Water for the Environment Management Framework

South Australian River Murray

Government of South Australia
Department for Environment and Water

Acknowledgement of the Traditional Owners

The Department for Environment and Water acknowledges Traditional Owners of Country throughout Australia and recognises the continuing connection to lands, waters and communities. We pay our respect to Aboriginal and Torres Strait Islander cultures and to Elders both past and present.

The First Nations of South Australia, the Aboriginal Traditional Owners, have occupied, enjoyed and managed their customary lands and waters since time immemorial and continue their deep cultural, social, environmental, spiritual and economic connection today. The Government of South Australia acknowledges and pays respect to the Traditional Owners and their Nations. The South Australian government also acknowledges and respects the rights, interests and obligations of Traditional Owners to speak and care for their Country – lands and waters – in accordance with their laws, customs, beliefs and traditions. In acknowledging this history and connection we also recognise the deep and irreversible damage and dislocation that Aboriginal and Torres Strait Islander people have experienced and continue to experience through European colonisation, settlement and displacement. Aboriginal Nations have advocated strongly for a healthier Murray–Darling Basin and just settlement of their land and water rights. This commitment led to a stronger Basin Plan for South Australians and asks us as a State Government to better recognise Traditional Owner interests in our water resource management. The Department for Environment and Water seeks to enable partnerships with Aboriginal Nations built upon mutual respect and trust. We recognise the differences between Nations and their preferred approaches for engagement with Government and will work through these arrangements to support Traditional Owners to meet their customary rights and obligations in natural resource planning and implementation.

First Nations peoples should be aware that this publication may contain images of deceased persons or culturally sensitive material.

Acknowledgements

The South Australian Riverland Floodplains Integrated Infrastructure Program (SARFIIP) is a $155 million investment program funded by the Australian Government through the Murray-Darling Basin Authority and implemented by the South Australian Government to improve the watering and management of River Murray floodplains in South Australia's Riverland.

Contents

Glossary

Acronyms and abbreviations

ADF - additional dilution flows
AOO – Annual Operational Outlook
BOC - Basin Officials Committee
BWAP – Basin Wide Annual Priorities
CEWH - Commonwealth Environmental Water Holder
CEWO - Commonwealth Environmental Water Office
CHWN – Critical Human Water Needs
CLLMM – Coorong, Lower Lakes and Murray Mouth (is also referred to as LLCMM under the TLM program)
COG – Chowilla Operations Group
Cth - Commonwealth
DEW – Department for Environment and Water (SA)
DPEI - Department of Planning, Industry and Environment (NSW)
EMLR - Eastern Mount Lofty Ranges
EMF - Environmental Management Framework
EPA – Environment Protection Authority
EWR – Environmental Water Requirement
GED – Group Executive Director
GL - a gigalitre; one billion litres
HEW - Held Environmental Water
IO – Integrated Operations
LRA - Lindsay River Allowance
LTAAY – Long Term Annual Average Yield
LTWP – Long Term Environmental Watering Plan
MDBA – Murray Darling Basin Authority
MRLB - Murraylands and Riverland Landscape Board
ML - a megalitre; one million litres
NAC – Ngarrindjeri Aboriginal Corporation
NGO – Non-government organisation
NRM – Natural Resources Management
NSW - New South Wales
PEA – Priority Environmental Asset
PEF – Priority Ecological Function
PEW – Planned Environmental Water
PIRSA – Primary Industries and Regions South Australia
PPMs - Prerequisite Policy Measures
PWC – Prescribed Watercourse
QSA - Discharge of River Murray flow at the South Australian border
RMAR – River Murray Action Request
RMOWG – River Murray Operations Working Group
RMIF - River Murray Increased Flow
RMUF - River Murray Unregulated Flow

SA - South Australia

SAMDB NRMB – South Australian Murray Darling Basin Natural Resources Management Board

SCB - Southern Connected Basin

SCBEWC - Southern Connected Basin Environmental Watering Committee

TLM - The Living Murray

VEWH - Victorian Environmental Water Holder

Vic – Victoria

WAP – Water Allocation Plan

WLWG - Water Liaison Working Group

WRP – Water Resource Plan

Other terms

Action – activities associated with environmental water management.

