

# South Australia's Prerequisite Policy Measures Implementation Plan for the River Murray in South Australia

South Australian Department of Environment, Water and Natural Resources

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## Table of Contents

1. Introduction .....	3
2. Background .....	3
3. Risks .....	4
4. Identifying the Issues .....	4
5. Assessment of Issues .....	5
Issue 1: Enhance governance and transparency of river operations .....	5
Issue 2: Tracking and reporting of environmental water .....	10
Issue 3: No substitution between planned and held environmental water .....	11
Issue 4: Develop a loss methodology for environmental water .....	12
Issue 5: Timing and magnitude of return flow .....	13
6. Next steps and workplan summary .....	14
7. Appendix 1 .....	15
8. Appendix 2 .....	18
9. Appendix 3 .....	20
10. Appendix 4 .....	21

## 1. Introduction

This document is the Prerequisite Policy Measures (PPM) Implementation Plan (the Implementation Plan) for the South Australian River Murray. States agreed to develop draft Implementation Plans by June 2015 with a revised plan by December 2015 and final Implementation Plans due by June 2016. This document was developed with due regard to the PPM Assessment Guidelines (Assessment Guidelines) and refined with ongoing input from MDBA officers. This Implementation Plan outlines the issues associated with implementing the PPMs in South Australia and the pathway to full implementation by June 2019, via a series of actions summarised in section 6.

## 2. Background

In developing the Basin Plan, the Murray-Darling Basin Authority (MDBA) assumed that rivers (and environmental water deliveries for those rivers) will be managed to maximise environmental outcomes with the water available. This concept is being explored by Basin States through the multi-site environmental watering trials (now referred to as Large Scale Environmental Watering Events) in the River Murray. Consistent with the policies adopted in those trials, the two key policy assumptions used in the preparation of the Basin Plan were:

- environmental water flows throughout the length of the river, and between rivers; and is protected from extraction, re-regulation or substitution (PPM1);
- to allow the release of environmental water on top of other in-stream flows, including unregulated flow events (PPM2).

These assumptions are known as PPMs and are the most significant of the Operational and Management constraints identified in the Constraints Management Strategy (CMS) 2013. The PPMs outlined in the Basin Plan (s7.15) are:

- credit environmental return flows for downstream environmental use (PPM 1);
- allow the call of held environmental water from storage during unregulated flow events (PPM 2).

The PPM relating to the release of environmental water from headwater storage is not relevant to South Australia and will not be addressed further in this document. Flows between rivers are also not applicable in South Australia. Therefore, that PPM is restated for applicability to South Australia as 'Environmental water flows throughout the length of the river; and is protected from extraction, re-regulation or substitution'.

The MDBA has developed Assessment Guidelines to guide the development of Implementation Plans. The Guidelines set out the criteria that the Implementation Plans should contain and by which MDBA will assess the Implementation of PPMs to ensure full implementation. MDBA is required to assess the effectiveness of State policies to address the PPMs as part of the SDL adjustment determination process when supply measures are proposed. PPMs will be assessed as 'met' if the States can demonstrate the appropriate policy settings are, or will be in place by June 2019. South Australia's Department of Environment, Water and Natural Resources (DEWNR) is responsible for developing the Implementation Plan for the South Australian River Murray.

In assessing South Australia's initial draft, MDBA advised that the final South Australia plan could specifically address the principles/criteria outlined in the PPM Assessment Guidelines of:

- **Secure and enduring:** Outline the South Australian policy framework, including a brief description of relevant legislative, regulative and planning instruments, policies and regulations and how they interact.
- **Fully operable:** Matters relating to river operations, including governance arrangements and relevant instruments, for example, how the South Australian environmental water planning framework is incorporated into the river operations framework. The plan should also outline any relevant agreements between river operators or environmental water holders.
- **Transparent:** Matters identified in the assessment guidelines requiring transparent disclosures including the calculation of use (losses). MDBA will also be seeking transparency around South Australia's river operations.
- **Risk and mitigation strategies:** Given South Australia relies to a large extent on Sustainable Diversion Limit (SDL) compliance to protect environmental water, addressing this criteria should include details on the risks and mitigation of non-compliance with the SDL.

South Australia is committed to the outcome of allowing environmental flows to flow throughout the length of the river, and to be protected from extraction, re-regulation or substitution. The PPM will be implemented in South Australia in accordance with the above principles.

### 3. Risks

This Implementation Plan is not expected to create any new risks to the reliability of retail entitlements (including held environmental water) or planned environmental water. This is because current management of water entitlements separates Entitlement Flow management (from which allocations are made) from environmental water management.

Environmental water is managed in South Australia at a policy and planning level consistent with the Basin Plan (i.e. through annual watering priorities, long-term watering plans and the Basin-wide Environmental Watering Strategy), as translated into specific operational documents such as the South Australian River Murray Annual Operating Plan. Further information on the management of environmental water and river management practices in South Australia is in **Appendix 1**.

### 4. Identifying the Issues

This implementation plan contains actions to ensure **PPM1** is met (as restated for applicability to South Australia; i.e. **Environmental water flows throughout the length of the river and is protected from extraction, re-regulation or substitution**) through addressing the following five issues:

- Issue 1: Enhanced governance and transparency of river operations.
- Issue 2: Tracking and reporting of environmental water.
- Issue 3: No substitution between planned environmental water and held environmental water.
- Issue 4: Develop a loss methodology for environmental water.
- Issue 5: Timing and magnitude of return flows.

## 5. Assessment of Issues

Each issue has been considered in terms of ‘Description, Change Proposal (action/s), Priority (including Status, e.g. any work underway), and Timeframe’. Specific tasks are summarised in **Table 3** (p15). Further information is provided in **Appendices 1 to 4**.

This Implementation Plan has been developed to meet the requirements of the Assessment Guidelines as described in **Table 1**.

