation

Table 44 provides a summary of stakeholder consultation.

WaterNSW do not undertake stakeholder consultation as part of environmental water delivery. WaterNSW role is operational and is a key stakeholder of the environmental water holders. All stakeholder consultation regarding delivery of environmental water is undertaken by the environmental water holders.

Table 44: Summary of stakeholder consultation for GDA e-watering events in 2023–24

Date	Stakeholder forum/name	Environmental watering action/s discussed	Type of consultation (eg. Workshop, webinar, phonecall, letter, survey, public exhibition)	Summary of feedback	Stakeholder requests	List of supporting documents
Weekly	E-water catchup - NSW Department of Climate Change, Energy, the Environment and Water (e-water managers, e-water registrar) - Water NSW	E-water actions and retail accounting of e-water holdings	Online meetings	Water Accounting	Accounting updates	Per retail orders and watering instructions

6.2.2.5 Recommendations to improve future environmental watering actions

Table 45 provides a summary of key issues encountered in 2023–24 and recommendations for addressing these.

Table 45: Summary of issues and recommendations

Environmental watering action	Issue	Agencies involved	Stakeholders involved	Recommendations	List of supporting documents
All events	Water order process requires improvements with regards to detail and timeliness.	NSW DCCEEW	NSW DCCEEW, CEWO, TLM	PPM instructions and retail water ordering should provide all required detail and be in place well in advance of start of event.	N/A
All events	Internal management of licences/carryover etc. not conducive to ordering to the end of water year/commencing following year not smooth	NSW DCCEEW	NSW DCCEEW	- Ordering and licence management of e-water accounts need to be improved (should be made possible to finalise after the end of the water year). - Retails orders against total licence volumes are placed with WaterNSW at the start of each year and debited against events, based on e-water Managers instructions (PPM) monthly. This relieves the need to make frequent retail orders. Moves to wholistic licence management.	N/A
All events	E-water planning	NSW DCCEEW	NSW DCCEEW, CEWO, TLM	Clear annual planning foresight required by e-water holders (under different scenarios) to provide operators an opportunity to look at long-term forecasting. Planning needs to be less reactive.	N/A

Attachments

Attachment A – Water orders

- D2024-124882 Great Darling Anabranh Ewater order 19_July_2023 v1.0
- D2024-124883 Great Darling Anabranh Ewater instruction 18_September_2023 v1.0
- D2024-124884 Great Darling Anabranh Ewater instruction 28_September_2023 v1.0
- D2024-124885 Great Darling Anabranh Ewater instruction 10 October 2023
- D2024-124886 Great Darling Anabranh Ewater instruction 24 October 2023
- D2024-124888 Great Darling Anabranh Ewater instruction 22 November 2023
- D2024-124889 Great Darling Anabranh Environmental Water use instruction - 4 December 2023_MDBA call on water ewater cover
- D2024-124890 Great Darling Anabranh – Amended Environmental Water use instructions 18 January 2024
- D2024-124891 Great Darling Anabranh – Amended Environmental Water use instructions 18 June 2024

Attachment B – Assumed Use Statements and evidence of other calculations used

- D2024-124893 GDA Releases - Assessed usage 2023-24 - FINAL.xlsx
- D2024-056934 FINAL Summary of Lower Darling eWater delivery 2023-24

6.2.3 Annual Environmental Release River Operations Report – Hume Multi-site events 2023–24

This report was prepared by WaterNSW in accordance with the reporting requirements described under Section 5.1 of the Prerequisite Policy Measures Procedures Manual for the Murrumbidgee Regulated River and the Prerequisite Policy Measures Procedures Manual for the NSW Murray and Lower Darling Regulated Rivers.

Table 46: WaterNSW's Hume Multi-site events 2023–24 Annual Environmental River Operations Report approvals

Report prepared by	David Wood	Report approved by	Jonathan Belej
Position	Water Planning and Delivery Specialist South	Position	Manager Water Planning and Delivery South
Contact number	0429310422	Contact number	0436950529
Date prepared	06/11/2023	Date approved	11/11/2023

6.2.3.1 Environmental watering actions

Table 47 provides an overview of the environmental water actions undertaken using PPMs in the 2023–24 water year.

Table 47: Summary of PPM watering actions in 2023–24 for Hume Multi-site

Name of environmental watering action	Event#1-PPM- Hume Multisite	Event#2-PPM- Hume Multisite	Event#3-PPM- Hume Multisite	Event#4-PPM- Hume Multisite	Event#5-PPM- Hume Multisite
River system	Murray River				
Type of PPM event	Directed releases from Hume Dam; Assumed use for directed releases from Hume Dam				
General description of watering action	The objective is to deliver flows in the Murray River at Doctors Point and downstream of Yarrawonga Weir to provide the following ecological outcomes as described in the NSW Murray-Lower Darling Long-term Environmental Watering Plan for the Hume to Yarrawonga and Yarrawonga to Barmah reach (and Edward-Wakool): • native fish: dispersal / condition (all species), pre-spawning, condition (flow pulse specialists) • ecosystem functions through longitudinal connectivity along the Murray, and Edward-Wakool: connectivity with low lying wetlands, hydraulic diversity and productivity and transport of nutrients and carbon • native vegetation: in-channel woody and non-woody, wetland vegetation and low-level river red gum condition.			The objective is to deliver specific flows in the Murray River downstream of Yarrawonga Weir to provide the ecological outcomes for native fish – dispersal / condition (all species), pre-spawning, condition (flow pulse specialists), as described in the NSW Murray-Lower Darling Long-term Environmental Watering Plan for the Hume to Yarrawonga and Yarrawonga to Barmah reach (and Edward-Wakool).	
Start date	14/08/2023	02/09/2023	13/10/2023	30/04/2024	14/06/2024
End date	15/08/2023	29/09/2023	02/12/2023	16/05/2024	30/06/2024
Was this an agreed or interim action?	Agreed				
Delivery pathway	Hume Dam to Murray River				

Name of environmental watering action	Event#1-PPM- Hume Multisite	Event#2-PPM- Hume Multisite	Event#3-PPM- Hume Multisite	Event#4-PPM- Hume Multisite	Event#5-PPM- Hume Multisite
Environmental site/s watered	Murray River and tributaries, Millewa Forest			Murray River and tributaries	
Total volume of water delivered (ML)	400 ML	58,964 ML	148,597 ML	28,497 ML	18,440 ML
Accounting method used	Accounting arrangements for environmental water releases from Hume Dam to meet flow targets at Doctors Point and downstream from Yarrawonga Weir will be as per the specific objectives and outcomes as described in the Objectives and Outcomes for River Operations in the River Murray System as published on the MDBA website. • 2.4 Directed releases from Hume Dam • 2.5 Assumed use for directed releases of held environmental water from Hume Any change to the sequence of environmental water product/s used will be made through an email request from the Water Group. It is acknowledged that new water accounting arrangements for directed releases from Hume Dam following airspace management were agreed at WLWG in September 2021 and are now in effect.				

6.2.3.2 Water orders

Table 48 provides an overview of the environmental water orders received for Prerequisite Policy Measures in the 2023–24 water year (including any order that was subsequently refused/rejected).

Further detail is provided in Attachment A as needed, including water orders and assumed use statements. If any water order using PPMs was refused, documentation and rationale supporting this decision is provided.

Table 48: Water orders received by WaterNSW in 2023–24 (excluding orders for MAA and BM-EWA) – Events #1-3 Hume Multisite

Order number	Q 1 – V 1 DPE EHG Ref: DDOC23/662323	Q 1 – V 2 DPE EHG Ref: DDOC23/766335	Q 2 – V 1 DPE EHG Ref: DDOC23/824737	Q 2 – V 2 DPE EHG Ref: DDOC23/975345
Organisation submitting order	NSW DCCEEW (Formally DPE EHG)	NSW DCCEEW (Formally DPE EHG)	NSW DCCEEW (Formally DPE EHG)	NSW DCCEEW (Formally DPE EHG)
Date order was submitted	01/08/2023	30/08/2023	15/09/2023	07/11/2023
Volume of order (ML)	100,000 (BMA)	150,000 (CEW) 30,000 (TLM)	150,000 (CEW) 30,000 (TLM)	137,509 (CEW) 18,127 (TLM)
Organisation delivering order	MDBA	MDBA	MDBA	MDBA
Release date	1 July 2023 – 30 September 2023	1 July 2023 – 30 September 2023	1 September 2023 – 31 December 2023	1 September 2023 – 31 December 2023
Form of water order submitted (e.g. Form A, email, verbal, other)	Email – PPM template as PDF document	Email – PPM template as PDF document	Email – PPM template as PDF document	Email – PPM template as PDF document
List of supporting documents	D2024-125508 Water Order_NSW Murray Multi Site 2023-24_Q1V1	D2024-125509 Water Order_NSW Murray Multi Site 2023-24_Q1V2	D2024-125510 NSW Watering Instructions _Murray River Multi Site 2023-24_Q2V1	D2024-125512 NSW Water Order Instructions - Murray River Multi-Site 2023- 24_Q2V2

Table 49: Water orders received by WaterNSW in 2023–24 (excluding orders for MAA and BM-EWA) – Events #4-5 Hume Multisite

Order number	Q 4 – V 2 NSW DCCEEW Ref: DDOC24/241681	Q 4 – V 2 NSW DCCEEW Ref: DDOC24/241681	Q 4 – V 3 NSW DCCEEW Ref: DDOC24/241681	Q 4 – V 4 NSW DCCEEW Ref: DDOC24/458969	Q 4 – V 5 NSW DCCEEW Ref: DDOC24/483612	Q 4 – V 6 NSW DCCEEW Ref: N/A
Organisation submitting order	DCCEEW BCSG	DCCEEW BCSG	DCCEEW BCSG	DCCEEW BCSG	DCCEEW BCSG	DCCEEW BCSG
Date order was submitted	28/03/2023	10/05/2023	13/05/2024	13/06/2024	21/06/2024	28/06/2024
Volume of order (ML)	19,500 (RMIF)	30,000 (CEW) 19,500 (RMIF)	30,000 (CEW) 19,500 (RMIF)	11,500 (CEW) 9,500 (RMIF)	1,000 (CEW) 9,500 (RMIF)	1,000 (CEW) 9,500 (RMIF) 8,000 (TLM)
Organisation delivering order	MDBA	MDBA	MDBA	MDBA	MDBA	MDBA
Release date	1 April 2024 – 30 June 2024	1 April 2024 – 30 June 2024	1 April 2024 – 30 June 2024	1 April 2024 – 30 June 2024	1 April 2024 – 30 June 2024	1 April 2024 – 30 June 2024
Form of water order submitted (e.g. Form A, email, verbal, other)	Email- PPM template as Word document	Email- PPM template as Word document	Email- PPM template as Word document	Email- PPM template as Word document	Email- PPM template as Word document	Email- PPM template as Word document
List of supporting documents	D2024-125514 NSW Water Order Instructions_Murray River Winter Flow_April-June 2024_Q4 V1	D2024-125515 NSW Water Order Instructions_Murray River Winter Flow_April-June 2024 version_2	D2024-125516 NSW Water Order Instructions_Murray River Winter Flow_April-June 2024 version_3	D2024-125517 NSW Watering Instructions_Murray River Winter Flow_April-June 2024 version_4	D2024-125519 NSW Water Order Instructions_Murray River Winter Flow_April-June 2024 version_5	D2024-125521 NSW Watering Instructions_Murray River Winter Flow - April-June 2024 - Version 6

6.2.3.3 Comparison of forecast and actual environmental water use

6.2.3.3.1 Events #1-3 – PPM Hume Multi-site

- Target daily flow rates and volumes
 - Target a flow rate equivalent of 3.0m at the Tocumwal gauge unless specified otherwise, with 1,000 ML/d downwards variability (at MDBA RMO discretion) in the flow rate provided to allow flexibility for operational decisions, using up to 335,636 ML.
- Actual daily flow rates and volumes
 - See Figure 1. Note: figure data represents flow and e-water component at Yarrawonga (instruction target site). It does not reflect the event dates and usage figures which are taken from Hume releases (accounting as per PPM).
- Forecast losses and actual losses (at an appropriate temporal scale for the event)
 - There were losses of 34,369 ML in the Murray Valley from Hume to the SA Border.
- Volume of environmental water debited (with corresponding licence numbers)
 - A total of 207,961 ML was debited from e-water licences.

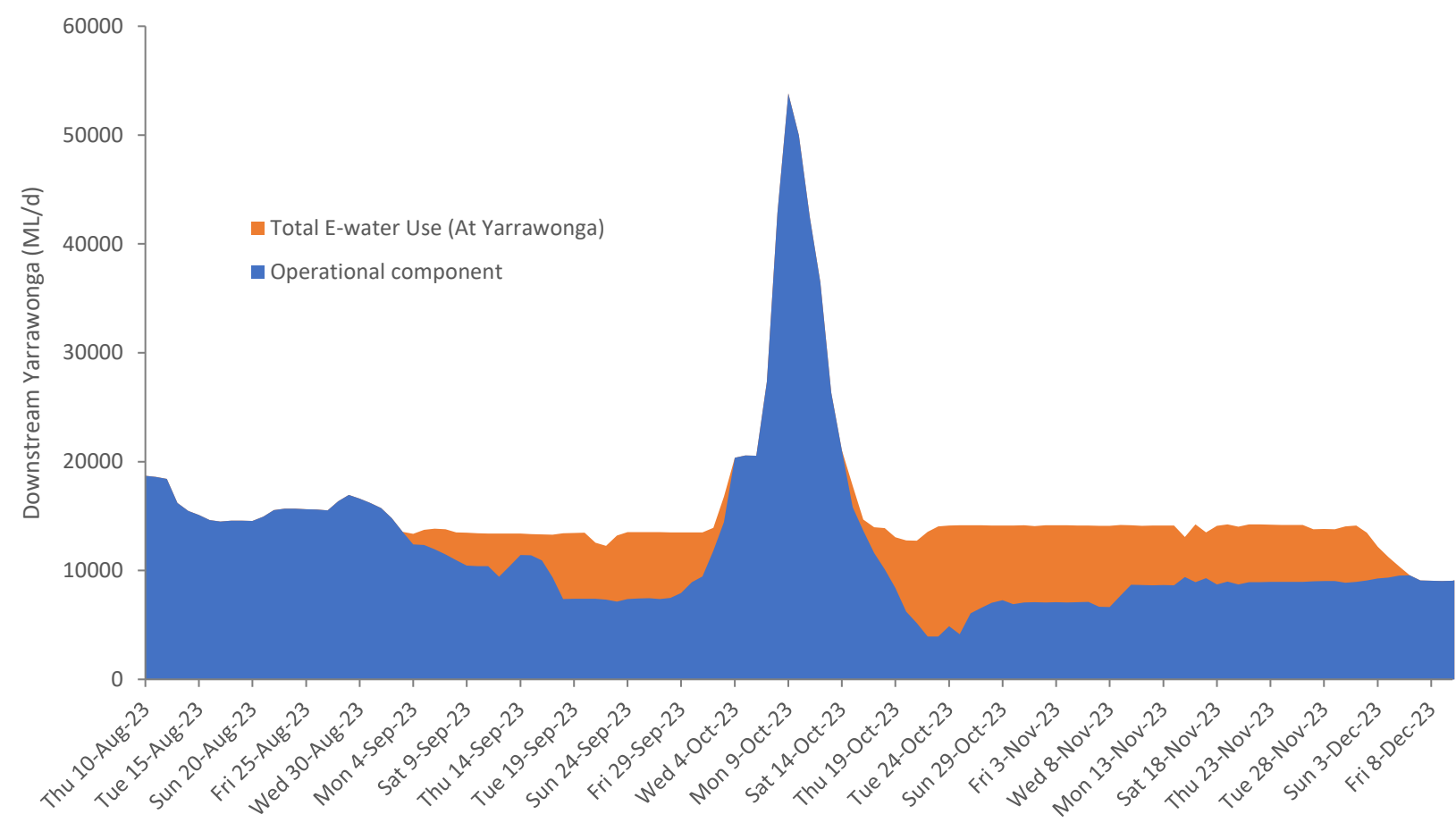
Table 50: Comparison of forecast and actual environmental water use

Licence #	Order (ML)	Usage (ML)	Return flow (ML)*
50AL507293	48,127	30,000	14,746
50AL513824	287,509	177,961	158,846
TOTAL	335,636	207,961	173,592

* Return flows associated with specific licences are estimated at the bulk level based on the distribution of percent of usage. It does not account for travel time between “usage” and “return flow” when determining proportions. This unlikely reflect actual return flow per licence. This method has been discussed with CEW as the best current solution with the tools available.

