Ref: DEW-D0021667

Policy for Application of Losses to Environmental Water

Purpose

The *Basin Plan 2012* requires implementation of policy measures to protect environmental water (held and planned environmental water), through the 'unimplemented' or 'Pre-requisite' Policy Measures (PPMs). This *Losses* policy is one of four policies that, together with accompanying procedures, constitute a significant proportion of South Australia's (SA) PPM environmental water protections. In addition to protection of held and planned environmental water, other water resources used for environmental watering purposes may also be afforded PPM protections within Basin-states in accordance with local requirements.

The purpose of this policy is to:

- provide direction regarding the calculation and application of losses (evaporation and seepage) in the management of environmental water, and
- support accounting for use and re-use of environmental water at multiple sites.

Scope

The extent of this policy outlines details of when and how the calculation of losses may be required and applied in relation to (1) incremental transmission losses, (2) site-based losses and, (3) Lower Lakes storage losses of environmental water within the River Murray in South Australia (SA). Attributes and methodology details for these types of losses are discussed in the *Procedure for Application of Losses to Environmental Water* (the Procedure).

The calculation of losses is an important water balance component for transparent environmental water accounting, which allows for and provides a level of confidence in the calculated volume of associated return flows from environmental watering actions. Any such return flow remaining in the system can then be re-used for additional environmental watering activities as it travels downstream, with the aim of maximising environmental benefits along the River Murray channel, and for the Coorong, Lower Lakes and Murray Mouth (CLLMM).

Further detail on the protection of environmental water for environmental outcomes in these areas can be found in the *Water Allocation Plan (WAP) for the River Murray Prescribed Watercourse*, the *SA River Murray Water Resource Plan (WRP)* and the *SA Murray Region WRP*.

Policy

- South Australia undertakes environmental watering in a transparent and accountable manner that includes the determination of losses under the circumstances described in this Policy and the associated *Procedure for the Application of Losses to Environmental Water* (the Procedure).
- Losses are calculated and/or modelled in a manner considered fit-for-purpose to enable the reasonable estimation of return flow, which is protected from consumptive extraction under provisions of the WAP and WRP and remain available for further environmental watering purposes.
- Any attributes of environmental water use, associated with an environmental watering action, will be determined using a *net environmental water use* method. The return flow volume will equal the total volume required to implement the environmental action (i.e. the fill volume delivered) minus losses. It should be noted the method for appropriately determining losses will vary, depending on the action, and is described in the Procedure.
- Pre-event modelling of site-based *net environmental water use* (losses and return flows) may be undertaken for planning and decision making, but may not be required if suitable data is available from look-up tables or from events of a similar nature under similar conditions, as agreed with environmental water holders.
- Post-event assessment of any environmental watering action(s) (monitored and/or modelled) will be undertaken where appropriate to determine *net environmental water use* for site-based losses and return flows from the actual event and observed climate.
- Incremental transmission losses are applied to Held Environmental Water (HEW) entitlements that are additional to SA Entitlement Flow; noting SA Entitlement flow has its own separate loss factor applied. The method for calculating incremental transmission losses must also be consistent with the modelling approach in DEW (2023), and as detailed in the Procedure.
- Incremental transmission losses may also be calculated and applied to unregulated flows, consistent with the modelling approach in DEW (2023) or based on post event modelling where flows exceed existing modelled estimates or further detail is required.
- If an unregulated flow event at the South Australian border is declared, then, during this event, losses associated with the use of HEW for environmental watering actions may instead be attributed to the unregulated flow, in accordance with the *Policy and Procedure for the Use of Unregulated Flow in the South Australian River Murray*.
- Post-event modelling of incremental transmission losses on the use of HEW is not required unless specifically requested by an Environmental Water Holder (EWH) or the Murray-Darling Basin Authority (MDBA).
- If HEW, that is not part of SA Entitlement flow, is stored (i.e. temporarily retained) in the Lower Lakes before passing through the barrages, an evaporation loss associated with the

stored water will occur using the Lower Lakes Storage losses approach described in the Procedure.

- Peer-reviewed hydrological models, such as the *River Murray Source Model in South Australia* (DEW 2020), are used for a range of investigative and assessment purposes to understand complex river, floodplain and catchment behaviours. In the context of this policy and other environmental water protection policies, the use of any particular model or calculation method used in the water balance of environmental actions will be agreed by the DEW, the MDBA and relevant environmental water holders, and documented, as necessary, in water delivery schedules. The use of the River Murray Source Model, in particular, to support water use accounting (losses and return flows) is accepted as a fit-for-purpose method.
- Accounting for environmental watering losses is recorded in:
    - the *SA River Murray Environmental Water Accounting Spreadsheet* in accordance with the *Procedure for Environmental Water Accounting in the South Australian River Murray* (maintained by Water Delivery Unit (WDU)), and
    - the *Non Class 9 Environmental Water Accounting Spreadsheet* (maintained by Environmental Water Unit (EWU)).
- This Losses policy does not apply to planned environmental water defined in the *SA River Murray WRP* such as the Lindsay River Allowance, Additional Dilution Flow (ADF) or Eastern Mount Lofty Ranges (EMLR) inflows.