**Table 1. Consistency with Assessment Guidelines**

Assessment Guideline	Summary of approach to meet the Guidelines
1. Secure and enduring	Outlined the SA policy framework including a description of relevant legislative, regulative and planning instruments, policies and regulations and how they interact.
2. Fully operable	River operation governance arrangements and relevant instruments are described. Agreements between river operators or environmental water holders are described.
3. Transparent	Calculation of use (losses) is described. Decision making structure and procedures for operations are described.
4. Identifies and mitigates risks	Risks and mitigation of non-compliance with SDLs are identified.
5. Provides for releases of environmental water from storages on top of other in-stream flows including unregulated flows	Not applicable in SA.
6. Allows for environmental water to flow throughout the length of the river, and between rivers; and be protected from extraction, re-regulation or substitution	The issues have been scoped and actions tested to ensure that the agreed actions achieve this outcome.

### Issue 1: Enhance governance and transparency of river operations

South Australia already has effective arrangements in place to ensure sound governance and transparency of decision making with respect to river operations. While not all of these arrangements are necessarily directly relevant to PPMs, comprehensive information is provided below. Consistent with the Government’s ongoing efforts to improve its processes a number of actions for improvement have also been documented.

Responsibilities at the highest level are set out in **Table 2**.

**Table 2 - SA Responsibility Matrix**

Entity	Authority	Responsibility
The Minister	The Minister is the State Constructing Authority under the MDB Agreement and is responsible for River Murray Operations assets (“RMO assets”) in South Australia. <sup>1</sup>	Authorise operation of the structures for an environmental watering event.
DEWNR	DEWNR is responsible for managing environmental water delivery, events and operation of the Structures on behalf of the Minister.  DEWNR is also responsible for facilitating the environmental water delivery through lodgement of trades and liaising with the MDBA and environmental water holders on environmental water availability and delivery; and for the site based accounting of environmental water where there is a direct agreement with DEWNR for the delivery of environmental water. Third parties using environmental water for specific actions such as Banrock Station and Nature Foundation SA wetland water use are not included in this process at this stage.	Manage environmental water delivery and operating event on behalf of the Minister.  Manage risks around water quality and impacts on third parties.
Minister’s Delegate	DEWNR Executives to whom the Minister has delegated the relevant powers to manage environmental watering events involving the Structures.	Manage environmental watering event and instruct SA Water in the day-to-day operations of the Structures.
SA Water	The Minister has appointed SA Water as “operational agent” of the Minister as State Constructing Authority responsible for operation of infrastructure related works and measures on the River Murray.	Operate the Structures in accordance with the Operations Plan and further instructions from the Minister’s Delegate from time to time.
MDBA	The MDBA is manager of RMO assets and River Murray operations as prescribed by the MDB Agreement.	Issue procedures under clause 66 of MDB Agreement.  Provide advice on flows to the South Australian border and other relevant matters.

Within DEWNR, the majority of delegations and operational decisions are made within and from the River Murray Operations Unit (under the Director, River Murray Operations). Specific operational and management decisions within defined operating limits occurs via a two level approach:

- Level 1 - Senior water resource managers have the ability to make operational decisions within currently defined operating limits. These operating limits are described in the SA River Murray Annual Operating Plan (AOP) and will also be included in the South Australian *Objectives and Outcomes for river operations* document (O&O document). For example, with weir pool raisings, a defined operating range has been set. A Senior Water Resource manager can make recommendations within that operating range, while a higher level delegate (Director/Executive Director) make decisions and approves actions outside that range.

<sup>1</sup> Section 9 of the MDB Act. RMO assets include the Structures, Locks 1 to 9, Lake Victoria and the Murray Mouth Barrages.

- Level 2 - The South Australian Minister for the River Murray has delegated a number of his powers relating to operational decision making to executive positions within the Department. These delegations allow operations to occur outside of the normal operating range, as specified in the AOP. The delegations are authorised under section 18(3) of the South Australian Murray-Darling Basin Act 2003 and section 12(3) of the River Murray Act 2003. The MDBA does not have the power to direct any operation in South Australia but provides support under the Clause 66 of the Murray-Darling Basin (MDB) Agreement.

Any decisions to operate outside of the normal operating range will usually require cross branch and/or agency coordination and collaboration, including through the following groups chaired by DEWNR officers:

- Murray-Darling Basin Coordination Committee (MDBCC) – high level advice/information sharing committee mainly comprising executives from within DEWNR (meets monthly). Operational decisions may be referred to the MDBCC from the RMOWG (see below), particularly if: significant issues arise that require a departure from prior practice; an agreement cannot be reached on River Murray management and operational issues; or direction is required for an operation that is outside the scope of the AOP.
- River Murray Operations Working Group (RMOWG) – senior manager level. Includes representation from other state Government agencies and the Commonwealth Environmental Water Holder (CEWH) as an observer (meets monthly), chaired by the Manager Water Resource Operations. An internal Environmental Flows Reference Group has been established, which is a sub-committee of the RMOWG. Sub committees may be established to discuss specific topics that are not necessarily relevant or of interest to all RMOWG members. The RMOWG will recommend specific river management actions to deliver the agreed river management outcomes identified in AOP. The group provides advice on potential changes to day-to-day operational actions required to deliver agreed environmental, economic and social strategic objectives for the river. In undertaking these broad responsibilities, the group will:
  - provide integration and optimisation of River Murray water resources management outcomes;
  - provide advice and contribute to management and operation of the River Murray in accordance with AOP; and
  - provide advice and contribute to detailed management of specific flow events within the guidelines of AOP to optimise the use of the water to deliver environmental, economic and social outcomes.
- Infrastructure Operating Groups – Chowilla, wetlands and barrages. The groups include participation from the CEWH and MDBA and meet as required with the exception of the barrage operations working group which meets fortnightly.
- Weir pool manipulation working group and steering committee (meet as required). Includes participation from the CEWH and MDBA.

For some of the groups listed above (e.g. Chowilla and Barrage Operations Working Groups), detailed information on environmental water use is provided to the members on a regular basis and, at times, daily. Information provided includes current and future operations, water use patterns/volumes and any potential risks. This information is provided by email or on Govdex. At the higher water use sites there is more regular reporting for greater transparency.