- Volume of water delivered to the Murray Valley that will be recognised as environmental water.
 - 173,592 ML was delivered to the Murray Valley with the total volume being recognised at the SA Border.

Figure 18: Flow downstream of Yarrawonga as part of Hume Multisite environmental delivery 2023–34; Events 1-3



6.2.3.3.2 Event #4 & #5 – PPM Hume Multi-site

- Target daily flow rates and volumes
 - On the recession from operational flows to a winter base flow, draw down flows at a rate of 1,000 ML/day and hold at 4,000 ML/day until 30 June 2024. (Hold between 3,000 and 4,000 ML/day from 13 June to the 30 June 2024.) This flow can vary upwards to 4,500 ML/day.
- Actual daily flow rates and volumes
 - See Figure 2. NOTE: Figure data represents flow and e-water component at Yarrawonga (instruction target site). It does not reflect the event dates and usage figures which are taken from Hume releases (accounting as per PPM).
- Forecast losses and actual losses (at an appropriate temporal scale for the event)
 - There were losses of 8,440 ML in the Murray Valley from Hume to the SA Border.
- Volume of environmental water debited (with corresponding licence numbers)
 - A total of 46,937 ML was debited from e-water licences.

Table 51: Comparison of forecast and actual environmental water use

Licence #	Order (ML)	Usage (ML) [^]	Return flow (ML)*
50AL513824	19,497	19,497	17,129
50AL507293	8,000	7,940	11,368
RMIF	19,500	19,500	10,000
TOTAL	46,997	46,937	38,497

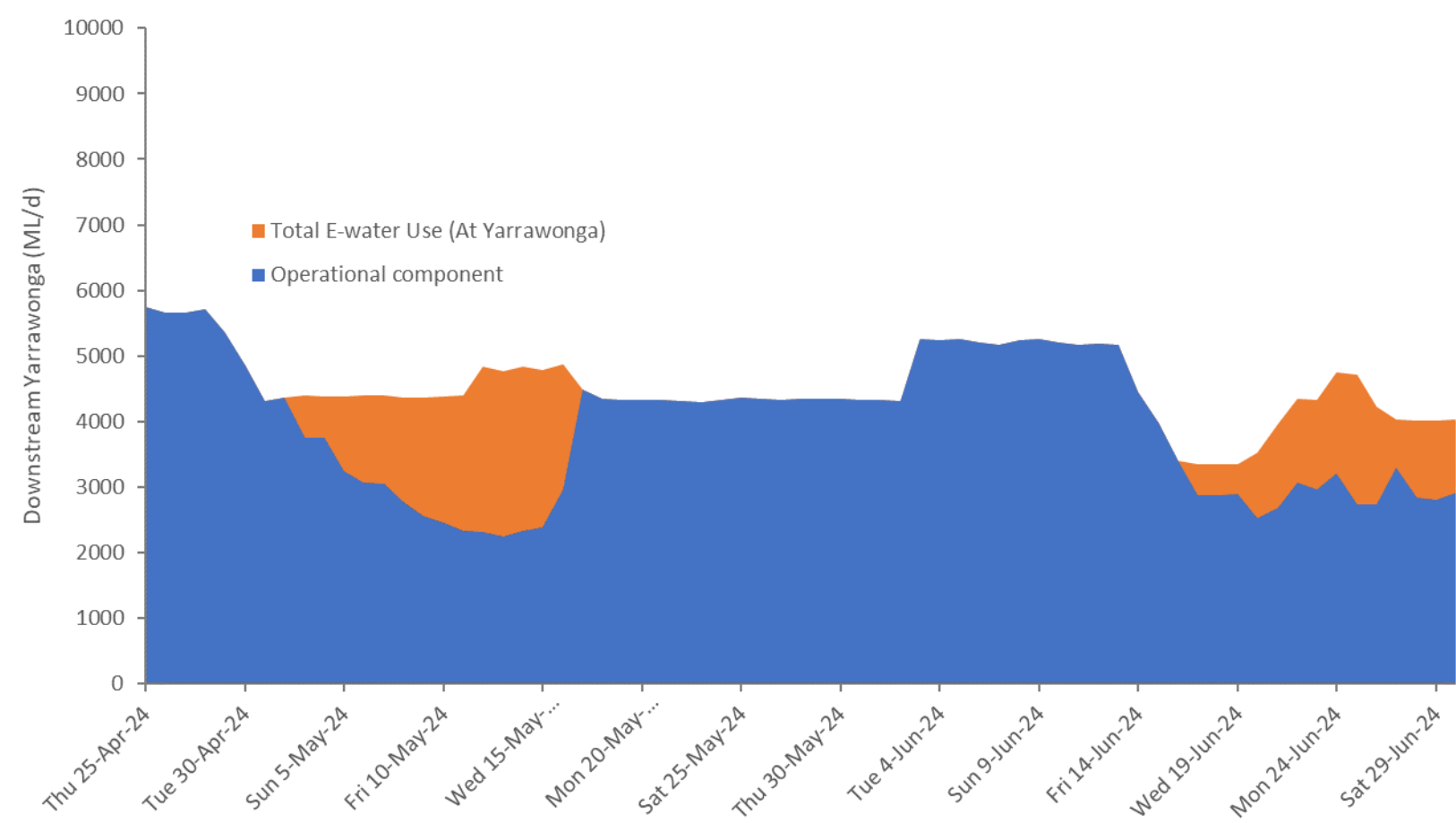
* Return flows associated with specific licences are estimated at the bulk level at a monthly time step based on the distribution of percent of usage. This unlikely reflect actual return flow per licence. It does not account for travel time between “usage” and ‘return flow” when determining proportions. This method has been discussed with CEW as the best current solution with the tools available.

[^]The monthly totals provided in “2024-25 RMS BULK & Daily Accounts End June 2024.xlsx” are incorrect under the month of May in the “Monthly Account Report (BULK)” tab. The correct figures can be obtained from the “Hume Direct Debit” tab and aligns with final charges to eWater holder made by NSW.

- Volume of water delivered to the Murray Valley that will be recognised as environmental water

— 38,497 ML was delivered to the Murray Valley with the total volume being recognised at the SA Border.

Figure 19: Flow downstream of Yarrawonga as part of Hume Multisite environmental delivery 2023-34; Events #4-5



6.2.3.4 Stakeholder consultation

WaterNSW do not undertake stakeholder consultation as part of environmental water delivery. WaterNSW role is operational and is a key stakeholder of the environmental water holders. All stakeholder consultation regarding delivery of environmental water is undertaken by the environmental water holders.

Table 52: Summary of stakeholder consultation for the Hume Multi-site e-watering events in 2023–24

Date	Stakeholder forum/name	Environmental watering action/s discussed	Type of consultation (eg. Workshop, webinar, phonecall, letter, survey, public exhibition)	Summary of feedback	Stakeholder requests	List of supporting documents
Meetings Monthly	Water Liaison Working Group- State agencies and operating agencies	Operational updates	Online meetings		River ops and forecast update	Meeting minutes recorded
Weekly / fortnightly online meetings	Barmah Millewa Ops Advisory Group-GMW, VEWH, GBCMA, WaterNSW, NSW DCCEEW, NSW Parks, CEWO, EWC, YYNAC, DEW, PV	Operational updates	Online meetings	• Current river operations • Accounting update • Update on e-water use plans and critical ecological targets • Confirmation/discussion of regulator settings and decision points, field report	River ops and forecast update	Meeting minutes recorded

Date	Stakeholder forum/name	Environmental watering action/s discussed	Type of consultation (eg. Workshop, webinar, phonecall, letter, survey, public exhibition)	Summary of feedback	Stakeholder requests	List of supporting documents
Weekly	E-water catchup - NSW Department of Climate Change, Energy, the Environment and Water (e-water managers, e-water registrar) - WaterNSW	E-water actions and retail accounting of e-water holdings	Online meetings	Water Accounting	Accounting updates	Per retail orders and watering instructions

6.2.3.5 Recommendations to improve future environmental watering actions

Table 53 provides a summary of key issues encountered in 2023–24 and recommendations for addressing these.

Table 53: Summary of issues and recommendations from the Hume Multi-site e-watering events in 2023–24

Environmental watering action	Issue	Agencies involved	Stakeholders involved	Recommendations	List of supporting documents
All events	Water order process requires improvements with regards to detail and timeliness.	NSW DCCEEW	NSW DCCEEW, CEWO, TLM	PPM instructions and retail water ordering should provide all required detail and be in place well in advance of start of event.	N/A
All events	Internal management of licences/carryover etc. not conducive to ordering to the end of water year/commencing following year not smooth	NSW DCCEEW	NSW DCCEEW	Ordering and licence management of e-water accounts need to be improved at policy level (allow accounts to be finalise after the end of the water year). Retails orders against total licence volumes are placed with WaterNSW at the start of each year and debited against events, based on e-water Managers instructions (PPM) monthly. Moves to wholistic licence management.	N/A
All events	E-water planning	NSW DCCEEW	NSW DCCEEW, CEWO, TLM	Clear annual planning foresight required by e-water holders (under different scenarios) to provide operators an opportunity to look at long-term forecasting. Planning needs to be less reactive.	N/A

Attachments

Attachment A – Water orders

- D2024-125508 Water Order_NSW Murray Multi Site 2023-24_Q1V1
- D2024-125509 Water Order_NSW Murray Multi Site 2023-24_Q1V2
- D2024-125510 NSW Watering Instructions_Murray Multi Site 2023-24_Q2V1

- D2024-125512 NSW Water Order Instructions - Murray River Multi-Site 2023-24_Q2V2
- D2024-125514 NSW Water Order Instructions_Murray River Winter Flow_April-June 2024 Q4 V1
- D2024-125515 NSW Water Order Instructions_Murray River Winter Flow_April-June 2024 version_2
- D2024-125516 NSW Water Order Instructions_Murray River Winter Flow_April-June 2024 version_3
- D2024-125517 NSW Watering Instructions_Murray River Winter Flow_April-June 2024 version_4
- D2024-125519 NSW Water Order Instructions_Murray River Winter Flow_April-June 2024 version_5
- D2024-125521 NSW Water Order Instructions_Murray River Winter Flow_April-June 2024 version_6

Attachment B – Assumed Use Statements and evidence of other calculations used

- D2024-125442 2024-25 RMS BULK & Daily Accounts End June 2024
- D2024-056933 – FINAL Summary of Murray eWater delivery 2023-24
- D2024-125505 - Hume Multi site Flow component breakdown 2023-24

6.2.4 Annual Environmental Release River Operations Report – Murrumbidgee River 2023–24 (Part 1 of 2)

This report was prepared by WaterNSW in accordance with the reporting requirements described under Section 5.1 of the Prerequisite Policy Measures Procedures Manual for the Murrumbidgee Regulated River and the Prerequisite Policy Measures Procedures Manual for the NSW Murray and Lower Darling Regulated Rivers.

Table 54: WaterNSW's Murrumbidgee events 2023–24 Annual Environmental River Operations Report approvals

Report prepared by	Shaun Gleeson	Report reviewed by	Nachi Nachiappan	Report approved by	Nachi Nachiappan
Position	WPD Specialist	Position	Manager Environmental & Cultural Water	Position	Manager Environmental & Cultural Water
Date prepared	19/02/2024	Date reviewed	27/11/2024	Date approved	27/11/2024

6.2.4.1 Environmental watering actions

Table 55 provides an overview of the environmental water actions undertaken using PPMs in the 2023–24 water year.

Table 55: Summary of PPM watering actions in 2023–24 for Murrumbidgee

Name of environmental watering action	PPM Event 1a	PPM Event 2a	PPM Event 2b
River system	Murrumbidgee	Murrumbidgee	Murrumbidgee
Type of PPM event	Directed releases from storages/s to meet a target flow at downstream Yanco Offtake.	Directed releases from storages/s to meet a target flow at downstream Darlington Point.	Directed releases from storages/s to meet a target flow at downstream Balranald.
General description of watering action	The primary objective is to build up a dispersal pulse as it passes down the Yanco Creek to maximise the dispersal of Trout Cod and Murray Cod larvae and juveniles, which have successfully bred during the steady flows provided earlier during this event. A secondary objective is to trigger perch spawning and migration conditions as water temperatures reach the desired threshold in the coming weeks.	to build up a native fish pulse to increase lateral connectivity with low lying billabongs, creeks and lakes to maximise native fish movement opportunities into favourable habitats. The secondary objective is to create a dispersal pulse in ~late November to maximise fish passage, larval dispersal and increase in stream habitat particularly in the lower reaches of the Murrumbidgee River.	to build up a native fish pulse to increase lateral connectivity with low lying billabongs, creeks and lakes to maximise native fish movement opportunities into favourable habitats. Secondary objectives are to maximise fish passage (weir gates out of the water) and to trigger perch spawning and migration conditions as water temperatures reach the desired threshold in the coming weeks, particularly in lower reaches of the Murrumbidgee River.
Release start date	2 September 2023	1 September 2023	15 November 2023
End date	6 December 2023	3 November 2023	1 January 2024
Was this an agreed or interim action?	Interim action	Agreed	Agreed

Name of environmental watering action	PPM Event 1a	PPM Event 2a	PPM Event 2b
Delivery pathway	Upper storage/s to nominated downstream site/s. Estimated return flows are to be protected downstream, including for delivery to the Murray River.	Upper storage/s to nominated downstream site/s. Estimated return flows are to be protected downstream, including for delivery to the Murray River.	Upper storage/s to nominated downstream site/s. Estimated return flows are to be protected downstream, including for delivery to the Murray River.
Environmental site/s watered	Murrumbidgee river D/s Yanco Creek	Murrumbidgee river D/s Darlington Point	Murrumbidgee river D/s Balranald Weir
Total volume of environmental water delivered (ML)	14,945 ML (total) 3,759 ML Held 1,186 (EWA)	156,513 ML (total) 127,073 ML Held 29,440 ML (EWA)	98,106 ML (total) 73,106 ML Held 25,000 ML (EWA)
Accounting method used	Assumed use method: Debit additional releases from storage calculated as the difference between the actual releases from storage and those that are estimated would have been made without the environmental water order.	Assumed use method: Debit additional releases from storage calculated as the difference between the actual releases from storage and those that are estimated would have been made without the environmental water order.	Assumed use method: Debit additional releases from storage calculated as the difference between the actual releases from storage and those that are estimated would have been made without the environmental water order.

6.2.4.2 Risk assessment and mitigation

Table 56 details risks identified during the planning and release of the environmental water orders received which use Prerequisite Policy Measures, including deliverability risks, operational risks and other risks considered. The mitigation measures applied are also included in Table 56. Supporting information is included in Attachment A.

Table 56: Risks considered during event planning for Murrumbidgee 2023–24 e-watering events

#	Description of risk	Mitigation measure/s applied
1	Under/over-estimating the volume of environment water used: inaccurate measurement.	Used appropriate estimates of unaccounted differences and operational decisions when estimating the 'without environmental order' when calculated additional release from storage.
2	Under-use/overuse of environmental water allocated for individual events resulting in potential forfeit of Held Environmental Water (HEW) from Licenced accounts.	Regular reporting of estimated water uses to the environmental water managers with uncertainties in the usage forecasts. Educating the environmental water managers on water ordering and use debit procedures by WaterNSW for all licenced users to effectively manage HEW portfolio under the NSW rules.