Responsibilities

Position	Responsibility
Chief Executive (CE), DEW	- Approves DEW policies.
Executive Director (ED), Water and River Murray (WaRM) Division	- Approves DEW Water and River Murray Division procedures. - Endorses the Annual Water for the Environment Plan for the South Australian River Murray and the Annual Water for the Environment Priorities for the South Australian River Murray.
Director, Water Infrastructure and Operations (WIO) Branch	- Approves watering schedules with the Commonwealth Environmental Water Holder (CEWH).
Environmental Water Unit (EWU)	- Coordinates the development of Annual Environmental Watering Priorities and the Annual Water for the Environment Plan for the South Australian River Murray. - Coordinates the determination of modelled losses associated with environmental watering actions.

	- Collaborates with EWHs on planning for environmental watering actions, accounting arrangements and water schedules. - Undertakes monthly and event-based reporting to EWHs. - Maintains the environmental watering accounts.
Water Delivery Unit (WDU)	- Receives and provides advice on River Murray Action Request Forms. - Maintains the *SA River Murray Environmental Water Accounting Spreadsheet*.
Water Science and Monitoring (Science) Branch	- Maintains the surface water monitoring network that provides input for water use assessments. - Develops and maintains hydrological models. - Undertakes modelling to determine environmental water use for various watering actions. - Undertakes flow gauging to verify calculated flows at key structures.
Murray-Darling Basin Authority (MDBA)	- Undertakes hydrological modelling to determine losses at The Living Murray (TLM) sites including the Chowilla floodplain site and the use of the environmental regulator. - Conducts a peer review of the models used.
Environmental Water Managers (EWMs)	- Develop and prepare environmental watering proposals and event plans. - Complete River Murray Action Request Forms. - Help to coordinate delivery of environmental water to agreed sites. - Pre-event estimation of losses.

Definitions

Controlled environmental watering action	An environmental watering action where a decision is made to use infrastructure such as a regulator or weir to increase the area of inundation or retain water, including operation of floodplain environmental regulators and raising of main-channel weirs.
Delivery schedule	Watering schedule (CEWH) and/or jointly managed water delivery instruction (TLM Initiative).
Environmental Outcomes	As defined in Section 4 of the *Water Act 2007;* *"environmental outcomes* includes: (a) ecosystem function; and (b) biodiversity; and (c) water quality; and

	(d) water resource health. Note 1: Paragraph (a) would cover, for example, maintaining ecosystem function by the periodic flooding of floodplain wetlands. Note 2: Paragraph (d) would cover, for example, mitigating pollution and limiting noxious algal blooms."
Environmental regulator	Built infrastructure that has the capacity to retain or release water on the floodplain to achieve environmental outcomes.
Environmental water	As defined in Section 4 of the *Water Act 2007;* "*environmental water* means: (a) held environmental water; or (b) planned environmental water" and, for the purposes of this Policy, environmental water also includes 'other' water resources that are neither held or planned environmental water but may be water entitlements and/or allocations used for environmental watering.
Environmental watering	As defined in Section 4 of the *Water Act 2007;* "The delivery or use of environmental water to achieve environmental outcomes."
Held environmental water (HEW)	As defined in Part 1 Section 4 of the *Water Act 2007;* "*held environmental water* means water available under: (a) a water access right; or (b) a water delivery right; or (c) an irrigation right; for the purposes of achieving environmental outcomes (including water that is specified in a water access right to be for environmental use)."
Hydrological model	A hydrological model is a simplification of a real-world water system at a chosen geographical scale, that may have varying components representing surface water, groundwater, soil moisture, wetlands, floodplains, storages, runoff, land uses, etc. and aims to replicate important functions and behaviours of the system. The purpose of developing such models supports the capacity to explore scenarios for water availability, water planning

	and forecasting activities. In the context of the South Australian component of the Southern Connected Basin of the Murray-Darling Basin, the *River Murray Source Model* (DEW 2020) is used to determine water balance information and assess water delivery scenarios in SA.
Incremental transmission losses	The losses (evaporation and seepage) which occur during an enhanced flow event due to an increase in River Murray channel inundated area, in comparison to what would have occurred in the absence of the flow enhancement.
Losses	Losses occur when water evaporates, is used by plants and/or seeps into the ground. Refer https://www.mdba.gov.au/water-management/mdba-river-operations/why-water-losses-happen
Lower Lakes	As defined in the *Water Act 2007*; *Lower Lakes* means Lake Albert and Lake Alexandrina in South Australia.
Net Environmental Water Use	The volume of water used by environmental watering action(s) based on the water balance equation *i.e. total volume delivered = Losses (evaporation and seepage) + Return Flows (remaining in system)*
Planned Environmental Water (PEW)	As defined in Part 1 Section 6 of the *Water Act 2007;* *"planned environmental water* is water that: (a) is committed by: (i) the Basin Plan or a water resource plan for a water resource plan area; or (ii) a plan made under a State water management law; or (iii) any other instrument made under a law of a State; to either or both of the following purposes: (iv) achieving environmental outcomes; (v) other environmental purposes that are specified in the plan or the instrument; and (b) cannot, to the extent to which it is committed by that instrument to that purpose or those purposes, be taken or used for any other purpose."
Regulated flow	The flow resulting from the release of stored water at the direction of the MDBA or state water resource managers, other than during or in anticipation of floods.
Return Flows	Water that returns back to the river after it is used. Refer https://www.mdba.gov.au/water-management/river-operations/return-flows