South Australia continues to improve river operations management and reporting including through:

- improving operational practice and transparency through the development of a South Australian Objectives and Outcomes (O&O) for River Murray operation document. The O&O document will be developed progressively as some operating arrangements for new and proposed infrastructure have yet to be defined. It will include Specific Objectives and Outcomes (where required) for river operations activities and the use of environmental water. The O&O document will be reviewed regularly, taking into account any changes or improvements to river operations;
- more robust and fit for purpose accounting processes through the Management Action Database (MAD); for example, to track site use (including environmental water delivery and use history); MAD is also being designed as a repository for information relating to the operation of structures and water use, including environmental water source, use and management;
- implementation and updating of SWET models for wetland and weir pool water use (to model/estimate environmental consumption);
- South Australian Floodplains Integrated Infrastructure Programs (SARFIIP) Environmental Pathways project which includes better documentation of floodplain watering processes and how decisions to operate are made;
- documenting a Weir Pool Manipulation Operating Protocol, which establishes the high level processes and procedures relating to weir pool manipulations;
- continued development of the River Murray Annual Operating Plan and improving annual reporting; and
- development and improvement of hydraulic models to provide estimates of modelled water use e.g. Chowilla hydraulic model and accounting practices as defined in the Chowilla Operating Procedures.

It is intended that these work tasks will be progressively delivered over the four years to June 2019, noting that some tasks are subject to funding requirements being quantified and funding being sourced.

### **River Murray Action Request Forms**

The majority of environmental watering actions in South Australia require event plans. These are prepared in consultation with all relevant stakeholders including the respective environmental water holders. River Murray Action Request Forms are required for most River Murray operational actions over 500 ML/day (with the exception of barrage operations as management actions are agreed through watering schedules with the CEWO). This is to ensure that operations are coordinated to minimise the risks to downstream water users. The following information is required:

- location and proposed action (physical details);
- timeframe for proposed operation;
- potential risks and impacts resulting from the proposed operation;
- risk assessment (water quality, quantity and potential impact on infrastructure operations); and
- source and volume of environmental water.

DEWNR also develops more detailed site operating plans and strategies for locations along the River Murray where significant areas of floodplain are to be inundated; for example through the use of improved infrastructure. A process of documenting current operational procedures is underway and as new projects come online, the operational procedures will be updated to improve the transparency of river operations.

An example of an operational plan which has been implemented is the Chowilla Environmental Regulator Operations Plan. Further plans will be developed for other major operational locations such as a Lower Lakes Water Level Policy and Barrage Operating Strategy (by June 2017).

## **River Operations Planning**

The AOP is the key document that guides transparent and coordinated operational decisions in South Australia. It describes how the desired outcomes are proposed to be delivered during a water year. It identifies how the River Murray may be routinely operated under a number of potential water availability scenarios to optimise the benefits to all water users. The AOP seeks to integrate and optimise the delivery and management of water to, and within, South Australia. Detailed information on the AOP objectives is at **Appendix 2**.

The AOP is a non-statutory internal document for use within South Australia. It complements the MDBA's River Murray System Annual Operating Plan. Guidelines and strategies for river operations that have been developed and applied over many years will continue to guide the operational arrangements for the River Murray upstream and within South Australia, in conjunction with BOC *Objectives and Outcomes for River Operations in the River Murray System*. Under Basin Plan implementation, current operating rules are being investigated by jurisdictions to determine if a wider operating range could be adopted to enable more flexibility to deliver environmental outcomes.

DEWNR will explore the potential for publicly communicating annual operating planning and annual reviews.

## **Dashboard Reporting**

DEWNR provides regular dashboard updates to internal committees and includes information on environmental water use and delivery volumes. Further customisation of the dashboard reporting will occur to enable ease of environmental water accounting. The dashboard reports are provided to the MDBCC on a monthly basis. The dashboard reports identify the volume, source and use of environmental water in South Australia. A version of the dashboard could be made publicly available to provide transparency on environmental water use and compliance with the PPM's. Further consideration is being given to this (by June 2017).

## **Process for disclosing information relating to environmental water use and management**

There are both internal and external processes for disclosing information on environmental water use and management:

- Weekly River Murray Flow Report (external);
- Monthly Water Resources Update (external); and
- Monthly water use and operations reports to the CEWO (internal).

The external information includes where and how much environmental water is being used and is done on a weekly basis through the publicly available River Murray Flow Reports distributed each Friday and the more comprehensive monthly water resources update.

## **Independent Review**

DEWNR is an active participant in the annual Independent Review of River Operations coordinated by the MDBA and led by the Independent Review of River Operations Group (IRORG). Key internal documentation is subject to review through the governance arrangements documented herein and DEWNR is open to this potentially being reviewed by IRORG on an issue basis, should this be deemed to be required.

Change proposal:

Workplan actions:

1. Develop a South Australian Objectives and Outcomes document for the River Murray in South Australia, including Specific Objectives and Outcomes where required for river operations activities and the use of environmental water (by June 2019).
2. Continue to develop the River Murray Annual Operating Plan and improve annual reporting (ongoing improvements annually in response to feedback);
3. Explore the potential for publicly communicating the annual operating plan (by June 2017).

Priority: Moderate - High

Status: All actions commenced.

## Issue 2: Tracking and reporting of environmental water

DEWNR has standard templates and some Standard Operating Procedures (SOPs) for trading, delivery, record of use, reconciling and reporting on environmental water. The section on 'Recognition of return flow from upstream watering events' in **Appendix 4** describes how gauges and modelling can be used to aid in measurement and reporting of environmental water use.

With the advent of the Basin Plan Water Trading Rules, DEWNR has developed and implemented a policy and procedure for management of sensitive water market information. Key to this is the implementation of Chinese Walls within the agency to separate business functions of those undertaking trading activity from those who may have access to information that could impact the water market or decisions to trade.