6.2.4.3 Water orders

Table 57 provides an overview of the environmental water orders received for Prerequisite Policy Measures in the 2023–24 water year (including any order that was subsequently refused/rejected).

Further detail is provided in Attachment B as needed, including water orders and assumed use statements. If any water order using PPMs was refused, the documentation and rationale supporting this decision is provided.

Table 57: Water orders summary received by WaterNSW in 2023–24 for Murrumbidgee

Order Event	Event 1a	Event 1a	Event 2a	Event 2b	Event 2b	Event 2b
Organisation submitting order.	eWater Registrar	eWater Registrar	eWater Registrar	eWater Registrar	eWater Registrar	eWater Registrar
Volume of order (ML)	8,659	6,000	130,091	25,000	50,000	50,000
Organisation delivering order.	EWA 40MA412242/3	CEWO 40AL415740	CEWO 40AL415740	EWA 40MA412242/3	CEWO 40AL415740	TLM 40AL405811
Form of water order submitted. (e.g. Form A, email, verbal, other)	Email	Email	Email	Email	Email	Email

6.2.4.4 Comparison of forecast and actual environmental water use

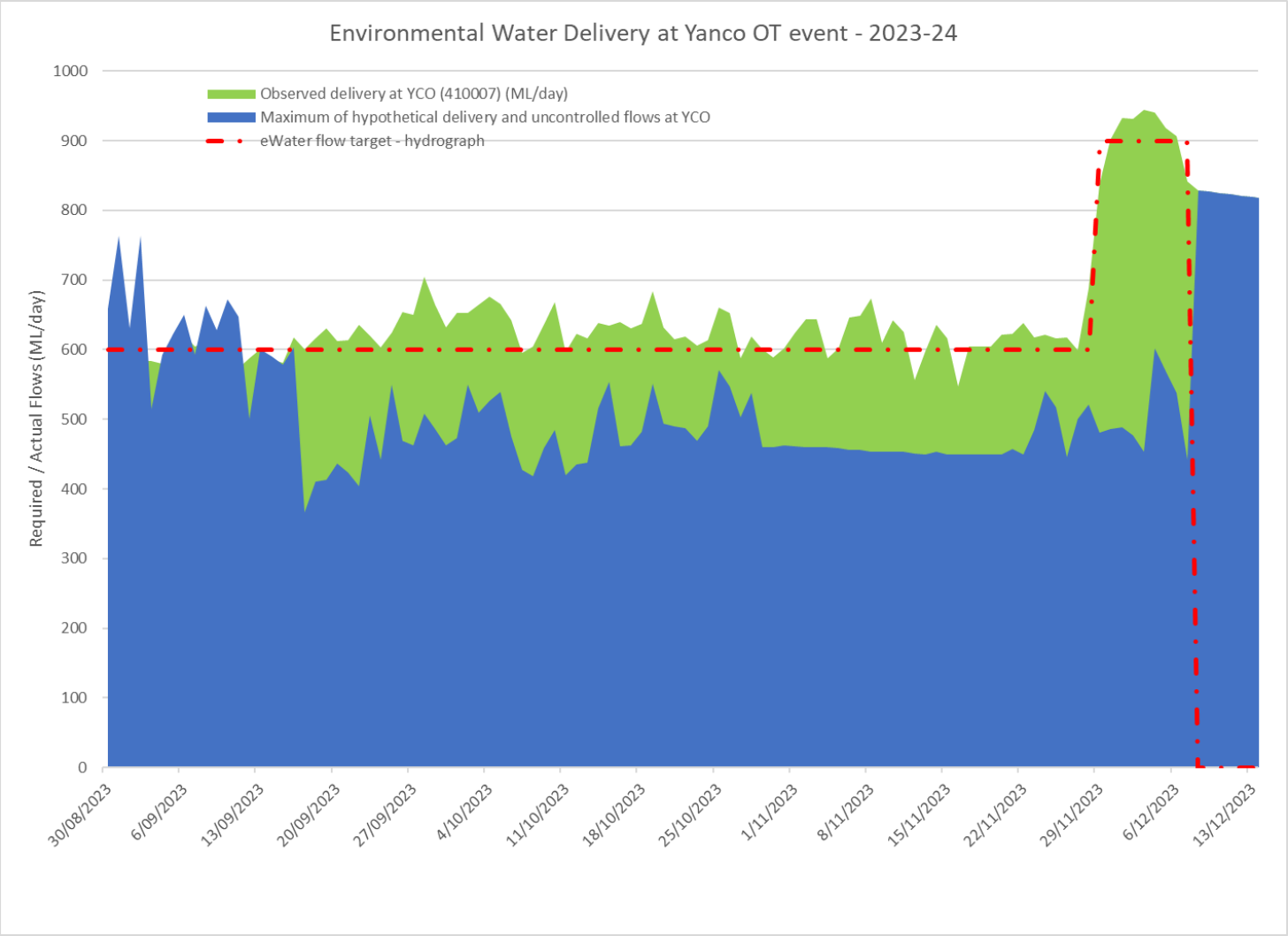
6.2.4.4.1 PPM event #1a

- *Trial PPM direction for future recognition
- Target a steady flow rate of 600 ML/d @ Yanco Offtake from 2 September until 28 November 2023
- Target a peak flow rate of 900ML/d @ d/s Yanco Offtake from 28 November 2023 for a period of 7 days
- Following the peak, manage a 15% recession rate until the flow reaches consumptive demand levels d/s Yanco Offtake
- Operate Tarabah Weir to maximise flow down Yanco Creek and fish passage through weir
- For all the flow rates specified plus or minus 10% is acceptable
- Forecast losses and actual losses (at an appropriate temporal scale for the event)
 - Loss were applied 1.1
- Volume of environmental water debited (with licence corresponding licence numbers)
 - 11,186 (EWA -40MA412242 & 40MA412243)
 - 3,759 (CEWO- 40AL40AL415740)
 - **Total** 14,945ML
 - **Recognised to SA** 0ML/d**

**No volume recognised due to the event trialing PPM arrangements. Further investigation and feedback is required before recognitions can be established.

Supporting document: D2024-010425 Yanco-Billabong PPM Fish Flow (Yanco Offtake) 2023-24 MBG23-24 01 Watering Instruction - Q2V1

Figure 20: Environmental water delivery at Yanco Offtake 2023–24; Event 1a



6.2.4.4.2 PPM event #2a

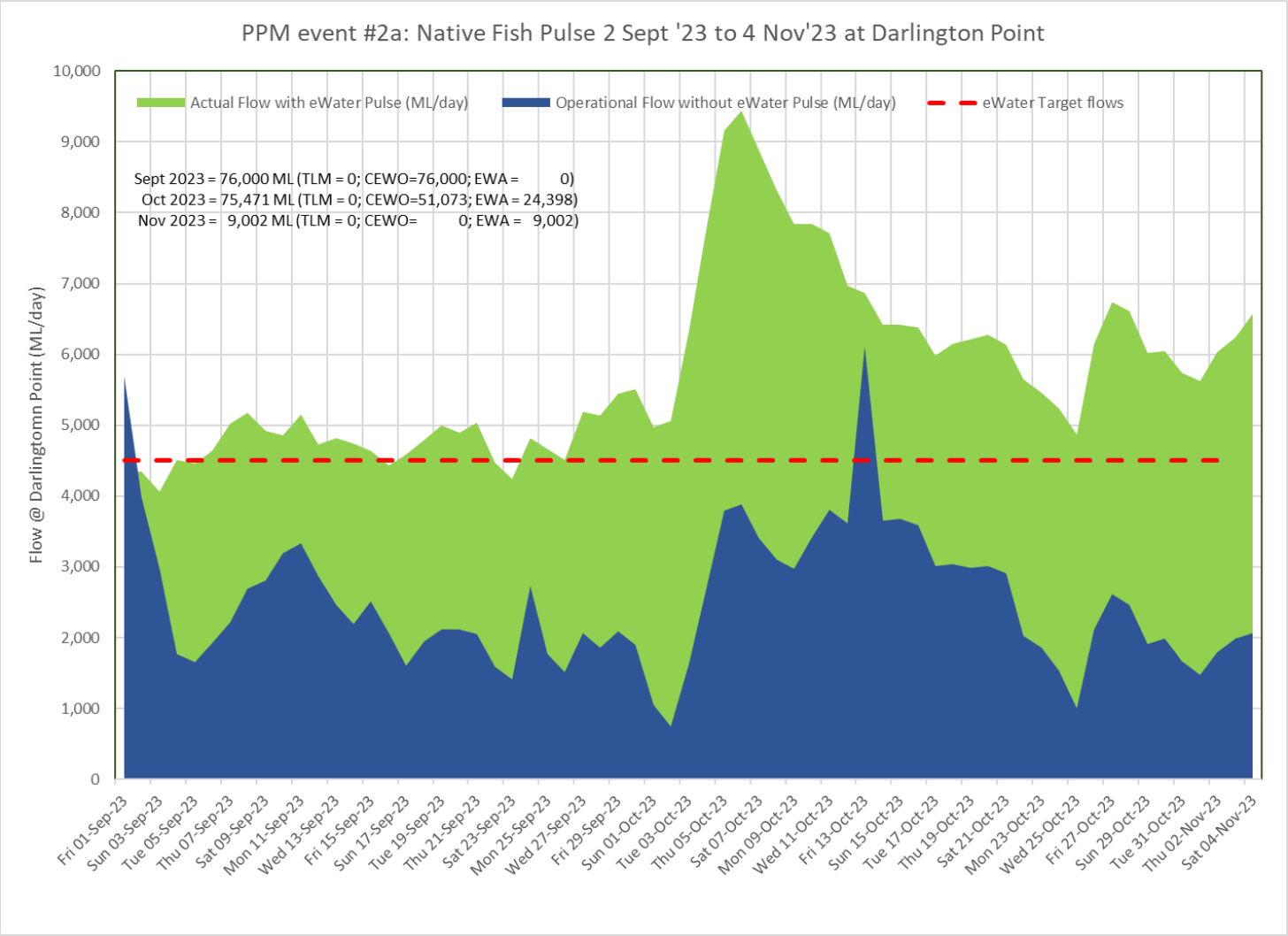
Target a steady flow rate of 4,500 ML/d @ Darlington Point from early September until late November 2023. If flows drop below 3,500ML/day after 15 September, then target that flow rate as the new minimum base flow. For all the flow rates specified plus or minus 10% is acceptable.

Maintain gates fully out of Beavers Creek for the period of the delivery.

- Forecast losses and actual losses (at an appropriate temporal scale for the event)
 - Loss were applied 1.1
- Volume of environmental water debited (with licence corresponding licence numbers)
 - 29,440 ML (EWA -40MA412242 & 40MA412243)
 - 127,073 ML (CEWO- 40AL40AL415740)
 - **Total** 156,513ML
 - **Recognised to SA** 122,769ML/d

Supporting document: D2024-010432 Murrumbidgee PPM Native fish flows 2023-24 Watering Instruction - Amendment No. 2

Figure 21: Native fish pulse 2 September to 4 November 2023 at Darlington Point; Event 2a



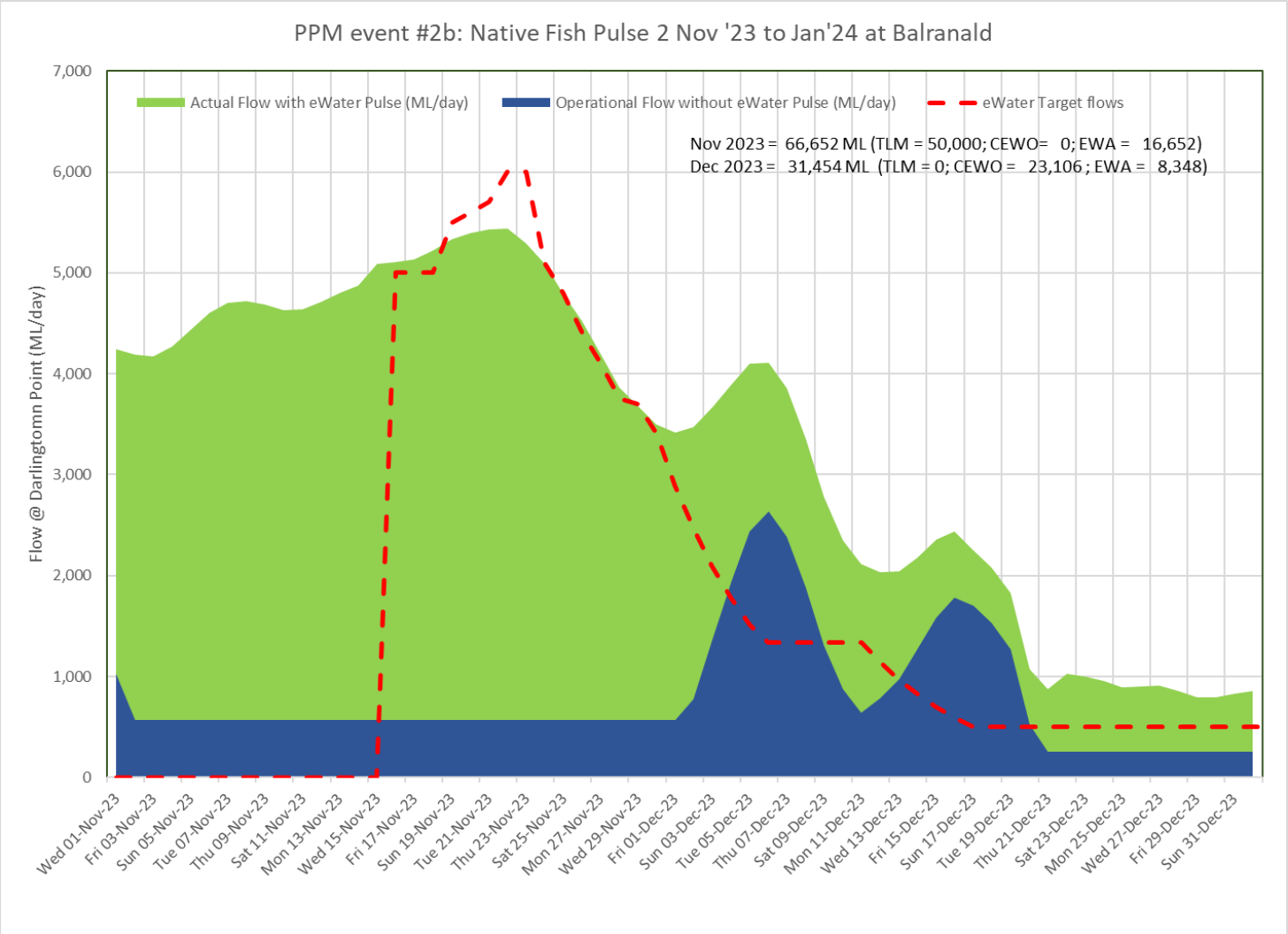
6.2.4.4.3 PPM event #2b

Target a peak flow rate of up to 6,000 ML/d @ d/s Balranald Weir during late November 2023 for a period of around 3 days. Following the peak flows, manage a 15% recession rate until the flow reaches 1,300 -1,400ML/day @ d/s Balranald Weir. Hold flows at 1,300-1,400ML/day for up to 14 days (if required) to allow for steady river levels at Balranald prior to installation of the weir panels. Once the weir is in place reduced flows down to 500ML/day with 15% recession rate. Maintain 500ML/day until 31 January. For all the flow rates specified plus or minus 10% is acceptable. Maintain gates fully out of Beavers Creek for the period of the delivery. Maintain gates fully out of Redbank Weir for as long as possible.