Site-based losses	Losses associated with a controlled environmental watering action where a decision is made to use infrastructure such as a regulator, pump or weir to increase the area of inundation through the delivery of environmental water to a particular location, resulting in increased evaporation and seepage.
Unregulated flow	Unregulated flow to SA is declared by the MDBA for a period of time, and extended as appropriate, after New South Wales and Victoria exercise their rights to access unregulated flows for consumptive use, and the water is unable to be captured in storages.

Acronyms

ADF	Additional Dilution Flow
CE	Chief Executive
CEWH	Commonwealth Environmental Water Holder
CLLMM	Coorong, Lower Lakes and Murray Mouth
Cth	Commonwealth
DEW	Department for Environment and Water
ED	Executive Director
EMLR	Eastern Mount Lofty Ranges
EWH	Environmental Water Holder
EWMs	Environmental Water Managers
EWU	Environmental Water Unit
HEW	Held Environmental Water
MDBA	Murray-Darling Basin Authority
PPM	Pre-requisite Policy Measures
SA	South Australia
TLM	The Living Murray

WAP	Water Allocation Plan
WRP	Water Resource Plan
WaRM	Water and River Murray
WDU	Water Delivery Unit
WIO	Water Infrastructure and Operations

Associated Documents and References

- Department for Environment and Water (DEW), 2022-23, *Annual environmental watering priorities for the South Australian River Murray (the Annual Priorities)* https://www.environment.sa.gov.au/topics/river-murray/improving-river-health/environmental-water/environmental-water-planning

- Department for Environment and Water (DEW), 2022-23, *Water for the Environment Annual Plan for the South Australian River Murray* https://www.environment.sa.gov.au/topics/river-murray/improving-river-health/environmental-water/environmental-water-planning

- Department for Environment and Water (DEW), 2023, *Methodology to Calculate Water Use Losses for Environmental Water Delivery in South Australia, DEW Technical Report* https://www.waterconnect.sa.gov.au/Content/Publications/DEW/Methodology to calculate water use losses for environmental water delivery in South Australia.pdf

- Department for Environment and Water (DEW), 2020, *Refinements to the River Murray Source Model in South Australia, DEW Technical report 2020/06* https://www.waterconnect.sa.gov.au/Content/Publications/DEW/TechnicalReport_RefinementsToTheRiverMurraySourceModelInSA_2020_final.pdf

- Department for Environment and Water (DEW), 2023, *Policy for Environmental Water Return Flow* https://www.environment.sa.gov.au/topics/river-murray/basin-plan/sustainable-limits-on-water-use/prerequisite-policy-measures

- Department for Environment and Water (DEW), 2023, *Policy for the Use of Unregulated Flow in the River Murray in South Australia* https://www.environment.sa.gov.au/topics/river-murray/basin-plan/sustainable-limits-on-water-use/prerequisite-policy-measures

- Department for Environment and Water (DEW), 2023, *Procedure for Application of Losses to Environmental Water Entitlements*
  (Not available online)

- Department for Environment and Water (DEW), 2023, *Procedure for Environmental Water Accounting in the South Australian River Murray*
  (Not available online)

- Department for Environment and Water (DEW), 2023, *Procedure for Environmental Water Return Flow*
  (Not available online)

- Department for Environment and Water (DEW), 2022, *Procedure for Quarterly Reporting on Environmental Water Accounts*
  (Not available online)

- Department for Environment and Water (DEW), 2023, *Procedure for the Use of Unregulated Flow in the River Murray in South Australia*
  (Not available online)

- *Landscape South Australia Act 2019*
  https://www.legislation.sa.gov.au/LZ/C/A/LANDSCAPE SOUTH AUSTRALIA ACT 2019.aspx

- Murray-Darling Basin Agreement 2008 (Cth) (see Schedule 1 of the *Water Act 2007*)
  https://www.mdba.gov.au/water-management/allocations-states-mdba/murray-darling-basin-agreement

- Murraylands and Riverland Landscape Board (MRLB), 2023, *Water Allocation Plan for the River Murray Prescribed Watercourse*
  https://www.landscape.sa.gov.au/mr/water/water-allocation-plans/river-murray-wap

- *Water Act 2007 (Cth)*
  https://www.legislation.gov.au/Series/C2007A00137

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Approved by	John Schutz, Chief Executive Department for Environment and Water	Date Approved	27 June 2023
Responsible Branch	Water Infrastructure and Operations	Review Date	30 June 2026
Keywords	River Murray, Environmental Water, Losses, Pre-requisite Policy Measures, PPM	Version	3.0