The trade of environmental water is undertaken by DEWNR Finance Officers and occurs mainly on-line using SOPs. The trading occurs within the DEWNR licensing system (WILMA) so all trades are recorded. The environmental water trades are reported on the DEWNR website as mentioned in the previous sections. DEWNR River Murray Operations maintain a register of environmental water delivery to the environmental assets that the Department manages. DEWNR Environmental Water Trade and River Operations Policy team (EWTRP) coordinates the records of use, develops the reports to the MDBA and publishes the use volumes on the DEWNR website each year.

Environmental water holders may have separate agreements with other parties who also use environmental water and the records of these actions are not as transparent compared to the DEWNR managed sites. DEWNR is working with environmental water holders and other parties (e.g. Nature Foundation SA) to improve the reporting against such actions.

Environmental water held in South Australia is usually delivered as part of Entitlement Flow in accordance with clause 88 (a, b) of the MDB Agreement. Currently the Commonwealth Environmental Water held in South Australia may be accounted as delivered each month to the Coorong, Lower Lakes and Murray Mouth (CLLMM). Environmental water from The Living Murray program held in South Australia may be accounted against a watering action; for example, raising the Chowilla Environmental Regulator or delivery to the CLLMM. For additional information regarding The Living Murray entitlements refer **Appendix 1**.

South Australian River Murray Action Request Forms (also described under Issue 1) provide information for River Operators to assess demand in each weir pool every month. These forms are completed by environmental asset managers to advise River Operators when there will be a requirement to use environmental water; for example, to pump a wetland or hold water back with the Environmental Regulator at Chowilla or to undertake a weir pool raising.

An additional task is the refinement of the River Murray Source Model. While MDBA and South Australia have developed a River Murray Systems Operations Model based on MSM-Bigmod, this model is not currently at the scale required to assess water use from environmental watering actions (such as weir pool manipulation). A future task is to undertake these refinements and operationalise the current Source model (and if necessary update other complementary models to provide the necessary input data, such as the MIKE hydraulic models). This will provide a basis for projecting monthly accounts and improve the transparency and accountability of environmental water use. The overall objective is to develop a system to track, monitor and report on water use throughout the system (including environmental water) in as near as real time as practicable. Work on decision support systems for planning purposes (being undertaken by the Goyder Institute for Water Research) may assist with this.

Change proposal:

Workplan actions:

4. DEWNR to refine and operationalise the Source Model (by June 2019).

Priority: High

Status: Commenced

### Issue 3: No substitution between planned and held environmental water

The Water Allocation Plan for the River Murray Prescribed Watercourse (the Plan) is a statutory instrument written in line with the legal requirements of the *Natural Resources Management Act 2004*. The Plan (Chapter 5) sets out the policies for a range of water management provisions, including:

- allocation of available water;
- managing consumptive pools;
- water entitlements; and
- water trading.

The Plan has recently been reviewed and a redrafted plan underwent community consultation in 2015 and is currently under final review. A Basin Plan compliant plan will be developed as part of the relevant water resource planning process by 1 July 2019.

All flow above Entitlement Flow into South Australia is protected from extraction for consumptive use by the WAP. The WAP describes the maximum volume of water that may be allocated and used by water holding or taking entitlements and only allows for water to be allocated against South Australian licences from the Entitlement Flow. There are no provisions in the current (or the redrafted Plan) that allow substitution between planned and held environmental water.

South Australia must also comply with the Cap under the MDB Agreement and by 1 July 2019 with the Basin Plan SDL. Further information is outlined in Appendix 4.

Under Schedule G of the MDB Agreement, South Australia must store some of its Entitlement Flow for both Critical Human Water Needs (CHWN) and Private Carryover. A Storage Right Decision Tool (the Tool) has been developed to assist with decision making regarding potential deferral volumes for storage each month. A decision by DEWNR to defer water is made independently from any request for environmental water delivery and relates to Entitlement Flow management only.

Assessment using the Tool occurs on a monthly basis and involves balancing multiple interests. South Australia has an obligation under the *Water Act 2007* and Basin Plan to ensure that future CHWN supplies are guaranteed. There are significant limitations with South Australia's Storage Right in that it has much less secure arrangements compared to NSW and Victoria. One of the main issues is the risk of spill. In years where this is high then the decision to defer and store portions of the Entitlement Flow may be postponed due to the risk of losing this water. When conditions change towards dry times, there may be a decision to defer and store Entitlement Flow due to the lower risk of spill. Coincidentally this may occur when environmental water is being delivered.

However, DEWNR understands that perceptions of substitution of environmental water for deferred water may still occur. DEWNR provides the Basin Officials Committee and the MDBA with the rolling deferred water storage plans so that information about South Australia's intentions to store water are clear well in advance of any decisions regarding environmental water provision. The forward plan for deferral is outlined in the monthly environmental water delivery spreadsheet provided by the MDBA. All parties, including environmental water holders, have access to this information.

Change proposal:

Workplan actions:

5. Develop a Basin Plan compliant water resource plan (by June 2019).

Priority: High

Status: Commenced

#### Issue 4: Develop a loss methodology for environmental water

The Dilution and Loss allowance is delivered as part of the Entitlement Flow (provided under clause 88(b) of the MDB Agreement). A fixed annual volume of 696 GL per year (58 GL/month) is provided and approximately 350 GL per year is the assumed loss above Wellington to the SA border. This volume is insufficient to cover the net annual loss experienced between the South Australian border and the barrages (including transmission and evaporative losses). As the flow increases above Entitlement Flow and higher inundation levels occur, there is an increase in evaporation due to an increase in the surface area of connected wetlands and floodplains. If the antecedent conditions are dry, then higher environmental consumption will occur. South Australia does not have a formal arrangement to apply an environmental consumption factor to the delivery of environmental water above Entitlement Flow, with the exception of weir pool raisings and the testing of floodplain infrastructure. A modelled consumption value has been used for these events, as opposed to a percentage loss factor.

The development of a loss factor for environmental water delivered to South Australia stored in the Lower Lakes needs to be documented. This will be on the basis of an agreed position negotiated directly with the relevant entitlement holder. In the case of the CEWH, such arrangements would be

discharged through Watering Schedules. Any water stored in the Lower Lakes for environmental water use at a later period of time would have a similar methodology applied as what occurs with the South Australian Storage Right; that being the volume of environmental water held as part of the total volume held.