- Forecast losses and actual losses (at an appropriate temporal scale for the event)
 - Loss were applied 1.1
- Volume of environmental water debited (with licence corresponding licence numbers)
 - 25,000 ML (EWA -40MA412242 & 40MA412243)
 - 50,000 ML (TLM-40AL405811)
 - 23,106 ML (CEWO- 40AL40AL415740)
 - **Total** 98,106 ML
 - **Recognised to SA** 69,781ML/d

Supporting document: D2024-010428 Murrumbidgee PPM Native fish flows 2023-24 Watering Instruction - Amendment No. 4 (Balranald)

Figure 22: Native fish pulse 2 November 2023 to January 2024 at Balranald; Event 2b



6.2.4.5 Stakeholder consultation

Table 58 provides a summary of stakeholder consultation. Supporting documents are provided in Attachment D.

Note: stakeholder consultation is not considered a core responsibility of WaterNSW. eWater holders have the responsibility of ongoing stakeholder consultation. Listed below are ongoing meetings WaterNSW actively attends and provides updates.

Table 58: Summary of stakeholder consultation

Date	Stakeholder forum/name	Environmental watering action/s discussed	Type of consultation (eg. Workshop, webinar, phonecall, letter, survey, public exhibition)	Summary of feedback	Stakeholder requests	List of supporting documents
Weekly	Bidgee Water Managers Catch-up	Ongoing environmental deliveries and planning	Teams Meeting	River ops and forecast update	EHGeW	
Weekly	Murrumbidgee eWater updates	Ongoing environmental deliveries and planning	Teams Meeting	River ops and forecast update	NSW DCCEEW	
Var.	Account updates	Ongoing environmental delivery accounting updates	Email	Accounting updates	NSW DCCEEW	

6.2.4.6 Recommendations to improve future environmental watering actions

Table 59 provides a summary of key issues encountered in 2023–24 and recommendations for addressing these. Supporting documents are provided in Attachment E.

Table 59: Summary of issues and recommendations from Murrumbidgee e-watering events in 2023–24

Environmental watering action	Issue	Agencies involved	Stakeholders involved	Recommendations	List of supporting documents
All	Water order process continued to frustrate all parties with the availability of water for delivery, the timeliness of amendments and the necessary feedback of actual use to the customers so that orders can be managed in real time.	EHG and WaterNSW	EHG, CEWO, TLM, NSW DCCEEW	The water orders must have all the elements as outlined in the PPM Procedures manual. (Section 2.4.2 of NSW PPM Procedures Manual for the Murrumbidgee Regulated River (Nov 2022))	
All	Directions for flow and accounting splits need to be delivered to the entire South Operations team. Direct emails to individuals of specific directions makes post even accounting and reporting difficult.	EHG and WaterNSW	EHG, CEWO, TLM, NSW DCCEEW	Include southoperations.team@waterNSW.com.au in all correspondence. Possibility of creating a SharePoint page/folder to track history, changes and final decisions made for each event.	
All	Use of iWas ordering system rather than manual order placing	EHG and WaterNSW	EHG, CEWO, TLM, NSW DCCEEW	iWas would assist with tracking and final order placing rather than back and forth email tracking post event	
All	Planning	DCCEEW	DCCEEW EES, CEWO, TLM, NSW DCCEEW	Clear annual planning foresight required by e-water holders (under different scenarios) to provide operators an opportunity to look at long-term forecasting. Planning needs to be a less reactive.	

Environmental watering action	Issue	Agencies involved	Stakeholders involved	Recommendations	List of supporting documents
All	Recognition of PPM deliveries in the Yanco Creek	DCCEEW	EHG, CEWO, TLM, NSW DCCEEW	Further work is required to recognise PPM deliveries in the Yanco Creek. Losses between Darlot and Boundary Bend on the Murray need to be accounted for.	
All	Post event PPM direction review	DCCEEW	EHG, CEWO, TLM, NSW DCCEEW	when changes are agreed to the original PPM instruction eWater holder must submit the final agreed version to WaterNSW. Clear differences can be observed between the accounted flows and original PPM instruction	

Attachments

Attachment A – Risk assessments

Attachment B – Water orders

- D2024-010425 Yanco-Billabong PPM Fish Flow (Yanco Offtake) 2023-24 MBG23-24 01 Watering Instruction - Q2V1
- D2024-010428 Murrumbidgee PPM Native fish flows 2023-24 Watering Instruction - Amendment No. 4 (Balranald)
- D2024-010432 Murrumbidgee PPM Native fish flows 2023-24 Watering Instruction - Amendment No. 2

Attachment C – Assumed Use Statements and evidence of other calculations used

- D2024-5152 Yanco Creek eWater Accounting 2023-24 Updated 20240109
- D2024-5150 - Murrumbidgee PPM -Native Fish Flow MBG23-24-No. 02 - Sept to Nov 2023 _Assessment - 11_2024-01-23

Attachment D – Details of stakeholder consultation and feedback

Attachment E – Supporting documents for key issues encountered and recommendations to address these issues

6.2.5 Annual Environmental Release River Operations Report- Murrumbidgee River 2023–24 (Part 2 of 2)

This report was prepared by WaterNSW in accordance with the reporting requirements described under Section 5.1 of the Prerequisite Policy Measures Procedures Manual for the Murrumbidgee Regulated River and the Prerequisite Policy Measures Procedures Manual for the NSW Murray and Lower Darling Regulated Rivers.

Table 60: WaterNSW's Murrumbidgee events 2023–24 Annual Environmental River Operations Report approvals

Report prepared by	Shaun Gleeson	Report reviewed by	Nachi Nachiappan	Report approved by	Nachi Nachiappan
Position	WPD Specialist	Position	Manager Environmental & Cultural Water	Position	Manager Environmental & Cultural Water
Contact number	N/A	Contact number	N/A	Contact number	N/A
Date prepared	27/11/2024	Date reviewed	27/11/2024	Date approved	27/11/2024

6.2.5.1 Environmental watering actions

Table 61 provides an overview of the environmental water actions undertaken using PPMs in the 2023–24 water year.

Table 61: Summary of PPM watering actions in 2023–24 in Murrumbidgee

Name of environmental watering action	PPM Event 3	PPM Event 2c	PPM Event 2d	PPM Event 2e	PPM Event 4
River system	Murrumbidgee	Murrumbidgee	Murrumbidgee	Murrumbidgee	Murrumbidgee
Type of PPM event	Directed releases from storages/s to meet a target flow at downstream Yanco Offtake	Directed releases from storages/s to meet a target flow at downstream Balranald	Directed releases from storages/s to meet a target flow at downstream Balranald	Directed releases from storages/s to meet a target flow at downstream Balranald	Directed releases from storages/s to meet a target flow at downstream Maude
General description of watering action	The primary objective is to build up a dispersal pulse as it passes down the Yanco Creek to maximise the dispersal of Trout Cod and Murray Cod larvae and juveniles, which have successfully bred during the steady flows provided earlier during this event. A secondary objective is to trigger perch spawning and migration conditions as water temperatures reach the desired threshold in the coming weeks.	The primary objective is to build up a native fish pulse to increase lateral connectivity with low lying billabongs, creeks and lakes to maximise native fish movement opportunities into favourable habitats. Secondary objectives are to maximise fish passage between the Murray system and particularly along the lower reaches of the Murrumbidgee River, i.e. weir gates out of the water wherever possible.	The primary objective is to maintain elevated base flows in the lower Murrumbidgee River of 500 ML/day for 3 weeks from late Feb, increase to 1000 ML/day for 4 weeks March-April, and 1500 ML/day till the end of April, to increase in-stream habitat for native fish. This flow target is above the end of system flow target (ESFT) specified in the Murrumbidgee Regulated Water Sharing Plan of 180 ML/day (January – April).	The primary objective of this event is to create a large pulse in the Murrumbidgee River, while the three lower weirs are fully removed, to increase in-stream habitat and dispersal opportunities for native fish. The secondary objective was to allow for fish movement between Tala Creek/Lake and the river, whilst also providing a replenishment flow into Tala Creek/Lake to sustain these two key golden perch refuge and recruitment areas.	North Caira offtake regulator to remain fully opened during the ~10 day weir drawdown period until backflows from Bala cease (as measured at the Caira cutting gauging station) or the Maude weir pool reaches a level of 5.0M (which-ever occurs first).

Name of environmental watering action	PPM Event 3	PPM Event 2c	PPM Event 2d	PPM Event 2e	PPM Event 4
Release start date	6 February 2024	3 February 2024	28 February 2024	23 February 2024	22 March 2024
End date	20 February 2024	11 February 2024	22 February 2024	25 May 2024	24 March 2024
Was this an agreed or interim action?	Agreed	Agreed	Agreed	Agreed	
Delivery pathway	Upper storage/s to nominated downstream site/s. Estimated return flows are to be protected downstream, including for delivery to the Murray River.	Upper storage/s to nominated downstream site/s. Estimated return flows are to be protected downstream, including for delivery to the Murray River.	Upper storage/s to nominated downstream site/s. Estimated return flows are to be protected downstream, including for delivery to the Murray River.	Upper storage/s to nominated downstream site/s. Estimated return flows are to be protected downstream, including for delivery to the Murray River.	Upper storage/s to nominated downstream site/s. Estimated return flows are to be protected downstream, including for delivery to the Murray River.
Environmental site/s watered	Murrumbidgee river D/s Yanco Creek	Murrumbidgee river D/s Balranald	Murrumbidgee river D/s Balranald	Murrumbidgee river D/s Balranald	Murrumbidgee river D/s Maude
Total volume of environmental water delivered (ML)	4,646 ML (total & held)	13,206 ML (total & held)	24,569 ML (total & held)	91,684 ML (total) 57,000 ML held 34,684 ML (EWA)	1,198 ML (total & held)
Accounting method used	Assumed use method: Debit additional releases from storage calculated as the difference between the actual releases from storage and those that are estimated would have been made without the environmental water order.	Assumed use method: Debit additional releases from storage calculated as the difference between the actual releases from storage and those that are estimated would have been made without the environmental water order.	Assumed use method: Debit additional releases from storage calculated as the difference between the actual releases from storage and those that are estimated would have been made without the environmental water order.	Assumed use method: Debit additional releases from storage calculated as the difference between the actual releases from storage and those that are estimated would have been made without the environmental water order.	Assumed use method: Debit additional releases from storage calculated as the difference between the actual releases from storage and those that are estimated would have been made without the environmental water order.

6.2.5.2 Risk assessment and mitigation

Table 62 details any risks identified during the planning and release of the environmental water orders received which use Prerequisite Policy Measures, including deliverability risks, operational risks and other risks considered. The mitigation measures applied are also included the table. Supporting information is provided in Attachment A.

Table 62: Risks considered during event planning

#	Description of risk	Mitigation measure/s applied
1	Under/over-estimating the volume of environment water used: inaccurate measurement.	Used appropriate estimates of unaccounted differences and operational decisions when estimating the 'without environmental order' when calculated additional release from storage.
2	Under-use/overuse of environmental water allocated for individual events resulting in potential forfeit of Held Environmental Water (HEW) from licenced accounts.	Regular reporting of estimated water uses to the environmental water managers with uncertainties in the usage forecasts. Educating the environmental water managers on water ordering and use debit procedures by WaterNSW for all licenced users to effectively manage HEW portfolio under the NSW rules.

6.2.5.3 Water orders

Table 63 provides an overview of the environmental water orders received for Prerequisite Policy Measures in the 2023–24 water year (including any order that was subsequently refused/rejected).

Further detail is provided in Attachment B as needed, including water orders and assumed use statements. If any water order using PPMs was refused, documentation and rationale supporting this decision is provided.

Table 63: Water orders summary received by WaterNSW in 2023–24

Order Event	Event 3	Event 2c	Event 2d	Event 2e	Event 4
Organisation submitting order	eWater Registrar	eWater Registrar	eWater Registrar	eWater Registrar	eWater Registrar
Volume of order (ML)	8,700 ML	15,000 ML	12,170 ML	72, 542 ML (33,000ML EWA was ordered)	3,000 ML
Organisation delivering order	CEWH 40AL415740	CEWH 40AL415740	CEWH 40AL415740 NSW EHG 40AL415740	EWA 40MA412242/3 CEWO 40AL415740 TLM 40AL405811 NSW EHG 40AL415740	CEWH 40AL415740
Form of water order submitted. (e.g. Form A, email, verbal, other)	Email	Email	Email	Email	Email

6.2.5.4 Comparison of forecast and actual environmental water use

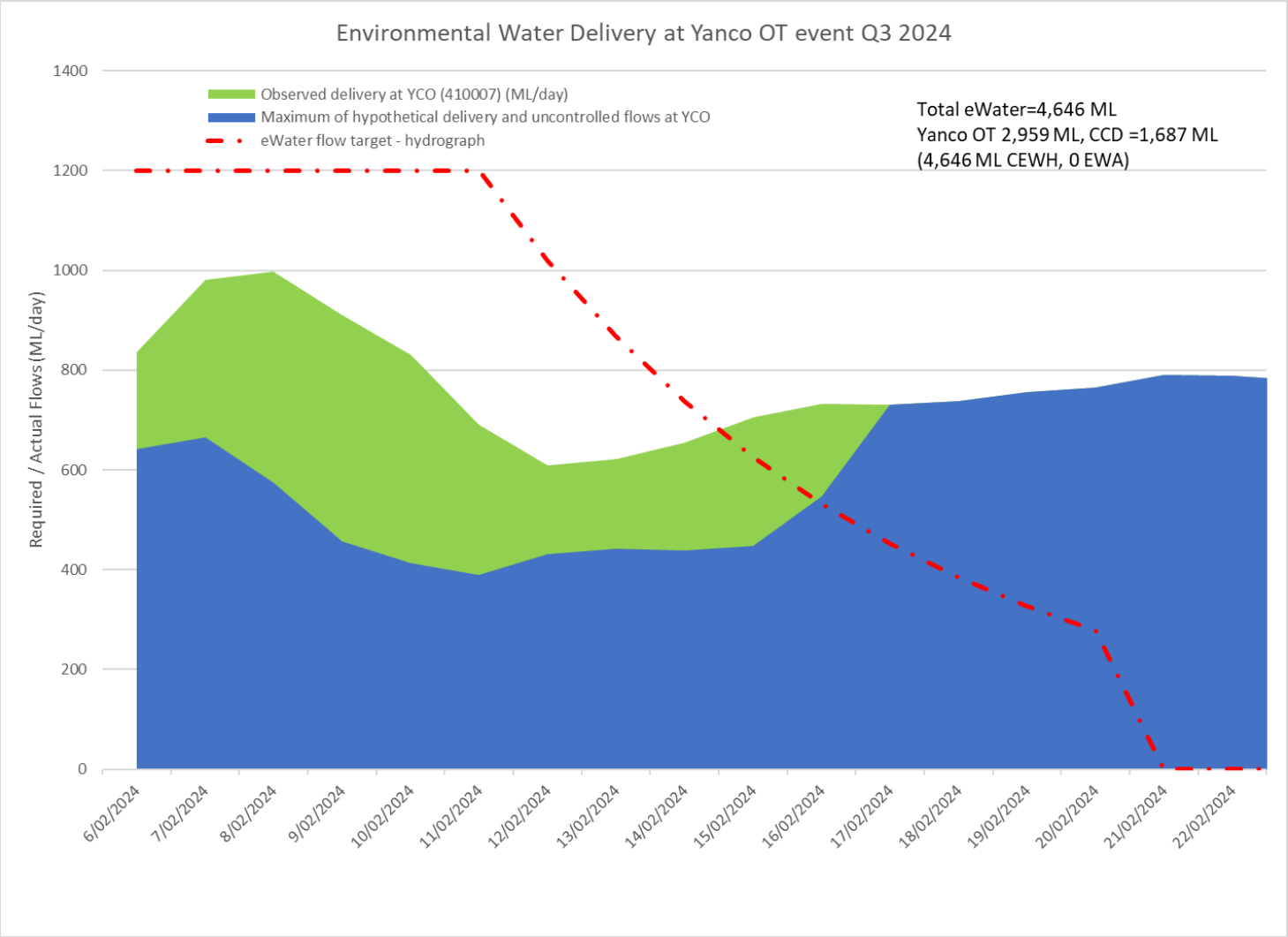
6.2.5.4.1 PPM event 3:

- *Trial PPM direction for future recognition
- Target a peak flow rate of 1,000 - 1200ML/d @ d/s Yanco Offtake from the 6 February 2024 for a period of 6 days
- Following the peak, manage a 15% recession rate until the flow reaches consumptive demand levels d/s Yanco Offtake
- Operate Tarabah Weir to maximise flow down Yanco Creek and fish passage through the weir
- Target diversions of up to 300ML/day down the CCD for 9 days starting 7 February 2024
- For all the flow rates specified plus or minus 10% is acceptable
- Forecast losses and actual losses (at an appropriate temporal scale for the event)
 - Loss were applied 1.1
- Volume of environmental water debited (with licence corresponding licence numbers)
 - 2,959 Yanco Offtake
 - 1,687 Colly Catchment Drain
 - Total 4,646 ML
 - **Recognised to SA XXML/d****

**No volume recognised due to the event trialing PPM arrangements. Further investigation and feedback is required before recognitions can be established.