When environmental water is stored in the Lower Lakes for later release to the Coorong, evaporation occurs. This should be factored into any calculation of releases to the Coorong.

Change proposal:

Workplan Actions:

6. DEWNR to undertake additional modelling for the quantification of losses/use in South Australia from the border to the barrages (by June 2017)
7. DEWNR to develop rules for the loss rates (see **Appendix 3** for a draft) and incorporate these in a SOP for the calculation of losses (by December 2017).

Priority: Medium

Status: Commenced

#### Issue 5: Timing and magnitude of return flow

The timing and magnitude of delivery of a return flow peak is unlikely to be changed within South Australia. South Australia's consumptive demand for water will not have a significant impact on any additional flow, such as flow peaks, as South Australia's Entitlement Flow delivery schedule is already designed to account for the variation in consumptive demand and evaporation throughout the year.

However, the timing of delivery of a flow to the CLLMM may be changed if there is previous agreement with environmental water holders to use the water as part of the operation of an environmental regulator or for a weir pool raising event. For example, a raising event in the Lock 5 weir pool or behind the Chowilla environmental regulator may hold up the water for several months before the return flow is delivered to the CLLMM.

Similarly, the timing of delivery of environmental water to the Coorong may also be delayed by storage in the Lower Lakes. This may occur if there is a high risk of the Lower Lakes falling below 0.5 m AHD or the water needs to be stored for later release to the Coorong over summer to maintain connectivity through the fishways for as long as possible.

Further information on return flows and South Australia's draft Return Flow Policy and Procedure is provided in **Appendix 4**. A SOP for return flow accounting is to be developed.

Change proposal:

Workplan Actions:

8. Finalise the draft Return Flow Policy and Procedure and develop a SOP for return flow accounting (by December 2016).

Priority: Medium

## 6. Next steps and workplan summary

In the preceding section, a series of workplan actions have been proposed. Table 3 summarises the tasks, responsibility and timing for each of these workplan actions. Some work has commenced in respect of all actions. Note that some actions may be subject to funding.

**Table 3: Summary of workplan actions**

Action #	Task	Responsibility	Timing
<b><i>Issue 1: Enhanced governance and transparency of river operations.</i></b>			
1	Develop a South Australian Objectives and Outcomes document for the River Murray in South Australia, including Specific Objectives and Outcomes where required for river operations activities and the use of environmental water.	DEWNR RMO	June 2019
2	Continue to develop the River Murray Annual Operating Plan and improve annual reporting (ongoing improvements annually in response to feedback).	DEWNR RMO	Ongoing/ annually
3	Explore the potential for publicly communicating the Annual Operating Plan.	DEWNR RMO	June 2017
<b><i>Issue 2: Tracking and reporting of environmental water.</i></b>			
4	DEWNR to refine and operationalise the Source Model.	DEWNR RMO/SMK	June 2019
<b><i>Issue 3: No substitution between planned environmental water and held environmental water.</i></b>			
5	Develop a Basin Plan compliant water resource plan.	DEWNR WCC	June 2019
<b><i>Issue 4: Develop a loss methodology for environmental water.</i></b>			
6	DEWNR to undertake additional modelling for the quantification of losses/use in South Australia from the border to the barrages.	DEWNR SMK	June 2017
7	DEWNR to develop principles/rules for the application of a loss rate (see Appendix 3 for a draft) and incorporate these in a SOP for the calculation of losses.	DEWNR WCC/RMO	December 2017
<b><i>Issue 5: Timing and magnitude of return flows.</i></b>			
8	Finalise the draft Return Flow Policy and Procedure and develop a SOP for return flow accounting.	DEWNR WCC/RMO	December 2016

\*RMO – River Murray Operations; WCC - Water and Climate Change; SMK- Science Monitoring and Knowledge

## 7. Appendix 1

### **System Operations in South Australia**

#### **Retail Accounting**

Given that South Australia has varying methodologies for accounting for environmental water coming from Victoria and New South Wales, it is beneficial to examine each of the states separately.

Victorian environmental water allocations are traded into the Minister's account at the South Australian border. These allocations appear in the South Australian Water Minister's account as a credit until the end of the year when debits are placed against the account to ensure a balance.

New South Wales environmental allocations are delivered to the border, however, no trade takes place between states. Therefore there is no accounting of this water against the Minister's licence. That said, records of where the water is used throughout the River Murray are kept. Direct trades from New South Wales to South Australia are credited to the Minister's account.

Although accounting methodologies differ between Victoria and New South Wales the outcome once the environmental water crosses the South Australian border are essentially the same. The environmental water allocation accounts which were sourced from both New South Wales and Victoria are not accounted for in an accounting system once that water crosses over the border. However, the MDBA does identify volumes delivered by Victoria (a trade) and New South Wales (an environmental delivery) and records these volumes as a delivery to the South Australian border in the MDBA's monthly water accounts. The current systems used to report on this water are generated outside of an accounting system in spreadsheets that are maintained internally by DEWNR RMO.

Both The Living Murray (TLM) and CEWH hold a relatively small amount of South Australian environmental water allocations which are accounted for against their respective licences. The water licensing system references the site use approvals for the majority of entitlements in South Australia with the exception of environmental water as this may be used at many different locations for multiple purposes (e.g. weir pool raising and discharge over the barrages).

The allocation of water within South Australia is guided by the South Australian Water Allocation Plan for the River Murray Prescribed Watercourse 2002 (WAP). The WAP allocates less than the total South Australian entitlement delivered to the state under the MDB Agreement. Annually, DEWNR develops River Murray Water Allocation Frameworks which outline the volume of consumptive entitlements which can be taken as consistent with the WAP, this is published by 1 July each year and occurs prior to the provision of environmental water. The system ensures that neither the Victorian nor New South Wales environmental allocations can be taken by the consumptive pool providing that the WAP is complied with. Overall, this is also reliant on South Australia's compliance with both Cap and SDL which is an annual assessment.

#### **Environmental Water Planning Framework**

In its current form South Australia's environmental water planning framework relies heavily on what is known as River Murray Action Requests. This mechanism is instigated by DEWNR's Environmental Water Manager submitting a River Murray Action Request form to DEWNR's RMO and is required for watering actions that may affect river operations (i.e. volumes greater than 1 GL or collectively greater than 1 GL).

A River Murray Action Request form is not required for environmental water used in the Lower Lakes as this is guided by a separate set of arrangements and reporting practices. These alternative arrangements include watering schedules with the CEWH and monthly water use reports are issued by DEWNR to the CEWH to demonstrate how environmental water has been used. Because environmental water allocation accounts from New South Wales and Victoria are not debited (refer Retail Accounting), a spreadsheet is maintained by DEWNR's River Operator to ensure that environmental water is available and reported on.

In terms of environmental water framework within South Australia the Environmental Watering Plan (Chapter 8 of the Basin Plan) directs the state regarding its environmental water management.

Chapter 8 sets out the requirements for the Basin-wide Environmental Watering Strategy, the Basin annual environmental watering priorities, the Long Term Environmental Watering Plans and the State annual environmental watering priorities.

South Australia has complied with (and will continue to comply with) Chapter 8 in developing its annual environmental watering priorities for all three South Australia MDB Water Resource Plan areas. The annual environmental watering priorities are approved by the South Australian Minister for Water and the River Murray and published on the DEWNR web site annually.

South Australia has also complied with Chapter 8 in developing the Long Term Watering Plan for the South Australian River Murray Water Resource Plan area. The South Australian River Murray Long Term Environmental Watering Plan was approved by the Minister for Water and the River Murray in November 2015 and published on the DEWNR web site in December 2015.

### **Commonwealth Environmental Water Office (CEWO)**

For the management of CEWH water a CLLMM Watering Schedule is developed that articulates the intended purpose and desired outcomes for the environmental water.

The schedules includes significant specificity in terms of river operations direction and are developed with New South Wales Office of Environment and Heritage and Victorian Environmental Water Holder who authorise the release of Commonwealth Environmental Water from an upstream storage. The watering schedule gives effect to an annual Commonwealth Environmental Water delivery plan.

On request by CEWO, South Australia provides confirmation of environmental water traded to the South Australian border. Traded volumes of environmental water provide the only formal accounting within South Australia. Consolidated reporting on environmental water use within South Australia is undertaken by CEWO. Currently South Australia provide an annual report on environmental water use as well as additional reporting as requested by CEWO via related watering schedules.

### **The Living Murray**

Initial watering proposals are prioritised and then approved by the Southern Connected Basin Environment Watering Committee. Following this the MDBA contacts DEWNR with trade instructions for TLM entitlements that are held by MDBA. The MDBA will also contact New South Wales' Department of Primary Industries (DPI) or Victoria's Department of Environment Land Water and Planning (DELWP) with trade instructions for TLM entitlements that are held by those respective states, subsequently the DPI or DELWP forward a trade instruction onto DEWNR. Environmental water proposals include high level outcomes rather than the specific details of river management.

DEWNR is required to not only deliver outcomes specified in the watering proposals but also ensure the delivery of environmental water for a given proposal. DEWNR advise TLM as to how water was used on an annual basis. Operational advisory groups consider that South Australia are balancing environmental priorities with other operating priorities.

A Return Flow Policy and Procedure has been developed by DEWNR to guide the reporting of the use of return flows from environmental watering actions undertaken for the South Australian River Murray floodplain. The policy relates specifically to sites which utilise floodplain infrastructure and/or weir pool raising. It is also worth noting that the Return Flow Policy does not impact River Operations.

### **South Australia Policy Framework**

The *Natural Resources Management (NRM) Act 2004* and Regulations provide the overarching legislation in South Australia for environmental water management. The WAP for the River Murray Prescribed Watercourse (2002) was developed under the (now repealed) Water Resources Act 1997. It assesses the needs of water dependent ecosystems and the capacity to meet the demands.

An Environmental Watering Plan for the South Australian River Murray has been written each year for the last eight years and published on the DEWNR web site. Each year, the environmental asset managers determine the environmental water needs of the environmental assets of the South Australian River Murray under different flow scenarios and these are collated to form the basis of environmental watering bids/proposals that are used to seek provision of environmental water from environmental water holders.

This process was adapted for the development (under the Basin Plan) of the annual environmental watering priorities for South Australia. A standard procedure documented in the South Australian annual environmental watering plan is followed by DEWNR and includes workshops and consultation with key stakeholders and community groups. The annual environmental watering priorities are approved by the South Australian Minister for Water and the River Murray and then submitted to the MDBA. They are incorporated into the South Australian annual environmental watering plan for the South Australian River Murray. The River Murray priorities are also included in South Australia's River Murray Annual Operating Plan.

The South Australian River Murray Long Term Environmental Watering Plan incorporates background and detailed information that until now was included in the annual plan. This means future annual plans (from 2016-17) will not include this information.

Site management plans prepared for the Chowilla Floodplain and the CLLMM sites are available on the DEWNR web site. There are also management plans for managed wetlands to guide environmental water use at these sites.

DEWNR is documenting existing environmental water policy and procedures for the publication of a Handbook in 2017 to guide and assist environmental water managers in DEWNR.

DEWNR convenes an Environmental Water Coordination Forum to enable environmental water managers to share ideas and develop environmental water policy and plans. It meets approximately every two months. Other less formal groups that provide more specific event and on-ground advice are: the Environmental Flows Reference Group, the Wetland Working Group and the Weir Pool Advisory Committee. There is a Scientific Advisory Group that provides advice for environmental water planning and management on environmental water management with a focus on the needs of the CLLMM.