- **Supporting documents:**
 - Yanco-Billabong PPM Fish Flow (Yanco Offtake) 2023-24 MBG23-24 01 Watering Instruction - Q3V1
 - D2024-5152 Yanco Creek eWater Accounting 2023-24 Updated 20240319

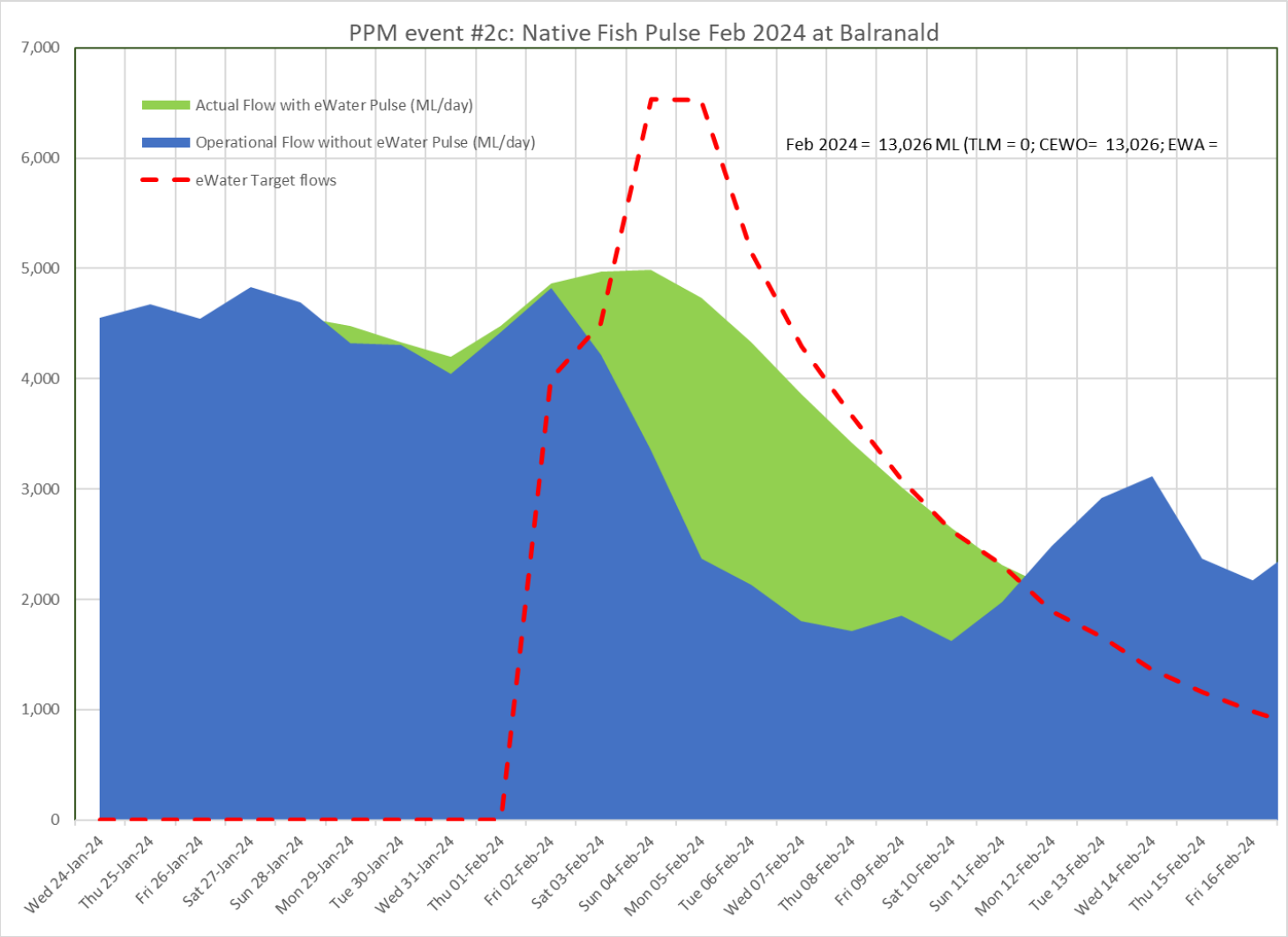
Figure 23: Environmental water delivery at Yanco Offtake event Q3 2024; Event 3



6.2.5.4.2 PPM event 2c:

- Target a peak flow rate of up to 6 -7,000 ML/d @ d/s Balranald Weir during February 2024 for a period of around 5 days
- Following the peak flows, manage a 15% recession rate until Balranald Weir is re-instated
- For all the flow rates specified plus or minus 10% is acceptable
- Maintain gates fully out of Beavers Creek for the period of the delivery
- Forecast losses and actual losses (at an appropriate temporal scale for the event)
 - Loss were applied 1.1
- Volume of environmental water debited (with licence corresponding licence numbers)
 - 13,206 ML (CEWO- 40AL415740)
 - Recognised to SA 13,091ML/d*
- **Supporting documents:**
 - D2024-117974 - Murrumbidgee PPM -Native Fish Flow MBG23-24-No. 03- Jan-Feb 2024 _Assessment - 2_2024-03-11
 - Murrumbidgee PPM Native fish flows 2023-24 Watering Instruction - 2c (Balranald)

Figure 24: Native fish pulse February 2024 at Balranald; Event 2c



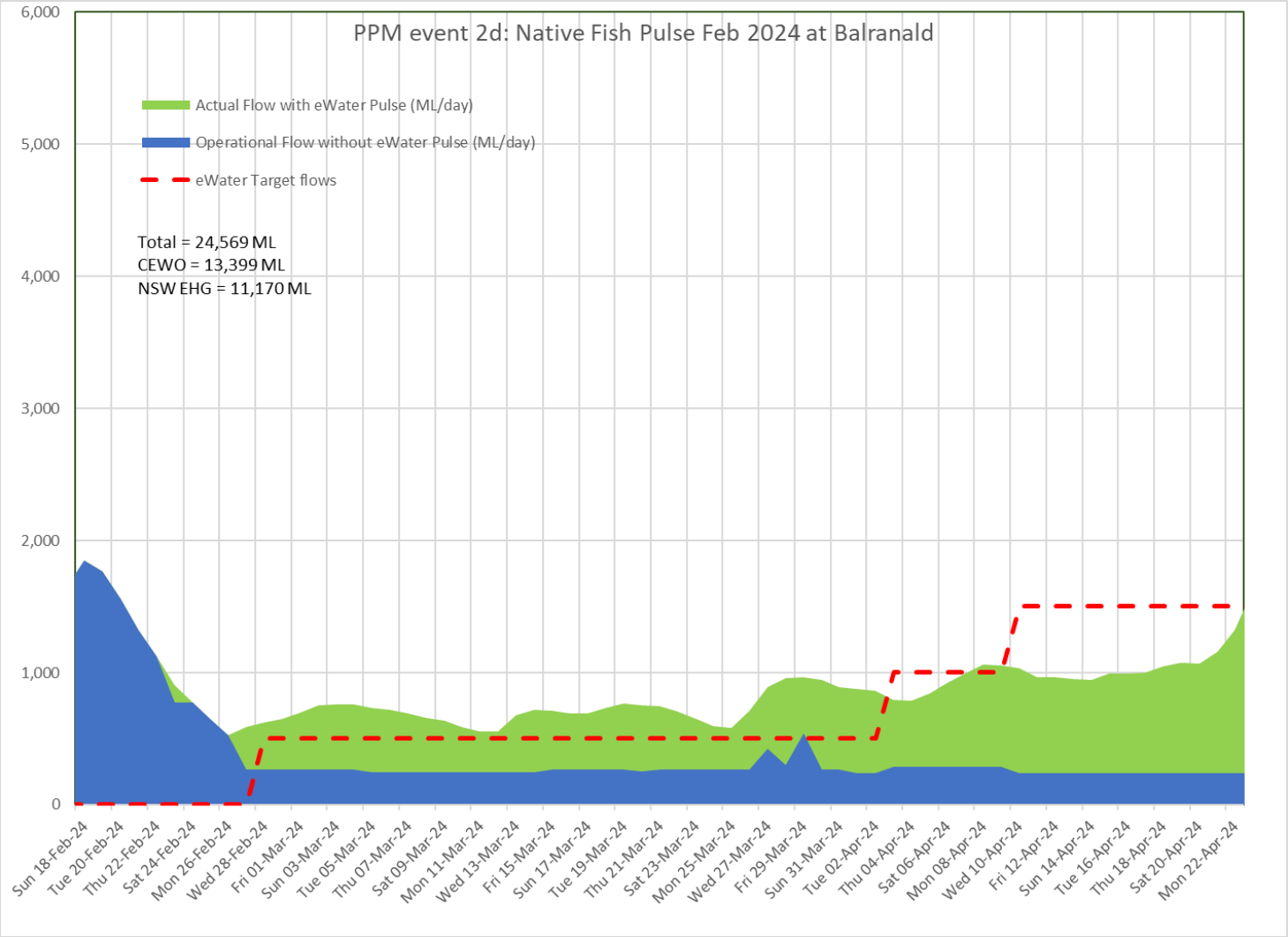
6.2.5.4.3 PPM event 2d

Target a flow rate of 500 ML/day @ d/s Balranald Weir from the end of February for 3 weeks followed by an increase to 1000 ML/day for 4 weeks, and a further increase to 1500 ML/day from mid to the end of April.

At the completion of the 1500 ML/day flow, reduce to the ESFT flow using a 15% rate of recession. For all the flow rates specified plus or minus 10% is acceptable.

- Forecast losses and actual losses (at an appropriate temporal scale for the event)
 - Loss were applied 1.1
- Volume of environmental water debited (with licence corresponding licence numbers)
 - 13,399 ML CEWO
 - 11,170 ML EHG
 - **Total:** 24,569 ML
 - **Recognised to SA:** 22,610 ML
- **Supporting documents:**
 - Murrumbidgee PPM Native fish flows 2023-24 Watering Instruction - 2d (Balranald) Version 2
 - D2024-47376 - Murrumbidgee PPM -Native Fish Flow MBG23-24 2d Assessment 2024528 PPM Adjusted

Figure 25: Native fish pulse February 2024 at Balranald; Event 2d



6.2.5.4.4 PPM event 2e:

Using up to 90,000ML of environmental water, please give effect to the following flow rates downstream of Balranald Weir, as specified in the below table and shown in the attached hydrograph.

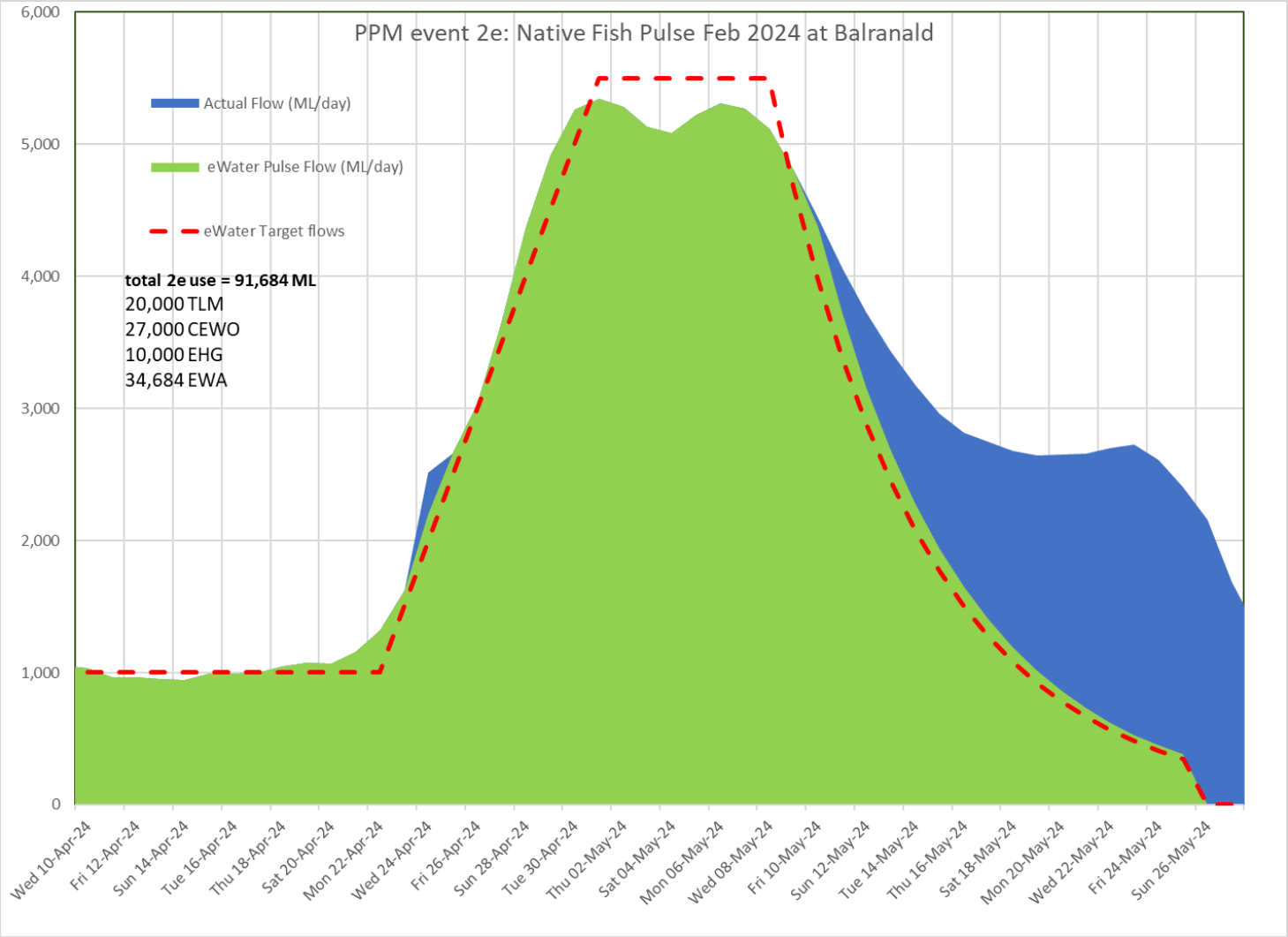
The primary objective of this event is to create a large pulse in the Murrumbidgee River, while the three lower weirs are fully removed, to increase in-stream habitat and dispersal opportunities for native fish.

The secondary objective was to allow for fish movement between Tala Creek/Lake and the river, whilst also providing a replenishment flow into Tala Creek/Lake to sustain these two key golden perch refuge and recruitment areas. However, it is noted that since the last instruction was provided, the access to the Tala escape regulator has been deemed to be unsafe, so WNSW will be unable to open the escape during this event.

As such NSW BCS staff have requested that WNSW use all available storages (other than Maude, Redbank and Balranald weirs) to recapture some of the environmental flow releases in transit which are surplus to the primary event objectives.

- Forecast losses and actual losses (at an appropriate temporal scale for the event)
 - Loss were applied 1.1
- Volume of environmental water debited (with licence corresponding licence numbers)
 - 34,684 ML EWA 40MA412242/3
 - 20,000 ML TLM 40AL405811
 - 27,000 ML CEWO 40AL415740
 - 10,000 ML NSW EHG 40AL415740
 - **Total:** 91,684 ML
 - **Recognised to SA** 52,487 ML
- **Supporting documents:**
 - Murrumbidgee PPM Native fish flows 2023-24 Watering Instruction - 2e (Balranald) – Final
 - D2024-47372 - Murrumbidgee PPM -Native Fish Flow MBG23-24 2e Assessment 2024 05 27

Figure 26: Native fish pulse February 2024 at Balranald; Event 2e

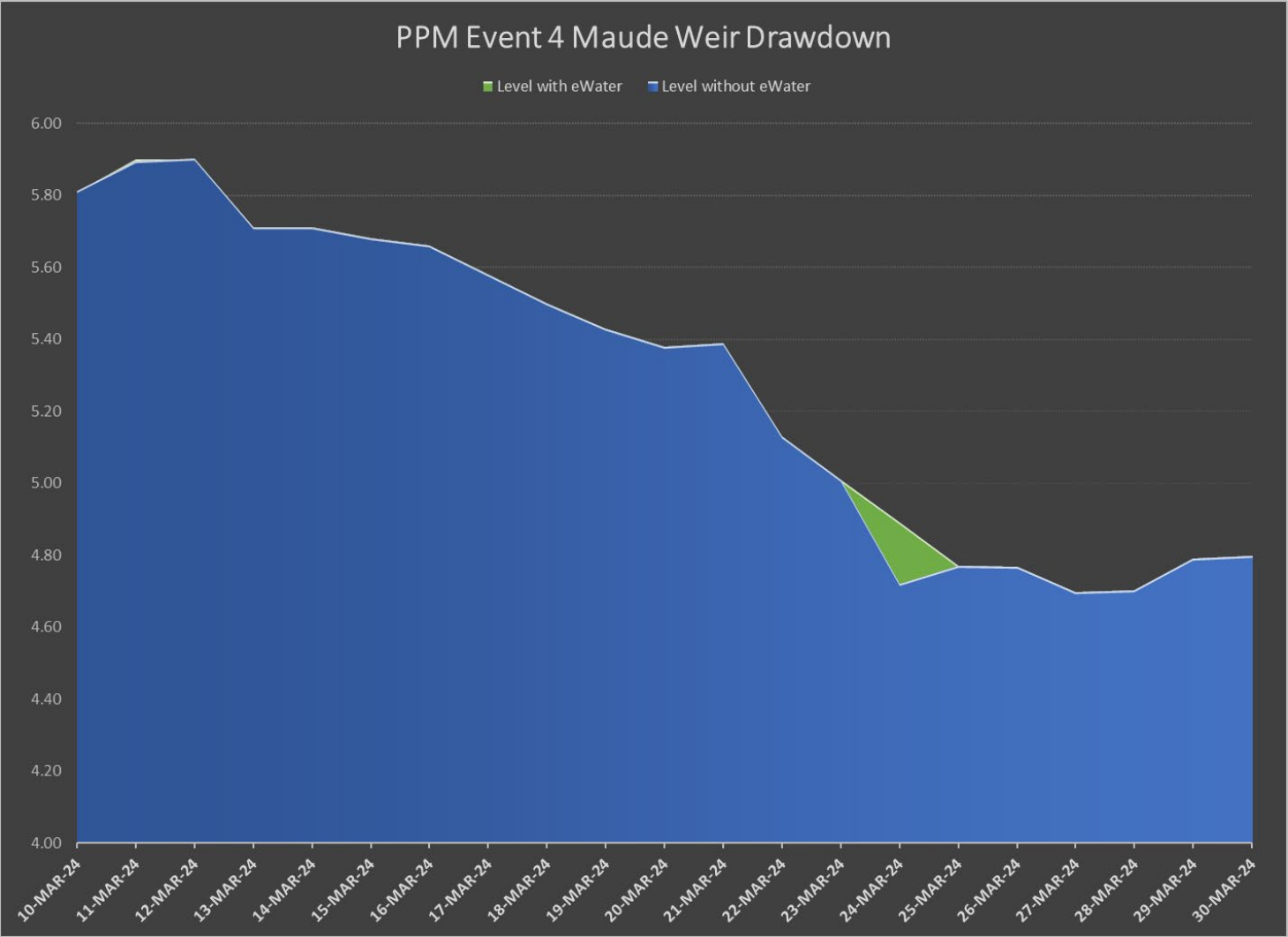


6.2.5.4.5 PPM event 4:

North Caira offtake regulator to remain fully opened during the ~10 day weir drawdown period until backflows from Bala cease (as measured at the Caira cutting gauging station) or the Maude weir pool reaches a level of 5.0M (which-ever occurs first).

- For all the flow rates specified plus or minus 10% is acceptable
- Forecast losses and actual losses (at an appropriate temporal scale for the event)
 - Loss were applied 1.1
- Volume of environmental water debited (with licence corresponding licence numbers)
 - 1,198 CEWO 40AL415740
 - Total 1,198 ML
 - Recognised to SA 430 ML/d**
- **Supporting documents:**
 - Gayini Nimmie Caira Event (Bala backflow) MBG23-24 0# Watering Instruction - Q2V1
 - D2024-47763 -Gayini Nimmie Caira Event (Bala backflow) MBG23-24 4# Re Assessment 2024 05 27

Figure 27: Maude Weir drawdown; Event 4



6.2.5.5 Stakeholder consultation

Table 64 provides a summary of stakeholder consultation. Supporting documents are provided in Attachment D.

Note: stakeholder consultation is not considered a core responsibility of WaterNSW. eWater holders have the responsibility of ongoing stakeholder consultation. Listed below are ongoing meetings WaterNSW actively attends and provides updates.

Table 64: Summary of stakeholder consultation

Date	Stakeholder forum/name	Environmental watering action/s discussed	Type of consultation (eg. Workshop, webinar, phonecall, letter, survey, public exhibition)	Summary of feedback	Stakeholder requests	List of supporting documents
Weekly	Bidgee Water Managers Catch-up	Ongoing environmental deliveries and planning	Teams Meeting	River ops and forecast update	DCCEEW-EHG	
Weekly	Murrumbidgee eWater updates	Ongoing environmental deliveries and planning	Teams Meeting	River ops and forecast update	NSW DCCEEW	
Var.	Account updates	Ongoing environmental delivery accounting updates	email	accounting updates	NSW DCCEEW	

6.2.5.6 Recommendations to improve future environmental watering actions

Table 65 provides a summary of key issues encountered in 2023–24 and recommendations for addressing these. Supporting documents are provided in Attachment E.

Table 65: Summary of issues and recommendations

Environmental watering action	Issue	Agencies involved	Stakeholders involved	Recommendations	List of supporting documents
All	Water order process continued to frustrate all parties with the availability of water for delivery, the timeliness of amendments and the necessary feedback of actual use to the customers so that orders can be managed in real time.	EHG and WaterNSW	EHG, CEWO, TLM, NSW DCCEEW	The water orders must have all the elements as outlined in the PPM Procedures manual. (Section 2.4.2 of NSW PPM Procedures Manual for the Murrumbidgee Regulated River (Nov 2022))	
All	Directions for flow and accounting splits need to be delivered to the entire South Operations team. Direct emails to individuals of specific directions makes post even accounting and reporting difficult.	EHG and WaterNSW	EHG, CEWO, TLM, NSW DCCEEW	Include southoperations.team@waternsw.com.au in all correspondence. Possibility of creating a SharePoint page/folder to track history, changes and final decisions made for each event.	
All	Use of iWas ordering system rather than manual order placing	EHG and WaterNSW	EHG, CEWO, TLM, NSW DCCEEW	iWas would assist with tracking and final order placing rather than back and forth email tracking post event	
All	Planning	DCCEEW	DCCEEW EES, CEWO, TLM, NSW DCCEEW	Clear annual planning foresight required by e-water holders (under different scenarios) to provide operators an opportunity to look at long-term forecasting. Planning needs to be a less reactive.	
All	Recognition of PPM deliveries in the Yanco Creek	DCCEEW	EHG, CEWO, TLM, NSW DCCEEW	Further work is required to recognise PPM deliveries in the Yanco Creek. Losses between Darlot and Boundary Bend on the Murray need to be accounted for.	

Environmental watering action	Issue	Agencies involved	Stakeholders involved	Recommendations	List of supporting documents
All	Post event PPM direction review	DCCEEW	EHG, CEWO, TLM, NSW DCCEEW	when changes are agreed to the original PPM instruction eWater holder must submit the final agreed version to WaterNSW. Clear differences can be observed between the accounted flows and original PPM instruction	

Attachments

Attachment A – Risk assessments

Attachment B – Water orders

- Yanco-Billabong PPM Fish Flow (Yanco Offtake) 2023-24 MBG23-24 01 Watering Instruction - Q3V1
- Murrumbidgee PPM Native fish flows 2023-24 Watering Instruction - 2c (Balranald)
- Murrumbidgee PPM Native fish flows 2023-24 Watering Instruction - 2d (Balranald) Version 2
- Murrumbidgee PPM Native fish flows 2023-24 Watering Instruction - 2e (Balranald) – Final
- Gayini Nimmie Caira Event (Bala backflow) MBG23-24 0# Watering Instruction - Q2V1

Attachment C – Assumed Use Statements and evidence of other calculations used

- D2024-5152 Yanco Creek eWater Accounting 2023-24 Updated 20240319
- D2024-xxxxx - Murrumbidgee PPM -Native Fish Flow MBG23-24-No. 03- Jan-Feb 2024 _Assessment - 2_2024-03-11
- D2024-47376 - Murrumbidgee PPM -Native Fish Flow MBG23-24 2d Assessment 2024528 PPM Adjusted
- D2024-47372 - Murrumbidgee PPM -Native Fish Flow MBG23-24 2e Assessment 2024 05 27
- D2024-47763 -Gayini Nimmie Caira Event (Bala backflow) MBG23-24 4# Re Assessment 2024 05 27

Attachment D – Details of stakeholder consultation and feedback

Attachment E – Supporting documents for key issues encountered and recommendations to address these issues

6.3 CPHR Group (formerly BCS) Annual Environmental Watering Statement

Prerequisite Policy Measures: Annual environmental watering statement 2023–24

This statement was prepared by DPE-Environment and Heritage in accordance with the reporting requirements described under Section 5.1 of the Prerequisite Policy Measures Procedures Manual for the Murrumbidgee Regulated River and the Prerequisite Policy Measures Procedures Manual for the NSW Murray and Lower Darling Regulated Rivers ('the PPMs Procedures Manuals').

Table 66: BCS's 2023–24 Annual Environmental Watering Statement approvals

Report prepared by		Report approved by	
Position	DCCEEW BCS	Position	DCCEEW BCS
Contact number		Contact number	
Date prepared		Date approved	

This statement has been considered and reviewed by other relevant environmental water holders as appropriate, including the Commonwealth Environmental Water Holder and the MDBA.

6.3.1 List of environmental watering actions

Table 67 provides a list of the environmental water actions undertaken using Prerequisite Policy Measures (PPMs) in the 2023–24 water year. Attachment A includes relevant supporting documentation for each event, including:

- Water Event Plan (Form A – Request to Deliver Environmental Water)
- Water Event Outcome (Form B – Environmental Water Delivery Report)
- Water Orders (including email orders)

Table 67: List of environmental watering actions using PPMs in 2023–24

Event number (From Form A)	Event#1	Event#2	Event#3	Event#4	Event#5	Event#6	Event#7	Event#8
Name of environmental watering action	Great Darling Anabranh	Lower Darling/Baaka	Murray River Multi-Site 2023–2024	Edward-Wakool river system 2023–24	Murray River Winter Flow: April–June 2024	Lake Victoria directed release	Murrumbidgee Fish Flow 2023–24	Yanco-Billabong Fish Flow 2023–24
River system/target valley	Darling anabranh channel and adjoining floodplain lakes	Lower Darling River channel	Murray	Murray	Murray and Edward River channels	Murray	Murrumbidgee	Murrumbidgee
Description of environmental watering action	Delivery of flows to the Darling Anabranh with return flows to South Australia (rather than re-regulate or capture in Lake Victoria).	Delivery of flows to the Lower Darling with return flows to South Australia (rather than re-regulate or capture in Lake Victoria).	Delivery of water to numerous rivers, creeks and wetlands along the River Murray between Hume and the SA Border, including the Barmah-Millewa Forest and the Edward-Wakool Systems.	Delivery of extra in-channel flows through the Wakool River system outside of River Murray Multisite deliveries using Wakool seasonal loss allowance.	Deliver return flows to South Australia (rather than re-regulate or capture in Lake Victoria).	River Murray in channel delivery (via directed releases from Lake Victoria during unregulated flow conditions).	Delivery of eWater down the Murrumbidgee with return flows to South Australia (rather than re-regulate or capture in Lake Victoria).	Delivery of eWater down the Yanco-Billabong system with return flows to South Australia (rather than re-regulate or capture in Lake Victoria).

Event number (From Form A)	Event#1	Event#2	Event#3	Event#4	Event#5	Event#6	Event#7	Event#8
Environmental site/s targeted	Darling anabranh	Lower Darling River	Murray River Hume to SA and Edward-Wakool River system	Edward-Wakool River system (Yallakool, Wakool and Colligen-Niemur)	Murray River Hume to SA and Edward River	Murray River channel	Murrumbidgee river	Yanco-Billabong (Murrumbidgee)
PPMs action	Recognition of HEW inflows from the Anabranh – return flows in the River Murray from environmental orders at Cawndilla Outlet.	Recognition of HEW inflows from the Lower Darling – return flows in the River Murray from environmental orders at Weir 32.	Directed releases from Hume Dam Assumed use for directed releases from Hume Dam.	Directed releases from Hume Dam - return flows from the Wakool System (when the intended flow at Yarrawonga is less than the maximum planned release as described in SO&O 3.1b).	Directed releases from Hume Dam Assumed use for directed releases from Hume Dam.	Directed releases from Lake Victoria during unregulated flow conditions.	Recognition of HEW inflows from the Murrumbidgee River (return flows) in the River Murray.	Recognition of HEW inflows from the Murrumbidgee River (return flows) in the River Murray.
Delivery start date	1/07/2023	19/08/2023	1/08/2023	1/12/2023	1/04/2024	1/10/2023	2/09/2023	1/09/2023
Delivery end date	30/06/2024	30/06/2024	4/12/2023	31/05/2024	30/06/2024	30/11/2023	20/05/2024	15/02/2024

Event number (From Form A)	Event#1	Event#2	Event#3	Event#4	Event#5	Event#6	Event#7	Event#8
Volume of environmental water ordered (ML)								
Total volume of environmental water debited (ML)	50,624	89,498	254,898	79,256	46,937	47,647	383,529	19,591
Volume of environmental water debited by licence holder (ML)	CEWH 48,270, NSW PEW 2,354	NSW EWA 30,000, NSW PEW 5,198, TLM 54,300	CEWH 177,961, TLM 30,000	CEWH 58,010, NSW HEW 21,246	CEWH 19,497, TLM 7,940, RMIF 19,500	CEWH 22,647, TLM 25,000	CEWH 203,235, NSW PEW 89,124, NSW HEW 21,170, TLM 70,000	CEWH 8,405, NSW 11,186
Return flow volume recognised (end of system)								
Return flow volume recognised (SA border)	35,570 (split between CEWH and NSW not provided)	43,323	173,592 (158,846 CEWH, TLM 14,746)	-	38,497 (17,129 CEWH, TLM 11,368, RMIF 10,000)		276,627 (189,793 CEWH, 19,297 NSW HEW, 67,537 TLM)	0

6.3.2 Water orders

Table 68 provides an overview of the environmental water orders received for Prerequisite Policy Measures in the 2023-24 water year (including any order that was subsequently refused/rejected).