## 8. Appendix 2

### **Objectives of the SA River Murray Annual Operating Plan**

The objectives are as follows:

- accommodate the needs of all water users within system constraints to the extent that is practically possible;
- outline preferred environmental watering priorities and urban and irrigation water delivery requirements under a range of inflow and water availability scenarios;
- balance the requirement to deliver water and defer a portion of South Australia's Entitlement Flow for use in future dry years;
- provide for operational arrangements to underpin the security of supply and quality for all consumptive uses;
- ensure that the requirements are fulfilled under the:
  - Murray-Darling Basin Agreement 2008 (Cwlth) (the Agreement);
  - Water Act 2007 - Basin Plan 2012 (Basin Plan) – in particular Chapters 5, 9 and 11;
  - MDBA Operating Plan;
  - BOC Objectives and Outcomes for River Operations in the River Murray System; and
  - South Australian River Murray Objectives and Outcomes (yet to be developed).
- provide a documented and transparent rationale for South Australian River Murray operational decisions to be made.

The operating objectives and key outcomes generally sought by the AOP (in no particular order) are:

- optimise (where practicably possible) water accessibility for all users;
- provide the appropriate water quality and quantity to all water users;
- align delivery of consumptive water for all users with anticipated timing of demands;
- to manage water quality, including salinity levels, for environmental, social, cultural and economic activity in the South Australian portion of the River Murray;
- in accordance with s. 8.06 (3)(c) and (d) of the Basin Plan to ensure the Murray Mouth remains open at frequencies, for durations, and with passing flows, sufficient to:
  - enable the conveyance of salt, nutrients and sediment from the Murray-Darling Basin to the ocean;
  - ensure that tidal exchanges maintain the Coorong's water quality (in particular salinity levels) within the tolerance of the Coorong ecosystem's resilience;
- to manage water levels in the Lower Lakes in accordance with s. 8.06 (3)(e) of the Basin Plan, to ensure sufficient discharge to the Coorong and Murray Mouth and help prevent riverbank collapse and acidification of wetlands below Lock 1, and to avoid acidification and allow connection between Lakes Alexandrina and Albert, by:
  - maintaining water levels above 0.4 metres Australian Height Datum (AHD) for 95% of the time, as far as practicable; and
  - maintaining water levels above 0.0 metres AHD all of the time;
- give effect to the objectives in the Annual Environmental Watering Plans for the South Australian River Murray;
- coordinate the delivery of environmental water to South Australia to maximise the potential outcomes throughout the South Australian portion of the River Murray System;

- facilitate the operation of other River Murray environmental infrastructure;
- maximise hydrological connectivity between the Lower Lakes, Coorong and Southern Ocean through continuous barrage releases;
- spring inundation of fringing Lower Lakes wetlands;
- maximise the opportunity to create, or enhance, a spring/summer pulse;
- enable weir pool raising at targeted sites;
- generate small variations in water levels;
- meet the Basin Plan water quality requirements where possible;
- maintain Coorong South Lagoon water levels above, or between, 0 m AHD and 0.2 m AHD over summer (November to February inclusive);
- maximise opportunities to deliver environmental water to South Australia directly from the source storage, to promote longitudinal connectivity while having regard to the Lake Victoria Operating Strategy;
- have regard for the Short-term Barrage Operating Plans and other operating plans;
- have regard for the MDBA's Drought Emergency Framework for Lakes Alexandrina and Albert should drought conditions return;
- manage the rate of declining water levels within the River Murray Channel to:
  - minimise Riverbank collapse and slumping;
  - align with rates of fall in specific hydrographs;
  - maintain seasonal variability in Lower Lakes water levels, between 0.5 m AHD and 0.85 m AHD;
- use the best available information such as monitoring data, observations, modelling and expert advice, to guide real-time operational decision making;
- effectively document knowledge and information with regard to operational decisions;
- effectively communicate river operations with stakeholders;
- balance the potentially competing needs of floodplain works and flow delivery;
- actively manage Lake Albert salinity levels;
- maintain Coorong South Lagoon salinity levels at acceptable levels;
- implement clause 91 - South Australia's Storage Right;
- optimise the use of unregulated flow (should this occur) for environmental and water quality purposes;
- actively manage the risk of acid drainage water below Lock 1 from the Lower Murray Reclaimed Irrigation Area (LMRIA);
- monitor and report the impacts on flow to South Australia of water allocation trade to, and from, South Australia on a monthly basis during the trade adjustment period (September to April); and
- report on the delivery of the objectives and outcomes under the AOP. Appendix 1: System Operations in South Australia.

## 9. Appendix 3

### **Draft Rules for determining losses in South Australia**

The following draft rules are proposed for determining losses in South Australia:

- a) If environmental water that is being delivered remains in channel, is not stored in the Lower Lakes and is delivered through the barrages - no loss factor is used. It takes up to 12 days for water to flow from the South Australian border to the barrages and losses are negligible when the environmental water is delivered at a time when river conditions are regulated and at Entitlement Flow.
- b) If environmental water is used to raise weir pools any additional water use will be determined by DEWNR SMK team using the Source model.
- c) When environmental water is used to operate environmental regulators on the floodplain, modelled losses will be determined by DEWNR SMK or MDBA using the Source model and used in the calculation of return flows from the environmental watering action.
- d) If environmental water is used to enhance a flow peak and this causes overbank flows in South Australia then modelled losses will be determined by DEWNR SMK or MDBA using the Source model.
- e) If environmental water is stored in the Lower Lakes before passing through the barrages, an evaporation loss associated with the stored water will be calculated using a spreadsheet model. This is consistent with the operation of water accounts by the MDBA for other storages. This evaporation rate will depend on the time of year. It will be applied proportional to the volume of environmental water held in the Lakes until this water is released. It is proposed that incremental net evaporative losses will be calculated for CEWH and TLM water in the Lower Lakes in the same way that those losses are calculated for South Australian deferred water in the major upstream storages i.e. the calculation outlined in cl 22(2) of Schedule G.

## 10. Appendix 4

### **Protection of environmental water from extraction, re-regulation or substitution**

The primary PPM in South Australia is: *‘Credit environmental return flows for downstream environmental use’ (Environmental water to flow throughout the length of the system, and between rivers; and be protected from extraction, re-regulation or substitution).*

This appendix provides background information on how South Australia has addressed this PPM to date.