Further detail is provided in Attachment A as needed, including water orders and assumed use statements. If any water order using PPMs was refused, documentation and rationale supporting this decision is provided.

Table 68: Water orders placed in 2023–24

Event number	Event#1	Event#2	Event#3	Event#4	Event#5
Date order was submitted					
Volume of original order (ML)					
Form of water order submitted (e.g. Form A, email, verbal, other)					
List of supporting documents					

6.3.3 Risk assessment and mitigation

Table 69 details any risks identified during the planning of environmental water events which relied on Prerequisite Policy Measures, including deliverability risks, operational risks and other risks considered. The mitigation measures applied are also included in Table 69. Supporting information is included in Attachment B.

Table 69: Risks considered during event

#	Description of risk	Mitigation measure/s applied
1	Water usage (and return flows) is not separated between the CEWH and NSW, where allocations from both water holders are ordered from the same Water Access Licence. This means that water usage (and particularly PPM) reporting can be difficult to split between the water holders.	With appointment of an ‘Environmental and Cultural Flows Manager’ within WaterNSW, return flow accounting was vastly improved in 2023–24, with regular and accurate water usage and return flows accounting across most valleys. Separating of water usage and return flows between the CEWH and NSW is an area that needs further work to enable both CEWH and NSW to report on the return flows from their respective water use. The PPM Manual states “<i>the volume of water accounted as held environmental water that is to be passed into the Murray will also be specified, split by contributing environmental water holders/licences</i>”.

6.3.4 Environmental outcomes

Table 70 provides a summary of the objectives of the environmental watering event and the extent to which these objectives were met. It also provides information on the environmental outcomes observed to date, any ongoing monitoring of these outcomes. Supporting documents are included in Attachment C.

Table 70: Summary of environmental outcomes

Event number	Event name	Environmental objectives	Degree to which environmental objectives were satisfied	Environmental outcomes observed or being monitored
1	Great Darling Anabranch	Longitudinal connectivity for native fish and maintain habitat for waterbirds	Yes, objectives were satisfied	This water event maintained connectivity from Lake Cawndilla through to the Murray for the duration of the 2023–24 water season. This connectivity providing an opportunity for native fish dispersal from Lake Cawndilla to the Anabranch, and potentially further to the Murray River. Waterbirds were supported, particularly on Kangaroo and Packers Lakes. Vegetation has benefitted from consecutive years of flow. Landholders and community have reported seeing rakali, yabbies and turtles, with anglers noting Murray cod are moving into the lower reaches of the Anabranch.
2	Lower Darling/Baaka	Longitudinal connectivity for native fish and ecosystem processes	Yes, objectives were satisfied	Monitoring of native fish populations is ongoing however the event was critical for maintaining baseflows, connectivity and basic riverine functioning and water quality through the system in 2023–24. Juvenile golden perch are expected to have continued dispersing from the Menindee Lakes to the Lower Darling/Baaka and Murray during the event. Murray cod breeding (a key target in recovering the native fish population following the previous year's fish kills) unfortunately did not occur and the cod population remains in poor condition. However, a remnant breeding population remains and was supported by the flows, providing further opportunities to promote breeding in future years.

Event number	Event name	Environmental objectives	Degree to which environmental objectives were satisfied	Environmental outcomes observed or being monitored
3	Murray River Multi-Site 2023-2024	Lateral and Longitudinal connectivity for native fish and ecosystem processes	Yes, objectives were satisfied	Multiple monitoring projects demonstrated outcomes for native fish movement, spawning (golden and silver perch spawning detected) and recruitment along the length of the Murray. Upstream of Torrumbarry, the autumn fish census showed high abundances (including new recruits) of Murray cod, golden perch and silver perch. From Torrumbarry to Euston, Murray cod and silver perch abundances were low, while golden perch numbers had improved compared to 2023. Inundation of Barmah-Millewa Forest floodplains and wetlands provided for growth and expansion of native Moira grass and other understorey and creek/wetland vegetation. Australian white ibis and straw-necked ibis (with some royal spoonbill) were observed nesting at Reed Beds Swamp in Millewa Forest.
4	Edward-Wakool River system 2023-24	Longitudinal connectivity for native fish and ecosystem processes	Yes, objectives were satisfied	Monitoring showed that this event improved the health of the lower Wakool River system and helped prevent fish kills following overbank flows through the Koondrook-Perricoota Forest.
5	Murray River Winter Flow: April-June 2024	Longitudinal connectivity for native fish	Yes, objectives were satisfied	The event maintained baseflows through late autumn/early winter maintaining minimum flowing habitat through hundreds of kilometres of rivers and creeks along the Murray and Edward-Wakool system.
6	Murrumbidgee Fish Flow 2023-24	Support lateral and longitudinal connectivity for Fish	Yes, objectives were satisfied	Monitoring showed that the event provided opportunities for Golden Perch dispersal up the Murrumbidgee from the Murray.

6.3.5 Stakeholder consultation

Section 5.1 of the PPMs Procedures Manuals states that the Annual Environmental Watering Statement must document “any feedback from consultation with stakeholders on the actions undertaken”.

Table 62 provides a summary of stakeholder consultation. Supporting documents are included in Attachment D.

Table 71: Summary of stakeholder consultation

Date	Stakeholder forum/name	Environmental watering action/s discussed
20/06/2023 and 28/11/2024	Murray Lower Darling Environmental Water Advisory Group	Edward-Wakool River system 2023–24, Murray River Multi-Site 2023-2024, Great Darling Anabranh, Lower Darling/Baaka, Murray River Winter Flow: April-June 2024
1/05/2024	Edward Koley Wakool E-Water Reference Group	Edward-Wakool River system 2023–24
27 September 2023	Murrumbidgee Environmental Water Advisory Group	Murrumbidgee Fish Flow 2023–24

6.3.6 Attachments

Attachment A – Environmental watering event – supporting information

- Water Event Plan (Form A – Request to Deliver Environmental Water)
- Water Event Outcome (Form B – Environmental Water Delivery Report)
- Water Orders (including email orders)

Attachment B – Environmental outcomes supporting information

Attachment C – Risk assessments

Attachment D – Details of stakeholder consultation and feedback

Attachment E – Supporting documents for key issues encountered and recommendations to address these issues

6.4 Key evaluation questions

Table 72: Assigned performance indicators for KEQs

Key evaluation questions (KEQs)	Performance indicators	Reason for indicator inclusion, use of indicator
KEQ 1 How consistently were PPMs implemented during the last water year and how did that compare to previous years?	PI 1a Extent to which agencies fulfilled their roles as set out in the Procedures manuals during each stage of the process	Demonstrate whether each agency fulfilled their key obligations through each phase of PPMs, that is, planning, ordering, accounting, reporting phases. Assessed for each event relying on the implementation of PPMs.
	PI 1b Level of agency understanding of their roles and responsibilities	Determine how well each key agency understands of their obligations (activate if PI 1a assessment falls below acceptable benchmark level).
	PI 2a Extent to which reports and supporting information were provided (including annual reports, event forecasts and post-event accounting)	This indicator assesses the quality and comprehensiveness of the information provided by implementing agencies. The provision of data and reporting elements is a key element of successful PPMs implementation. Good indicator performance demonstrates NSW compliance with the PPMs procedure; ongoing identification of issues and recommendations and areas for improvements; building of data sets; building basis for future reviews.
KEQ 2 Was the PPMs process implemented efficiently during the last water year and how did that compare to previous years?	PI 2b Extent to which reports, and supporting information were submitted on time (including annual reports, event forecasts and post-event accounting)	This indicator assesses timeliness of information provided by implementing agencies. The timely provision of data and reporting elements is a key element of PPMs implementation and an Environmental Watering Plan commitment; delay may indicate onerous or inappropriate reporting requirements or lack of understanding. Delay in post-event accounting may also limit the efficient and effective use of HEW.
KEQ 3 How effective are PPMs in improving the use and accounting of environmental water?	PI 6 Extent to which accounting arrangements demonstrated improved efficiencies for environmental water use	Demonstrate from an accounting perspective where and how there have been ongoing improvements and efficiencies for how environmental water is accounted for and used.
KEQ 4 Are adaptive management processes effective in improving PPMs implementation?	PI 5 Extent to which recommendations from previous reviews were actioned	Determine if NSW making good on our commitment for review and continuous improvement.

Key evaluation questions (KEQs)	Performance indicators	Reason for indicator inclusion, use of indicator
	PI 7 Extent to which the level of conservatism in arrangements was commensurate with risk to other water users	Determine if the level of conservatism changes (i.e., decreases) as our knowledge, understanding and management of the real risk improves (e.g., ensure that the EWHs are not 'paying' for unnecessary conservatism to enable optimisation of e-water use).
KEQ 5 How can the implementation of PPMs be improved?	PI 3 Extent to which the process cannot be implemented as intended	Addresses consistency aspects. Identifies which elements of the process cannot be implemented by a particular agency (or agencies) and why not (impediments or barriers).
	PI 4 Extent to which risks were well managed	Addresses efficiency aspects. Management of risks, including risk to other water users, is important given that PPMs provide a new way of managing water requiring effective processes to be established and followed. New and emerging risks should be assessed, mitigated and documented as they arise. The mitigation of risks to other licence holders is also a key principle of PPMs implementation.

6.5 Evaluation results

Table 73: Evaluation results

Indicator	Annual performance	Evidence to support performance assessment	Trend since PPMs started
PI 1a Extent to which agencies fulfilled their roles as set out in the Procedures Manual during each stage of the process	Moderate: Agencies generally fulfilled nominated responsibilities. When not met, explanation of when, why and circumstances are identified and documented. Reports submitted in full. Activates assessment of PI 1b.	At a broader level, all agencies made a genuine attempt to make good on their PPMs responsibilities; this level of adhere to roles and processes is generally consistent with previous years. Obligations around the collaborative development of risk assessments and regular reporting on return flows split by licence holder are areas which have not been fully subscribed to both in this water year and earlier. It is noted that the PPMs Procedures Manual is possibly not prescriptive enough around requirements for WaterNSW and CPHR in terms of water ordering and provision of data.	Neutral: Retention of low or moderate performance
PI 1b Level of agency understanding of their roles and responsibilities	Moderate: Agencies generally understand nominated responsibilities. Most areas of poor understanding are identified and there are plans to address them.	Consistent to previous years, all agencies have a general understanding of their nominated responsibilities as set out under PPMs. The day-to-day busyness of staff across all agencies and the resource-intensive nature of the planning and reporting of events using PPMs (as opposed to say consumptive water orders) are the sticking point. However, this is generally fully articulated or captured in any reporting or meeting minutes.	Neutral: Retention of low or moderate performance

Indicator	Annual performance	Evidence to support performance assessment	Trend since PPMs started
PI 2a Extent to which reports and supporting information were provided, including annual reports, event forecasts and post-event accounting	Moderate: Most agencies submitted reporting elements with relevant supporting information	The annual reports provided were generally complete in that all sections of the reports were generally filled in. Relevant supporting information was provided, such as accounting spreadsheets. In both reporting elements (that is, the river operations report and the environmental watering statements), both the risk assessment and issues/recommendations sections of the respective report would benefit from more complete documentation to provide meaningful input into the PPMs review process, not only including agency perspectives on recommendations as to how these risks or issues could be overcome (as was done for the 2023–24 water year) but also specifying which agency is responsible for enacting on the risk mitigation/elimination and/or recommendation.	Neutral: Retention of low or moderate performance
PI 2b Extent to which reports, and supporting information was provided, including annual reports, event forecasts and post-event accounting, were submitted on time	Moderate: 50–75% submitted within agreed timeframes or by submission dates	The timely provision of reporting elements by partner agencies has improved and allowed the department to meet its reporting obligations to have an annual review report completed before the end of the following water year.	Neutral: Retention of low or moderate performance
PI 3 Extent to which the process cannot be implemented as intended	Moderate: Process is generally implemented; where there have been deviations or departures from process, there is a documented reason including identifying any possible risk or implications; barriers have been identified but not addressed.	While the overall PPMs process was generally implemented as intended, return flows were not able to be recognised for two events (Edward River and Yanco Creek).	Neutral: Retention of low or moderate performance

Indicator	Annual performance	Evidence to support performance assessment	Trend since PPMs started
PI 4 Extent to which risks were managed	Low: No evidence of consideration of risks during PPMs implementation.	Whilst there is some documentation to support an assessment of how risks were identified and managed, there needs to be more detailed capture of these risks and how they were mitigated so that opportunities to learn from these planning discussions can be 'built' into subsequent events or any supporting measures (such as assumed use methods or accounting arrangements). Also, the risk identification table in the WaterNSW's River Operations Report and CPHR's Annual Watering Statement could be improved by the Water Group by including who (that is, which agency) is responsible for implementing a long-term and sustainable risk mitigation measure that aims to eliminate the risk.	Neutral: Retention of low or moderate performance
PI 5 Extent to which recommendations from previous reviews have been actioned	Moderate: Prior review recommendations are included in this year's workplan; PPMs Working Group are generally satisfied with this year's progress on high priority actions.	Progress has been made on all of the recommendations made in the previous year's annual review (2022-23), including some larger pieces of work such as updating the Procedures Manuals, implementing or trialling accounting arrangements — for example, Yanco, Murrumbidgee, Murray Multi-site, Lower Darling, GDA and Edward-Wakool. Outstanding items remain on the workplan. The PPMs WG prioritise items on the workplan based on resources and their watering priorities. It is expected that the number of items on the workplan will reduce over time, as key tasks (such as those required under FAA and IPART) are completed.	Neutral: Retention of low or moderate performance

Indicator	Annual performance	Evidence to support performance assessment	Trend since PPMs started
PI 6 Extent to which accounting arrangements demonstrated improved efficiencies	Moderate: Accounting arrangements have been implemented for 3+ years without review; post-event accounting can demonstrate efficiencies in the volumes of e-water used.	Environmental water accounting demonstrates the efficiencies provided by PPMs in the southern NSW Basin. Without PPMs in place, the 213,000 ML of residual flows reaching the River Murray would otherwise have been re-socialised/reallocated to NSW resources. Similarly, a large portion of these return flows were then able to be recognised at the SA border, providing opportunities for downstream environmental benefits. Post-event began for the Wakool loss arrangement during 2022–23. This compared the real-time/gauged water balance data seasonal loss table percentages. It showed that the loss table was significantly over-estimating loss and informed the development of a new loss accounting method. The LD, GDA and Murray methods are due for review in 2025.	Neutral: Retention of low or moderate performance
PI 7 Extent to which the level of conservatism in arrangements were commensurate with risk to other water users	Moderate: Level of conservatism in discretionary decision making is somewhat commensurate with risks to other water users; new knowledge, understanding and data partially incorporated; not all arrangements have been subject to review of actual versus estimated losses.	NSW PPMs implementation principles state that they will be implemented to the extent that impacts on other licence holders can be mitigated or offset; where there is uncertainty, NSW adopts a precautionary approach to minimise potential detrimental impacts. During the 2023–24 water year a review of the Wakool method was conducted showing that the method significantly over-estimated losses. This will form the basis of the review of the method and potential new accounting arrangements.	Neutral: Retention of low or moderate performance

Indicator	Annual performance	Evidence to support performance assessment	Trend since PPMs started
PI 8 Extent to which PPMs are being adaptively implemented	Moderate: Any barriers to implementation are identified and discussed by the PPMs WG; supporting documentation (including procedures manuals) are updated as needed.	PPMs are being adaptively implemented, as demonstrated by both the types of events using PPMs for more efficient environmental water delivery, and also through (gradual) improvement of arrangements that are in place. There have been significant efforts made to adaptively implement PPMs. Yanco PPMs were trialled and from the outcomes, challenges were identified for rectification.	Neutral: Retention of low or moderate performance

6.6 Fulfillment of roles and responsibilities

Table 74: Fulfillment of roles and responsibilities

Requirement	Water Group	WaterNSW	CPHR Group	MDBA (TLM)	CEWH	NSW PPMs WG	Further Details
Planning							
Environmental water holders develop annual environmental watering priorities, strategies, and plans and inform the department			✓ (somewhat)				Water priorities for the upcoming year were provided at the July 2023 PPM WG meeting. It is recommended that there is a process where this is shared with river operators as part of annual planning.