All flow above Entitlement Flow into South Australia is protected from extraction for consumptive use by the WAP chapter 5 section 5.2. The WAP describes the maximum volume of water that may be allocated and used by water holding or taking entitlements and only allows for water to be allocated against South Australian licences from the Entitlement Flow. Additional information about the WAP is contained in Appendix 2.

South Australia does not order its water as do other States. Instead it is delivered in accordance with a volume and delivery schedule described in the Murray-Darling Basin Agreement Clause 88; this is designed to take into account the variation in consumptive demand and evaporation throughout the year. The South Australian demand for water is, in general terms, fixed and predictable and does not have a significant impact on any additional flow. This is because of the permanent nature of the horticulture. Periods of peak demand may result in an increased diversion of approximately 500 ML/day. (There is daily and monthly extraction data available so an average diversion volume can be calculated). South Australia may alter the pattern of delivery of its Entitlement Flow using Clause 90 of the Murray-Darling Basin Agreement with approval from the Basin Officials Committee. This may occur when water cannot be delivered; for example, due to river works.

#### *Recognition of return flow from upstream watering events*

Return flows from upstream watering events may be recognised and quantified in a number of ways.

If a return flow is traded to the Minister’s environmental water licence (both inter and intrastate trades), the trade is recognised through the retail water accounts and is reported on the DEWNR web site (<https://www.waterconnect.sa.gov.au/Systems/WTR/Pages/Default.aspx>) soon after the trade occurs.

If a return flow is not traded from interstate but is delivered to an environmental asset in South Australia, the additional volume above Entitlement Flow is recognised through the wholesale monthly water accounts and measured as part of the flow to South Australia. The volume that is delivered at the South Australian border is recorded by MDBA gauges.

Within South Australia, environmental water use at an environmental asset is recorded by the environmental asset manager. Water may be pumped to environmental assets; such volumes will be measured through gauges. Otherwise the use volume may be modelled (e.g. for gravity fed wetlands and for weir pool raising events).

At the end of the system, the volume that passes over the barrages between the Lower Lakes and the Coorong will be calculated using the barrage calculator.

The use volume from the Minister’s environmental water licences is reconciled with DEWNR Licensing and environmental water holders at the end of each water year and is reported to the MDBA via Basin Plan Matter 9.3 reporting and in the South Australian River Murray Annual Environmental Watering Report. Use volumes are also reported to the environmental water holders through formal reports.

Unregulated flow use is not generally reported by any State as environmental water unless it has been allocated for use at an environmental asset. This would occur at the direction of the MDBA Southern Connected Basin Environmental Water Committee. In these cases, the same methods for calculating the usage apply (measured through gauges or modelled).

#### *Protection of environmental water within South Australia*

Environmental water is protected from extraction and re-regulation in South Australia in the following ways:

- a) the direct trade of environmental water allocation onto the South Australian Minister for Water and the River Murray's environmental water account.
- b) the MDB Agreement - the amount of water that can be extracted from the River Murray in South Australia for consumptive purposes is set out in Schedule E of the MDB Agreement 2008.
- c) the South Australian WAP chapter 5 section 5.2.
- d) South Australia does not increase allocations as a result of environmental water delivery.
- e) the draft South Australian River Murray Return Flow Policy and Procedure (DEWNR Environmental Flow Policy and Procedure no.1, prepared in 2015).
- f) All irrigation water use is metered. The meters are read and reported annually.
- g) Irrigators can be fined for over-use of water.
- h) DEWNR has an agreed environmental watering schedule with CEWH to deliver CEW to the Coorong where possible. This is agreed every six months.

#### *Accounting and Compliance*

- a) All major non-environmental diversions are licenced (with the exception of small volumes of stock, domestic and riparian users) and use is measured by meters, which must meet state metering standards. Meter readings are reported to DEWNR each year and licences and accounts are reconciled by the DEWNR Licensing team for compliance purposes. Non-compliance may result in fines;
- b) Held environmental water is licenced and use is metered if it is pumped into a wetland. These pumped volumes are recorded on a monthly basis and reported annually to the environmental water holder, in the South Australian River Murray Annual Environmental Water Report and in the Basin Plan Schedule 12 Matter 9.3 reporting;
- c) Managed pool connected wetland environmental water is licenced and use is modelled using the SWET model accredited for this purpose by the Commonwealth Government. The wetlands are managed within the water volume on the Minister for Water and the River Murray's licence. Staff of Natural Resources SA MDB (Wetlands team) provide a comprehensive report on wetland water use each year to DEWNR Policy staff for environmental water reporting purposes for the South Australian River Murray Annual Environmental Water Report and the Basin Plan Schedule 12 Matter 9.3 reporting;
- d) The water used for the testing of the Chowilla Regulator, weir pool level raising and discharge through the barrages is modelled use. This volume is reported by DEWNR each year for environmental water reporting purposes for the South Australian River Murray Annual Environmental Water Report and in the Basin Plan Schedule 12 Matter 9.3 reporting.

MDBA's modellers model the net water use and estimate return flow volumes from the Chowilla Regulator operation. At the time of writing, this modelling approach was being documented by the MDBA. DEWNR is responsible for modelling net water use associated with weir pool manipulations and estimated barrage discharge volumes. The weir pool manipulation modelling approach is documented in the annual weir pool event plans and in the DEWNR publication 'Weir pool hydraulic modelling' 2012. Barrage discharge volumes are estimated using the Barrage Calculator and are reported fortnightly to the MDBA and the environmental water holders.

The draft DEWNR Return Flow Policy and Procedure, when finalised, will guide the use of return flow from environmental watering actions for the South Australian River Murray. These documents will guide water use from floodplain sites that utilise floodplain and/or regulating infrastructure. The draft Return Flow Policy provides an example of accounting for water use and return flow from the Chowilla Regulator operation. The draft Return Flow Procedure identifies the event plan as the appropriate document to include details of delivery of environmental water, its use, return flow, management of risk and accounting for the water use.

It is intended that these documents will form part of the Environmental Water Policy Handbook described in Appendix 1.