Requirement	Water Group	WaterNSW	CPHR Group	MDBA (TLM)	CEWH	NSW PPMs WG	Further Details
CPHR to work collaboratively with other environmental water holders (i.e. CEWH and through the Southern Connected Basin Environmental Watering Committee - SCBEWC if appropriate) in the planning and coordinated use of environmental water			✓	✓	✓		Submission of annual watering proposals to SCBEWC and participation on SCBEWC. Regular collaboration between CPHR and CEHW evidence throughout the year via emails and meetings.
NSW PPMs workplan maintained, and incorporates annual environmental watering priorities as provided by EWHs	✓						Requested group to review of workplan at PPMs WG meeting in December 2024 via shared document on SharePoint.
Assist in developing assumed use/in-stream loss rates/methods as per principles and rules in this Manual	✓	✓	✓	✓	✓		All agencies participated in the development of the Yanco, Werai, Wakool and GDA accounting methods.
Assess assumed use/in-stream loss rates/methods as per principles and rules in this Manual	✓						Wakool accounting method assessed as per principles in Procedures manuals.
Approve proposed interim arrangements or trials if suitable conditions and mitigation measures are demonstrated	✓						Interim arrangements approved for Yanco Creek.
Consult with the PPM Working Group on any new or revised actions or supporting measures	✓					✓	New Yanco accounting method and revised Wakool options paper presented to the PPM WG Meeting November 2023.

Requirement	Water Group	WaterNSW	CPHR Group	MDBA (TLM)	CEWH	NSW PPMs WG	Further Details
Classification of take / return measurement at recognised environmental watering sites	✓	✓					WaterNSW ensure the measurement accuracy for the debiting of environmental water and recognition of return flows in sites as per Procedures Manuals and meets the requirements of the NSW non-urban metering policy.
Work collaboratively to develop orders for environmental water actions and recommend appropriate risk mitigation strategies	✓ (somewhat)	✓ (somewhat)	✓ (somewhat)	✓ (somewhat)	✓ (somewhat)		General collaboration; however, further collaboration during the planning stage would assist in risk identification and contingency planning.
Environmental water holders work with WaterNSW to develop a watering proposal, including target flow and location		✓	✓	✓	✓		CPHR did not identify any impediments to this process in their Annual Environmental Watering Statement.
Review and approval environmental watering proposal/plan using PPMs	✓						Events using PPMs are not always provided to the department; for example, watering the Edward-Wakool and some of the Murrumbidgee events.
Implementation (ordering & release & accounting)							

Requirement	Water Group	WaterNSW	CPHR Group	MDBA (TLM)	CEWH	NSW PPMs WG	Further Details
CPHR submits Water Order to WaterNSW			✓				In their annual reports, WaterNSW raised that sometimes the order is placed within the WaterNSW ordering system after the event has commenced.
WaterNSW to consider operational risks and mitigation measures when considering water orders		✗ (somewhat)					Risks documented in the Environmental Release River Operations reports largely consider under/over-estimates and accounting. Operational risks are considered as per WaterNSW internal procedures however this is not documented in the PPMs process.
WaterNSW to collaborate with CPHR on risk and mitigation strategies as they relate to the use of PPMs prior to approval or rejection of water orders		✗ (somewhat)	✗ (somewhat)	✗ (somewhat)	✗ (somewhat)		No documentation of this provided.
For approved Water Orders, WaterNSW is to operate the river accordingly		✓					Evidence provided in WaterNSW reports.
For Water Orders that are refused or rejected, WaterNSW is to document the supporting explanations in the Annual Environmental Release River Operations Report		✓					No reports indicated that any order was refused or rejected.

Requirement	Water Group	WaterNSW	CPHR Group	MDBA (TLM)	CEWH	NSW PPMs WG	Further Details
Environmental water managers are required to undertake appropriate communication actions to ensure that potentially affected landholders and the general community are aware of the proposed watering event			✓				Annual Environmental Watering Statement listed consultation with Murrumbidgee and Murray Lower Darling EWAGs.
WaterNSW to provide operational reporting on release of environmental water, including regular environmental water use accounting during events		✓					Reporting provided to EWHs during events.
Accounting							
WaterNSW to provide monthly reporting to environmental water holders on water usage and return flows, split by licence holder		✗ (somewhat)					Monthly reporting provided to EWHs, however return flows are not reported by licence holder for some valleys.
WaterNSW determines and debits volume of held environmental water as a result of environmental watering actions using PPMs via an assumed use statement (including supporting information such as loss rates, source of data and assumptions)		✓					Assumed use statements are not provided. WaterNSW provide volumes of debit and return flows by way of email with supporting spreadsheets that set out the calculations based on the assumed use method (and also included in their PPMs annual environmental release statement).
Adaptive management (reporting & evaluation)							

Requirement	Water Group	WaterNSW	CPHR Group	MDBA (TLM)	CEWH	NSW PPMs WG	Further Details
WaterNSW will provide an Annual Environmental River Operations Report and relevant supporting information		✓					Yes, provided 15 December 2024
CPHR to provide an Annual Environmental Watering Statement and relevant supporting information			✓				Yes, provided 26 November 2024
CPHR to provide the CEWH and MDBA (TLM) with the Annual Environmental Watering Statement for their review			✓	✓	✓		Email from CEWH to CPHR on 22 November 2024 with comments on the report, confirming review occurred.
Water Group to complete Annual Evaluation and Review Report	✓						Final Annual Report completed for 2022–23 by 30/06/24, published on the Water website on 6/07/24. For the 2023–24 Annual Report we are on track for draft submission to the PPM WG in May 2025 and final version by 30/06/25.
Consult with WaterNSW, CPHR, MDBA and CEWH via the PPMs Working Group when conducting each annual review, including the annual evaluation and review report and its recommendations	✓					✓	Consultation and opportunity for review provided to the WG on the 2022-23 report. The 2023–24 report will be circulated to the PPM WG Out of Session (OoS). CPHR, WaterNSW and the CEWH had input into the annual report and further discussions have been arranged with these agencies as required.

Requirement	Water Group	WaterNSW	CPHR Group	MDBA (TLM)	CEWH	NSW PPMs WG	Further Details
Developing and documenting accounting arrangements for new or interim actions	✓						New accounting arrangements for Yanco were trialled in 2023–24. New arrangements for Werai and Wakool were progressed during the 2023–24 water year and completed in 2024–25.
Building and expanding data sets	✗ (somewhat)	✗ (somewhat)					Not formally undertaken as an action; however, data received from PPMs actions are collated and stored.
Hindcasting and review	✗ (somewhat)	✗ (somewhat)					Review and refinement of Wakool was started in the 2023–24 water year.
Refining/improving accounting arrangements	✓ (somewhat)						Work to refine/improve the Wakool method occurred during 2023–24 water year.
Updates to Procedures manuals published	✗ (somewhat)						Updates were made in December 2022, further updates are required based on the recommendations of this report. Updated and published manuals are planned for end 2025.
Approved and documented accounting methods	✓						New arrangements are documented and shared with the PPMs Working Group and WLWG for approval.

Requirement	Water Group	WaterNSW	CPHR Group	MDBA (TLM)	CEWH	NSW PPMs WG	Further Details
Review and approve PPMs arrangements and any subsequent variations following the review phase of PPM operations	x						This doesn't occur post-event.
Consultation							
Water Group to consult with WaterNSW, CPHR, MDBA via the NSW PPM WG on the annual review, developing new or existing actions and supporting measures	✓						Three PPM working group meeting were held during 2023–24 (July 2023, November 2023 and March 2024)
WaterNSW will consult with water users or their representative groups via existing forums and provide a summary as part of the requirements of the Annual Environmental Releases River Operations Report		✓					Consultation summary completed for all water actions. Consultation with Edward-Wakool Operations Advisory Group.
CPHR will consult with the river operator regarding proposed watering actions using PPMs before placing the order			✓				Delivery instructions sent to WaterNSW for most events prior to the placing of the order.

6.7 PPM Working Group Work Plan

6.7.1 Meetings and administration

Table 75: PPM Working Group Work Plan – meetings and administration

Task ID	Action	Responsibilities	Due	Priority	Status
0.1	PPM Working Group meetings	All agencies	Quarterly	Routine	In progress
0.2	Ad hoc PPM technical working group/s meetings (to discuss accounting arrangements)	All agencies	As required	Routine	In progress
0.3	Update NSW PPM workplan. To be reviewed each WG meeting.	Water Group	Quarterly	Routine	In progress
0.5	Review of work approval conditions to reflected gazetted WSP rules. This will be included in the scope of works for the revised Procedures Manuals	Water Group	31 December 2025	Medium	Not Started
0.6	PPM meetings with WaterNSW and Water Allocations	Water Group	Fortnightly	Medium	In progress
0.7	Interagency meetings on Murrumbidgee multi-site accounting	Water Group	As required	Medium	In progress
0.8	NSW PPM EEWD Meetings. EEWD-PPM linkages to be explored, with EEWD contribution to PPM workplan to be confirmed in EEWD Stage 1B, for delivery in EEWD Stage 2. EEWD Stage 1B is complete June 2024, with Stage 2 June 2024 to December 2026.	Water Group	31 December 2026	Medium	In progress

6.7.2 Reporting and communication

Table 76: PPM Working Group Work Plan – reporting and communication

Task ID	Action	Responsibilities	Priority	Status
1.1	PPMs Communications and Consultation Plan	Water Group	High	In progress
1.7	Annual PPM evaluation and review report 2023–24			
1.7a	Draft annual review report	Water Group	Medium	Complete
1.7b	Internal review	Water Group	Medium	Complete
1.7c	Share with PPM WG for comment	Water Group	Medium	Complete
1.7d	Finalise report	Water Group	Medium	Complete
1.7e	Publish report on environmental water management website	Water Group	Medium	Complete
1.8	Streamline annual reporting	Water Group	Medium	In progress

6.7.3 Watering priorities and technical tasks (by valley)

6.7.3.1 Murrumbidgee

Table 77: PPM Working Group Work Plan – watering priorities and technical tasks – Murrumbidgee

Task ID	Action	Responsibilities	Priority	Status
2.1	Develop loss an accounting method for Mid-Murrumbidgee wetlands reconnection event (multi-site) e-water deliveries of up to 22,000ML/d to Wagga Wagga for return flow recognition at Balranald. WaterNSW Modelling team to do modelling work and Water Group to guide methodology development, analysis and write up of accounting arrangement. This needs to encompass: - Accounting treatment of environmental flow reuse from Mid-Murrumbidgee wetlands to Balranald – this should also include from Wagga if that is a delivery location also. - Consider dam wall debit accounting of releases from storage. Future lifted constraints will be considered once the Murrumbidgee Source Model has been improved to include the loss work.	Water Group, BCS, RRC, WaterNSW, EEWD	High	In progress
2.2	Lowbidgee weir pool filling Previously EWHs have been charged to fill weir pools when conditions are dry/maintenance mode (e.g. if WaterNSW delivering to only one or two customers). Consider if EWH have ownership of the water d/s of the weir/event (i.e. similar to a multi-site arrangement) e.g. consider accounting treatment of return flows to fill Lowbidgee weir pools to enable delivery of e-water into GNC, Yanga or Redbank.	BCS, WaterNSW, Water Group	Medium	In progress
2.4a	Lowbidgee return flows (Yanga, Gayini Nimmie Caira and Redbank) Progress assumed use method for losses through Yanga, Gayini Nimmie Caira and Redbank. E-water delivery accounting arrangement to Redbank via Yanga and Tala with recognition at Balranald has been done. Need to include the option that was implemented into the updated Procedures Manual.	Water Group, BCS, WaterNSW	Low	90% complete

Task ID	Action	Responsibilities	Priority	Status
2.4b	Lowbidgee return flows (Gayini Nimmie Caira) Progress assumed use method for losses through Gayini Nimmie Caira. Lowbidgee return flows (Gayini Nimmie Caira) yet to be worked out & requires BCS input.	Water Group, BCS, WaterNSW	Low	In progress
2.6	Yanco Creek post-event accounting review. A new and improved accounting arrangement was shared with the PPM WG on 25/11/24. Need to include the option that was implemented into the updated Procedures Manual.	Water Group, WaterNSW, EEWD	High	90% complete
2.7	Review of the BED approach.	Water Group	Low	Not started
2.9	Develop procedures and or policies in relation to the accounting of environmental water events for the management of small supplementary events in the Lowbidgee in relation to PPMs. Need to include it clearly in the updated Procedures Manual that supplementary water is protected.	Water Group, BCS, WaterNSW	High	95% complete
3.0	Murrumbidgee dam/s recession rates, investigate changes to the WSP to address this issue e.g. amendment to allow piggybacking on translucency releases	Water Group, BCS	High	In progress
3.1	Mid-Murrumbidgee wetlands/forests – are there any watering events where you need to open an ungauged regulator to water a site during regulated conditions where there are no current accounting arrangements in place?	BCS	Low	Not started
3.2	Review the Murrumbidgee HEW to Murray loss lookup tables and method	Water Group	High	Not started

6.7.3.2 Lower Darling and Great Darling Anabranh

Table 78: PPM Working Group Work Plan – watering priorities and technical tasks – LD & GDA

Task ID	Action	Responsibilities	Priority	Status
3.2	NSW to develop position paper and ministerial briefing on return flows from MLS when the system is a NSW only resource.	Water Group	High	In progress
3.5	Confirm and document how losses are shared/reallocated between the states during MDBA control – some deliveries have been made, needs to be documented. This is included in the scope of works for the revision of the procedures manuals.	Water Group with Vic and MDBA	High	In progress
3.6	Review of Lower Darling losses (W32 to Burtundy).	Water Group	Low	Not started
3.7	Review of GDA accounting arrangements	Water Group	Low	Not started

6.7.3.3 NSW Murray

Table 79: PPM Working Group Work Plan – watering priorities and technical tasks – NSW Murray

Task ID	Action	Responsibilities	Priority	Status
4.1.2	Adjusted Wakool loss model in the River Murray Operations Bulk account	MDBA	High	In progress
4.3	Millewa Forest accounting – review of MDBA accounting method	Technical working group	Low	Not started
4.4	Confirm PPMs arrangements for D/s Stevens Weir deliveries below 2,700ML/d and update procedures as per the Murray Lower Darling Procedures Manual	Water Group	High	In progress
4.5	Koondrook Perricoota accounting arrangement	Water Group with agency input	Low	Not started

6.7.4 One-off tasks

Table 80: PPM Working Group Work Plan – watering priorities and technical tasks – one-off tasks

Task ID	Action	Responsibilities	Priority	Status
5.2	Revise and publish Murray and Murrumbidgee Procedures Manuals. Updated manuals to include: - Streamlined PPMs process including fit-for-purpose water ordering (improve and better document planning and ordering process including mapping out contingencies prior to e-water events) - Assumed use template - New accounting measures (may be in the form of a catalogue) - Requirement for a consistent environmental watering event identifier between agencies and WaterNSW - Review debiting methodology for piggybacking	Water Group	High	In progress