Asset – see PEA above.

Event – an occurrence that provides environmental water to achieve an ecological outcome at an environmental water site.

Lentic – (of organisms or habitats) inhabiting or situated in still fresh water.

Reach – the geographic area of the River Murray channel and floodplain (to the 1956 flood level) located between weirs and locks.

'Real time' water management – the short-term planning, decision-making and infrastructure operations related to water for the environment during the delivery of water to sites.

Return Flow – where an environmental water event requires water volumes greater than the volume that is actually used by that event. The balance of water not used (through evaporation, infiltration, floodplain storage) by the site re-enters the river system, therefore increasing flow downstream of the watering site. The returned environmental water volume is defined as a return flow.

Water for the Environment (or Environmental Water) - water used to achieve environmental outcomes, including benefits to ecosystem functions, biodiversity, water quality and water resource health.

Site – geographic location that environmental water can be delivered to. It can range from small scale wetlands and creeks to larger scale PEAs, e.g. River Murray channel.

1. Background

Framework purpose

This Environmental Water Management Framework for the South Australian River Murray (the Framework) documents the management of water for the environment and describes long and short-term planning and management arrangements in place to guide its use.

The purpose of this Framework is to:

- Outline the legislation and policies that set out the requirements for environmental water planning and how it is applied in South Australia (SA),
- Describe the process and steps taken by SA in the planning and delivery of environmental water to the SA River Murray Channel, Floodplain, and Coorong, Lower Lakes and Murray Mouth (CLLMM) on an annual and long-term basis,
- Provide information on the decision-making steps within the annual process,
- Support the co-ordinated use of environmental water within the SA River Murray to achieve the best outcomes and, where possible, target multiple sites for the delivery of water,
- Identify the clear links between annual planning at the site and system scale, and the integration of watering across all sites.

Scene setting

The Murray–Darling Basin is the largest and most complex river system in Australia (MDBA 2019b). It supports many plants, animals and ecosystems including those identified as nationally and internationally significant (MDBA 2010). A healthy, functioning river is important to the long-term viability and productivity of the industries and communities that depend on it. Over many decades, there has been a decline in the health of the Basin's water dependent ecosystems due to an increase in the use of water resources for agriculture, manufacturing and communities. In some parts of the system, flows have decreased by more than 50 percent.

The increase in extraction for consumptive use and upstream storage have contributed to a reduction in the flow available within SA to generate in-channel pulses, enable overbank inundation and provide sufficient water flows to the CLLMM. In addition, the construction of six weirs along the main channel of the River Murray in SA stabilised water levels and slowed water velocities, creating lentic 'weir pools'. These impacts have resulted in a decline in the ecological condition of the SA River Murray, and its floodplain, wetlands and estuary (DEW 2020c).

To begin to address the overuse of water, water sharing agreements between the States were established and led to the introduction of a permanent cap on water diversion in 1997.

'First Step Decision'

In 2002, The Living Murray (TLM) Program was established to improve the health of six designated sites (known as icon sites) with significant areas of forests, wetlands and lakes along the River Murray. The icon sites were chosen for their high ecological and economic value, as well as their cultural and heritage significance to Traditional Owners. All icon sites are regionally, nationally and/or internationally significant and recognised under international agreements such as the Ramsar Convention on Wetlands. Three icon sites are located wholly or partially within SA: Chowilla Floodplain, River Murray Channel and CLLMM.

In 2003, the Murray-Darling Basin Ministerial Council announced the 'First Step Decision' to recover 500 gigalitres (GL) of water for the environment for the six icon sites along the River Murray, and to construct infrastructure to help improve the ability to deliver water for the environment. By 2009, 489 gigalitres (GL) of this volume had been recovered for the environment (MDBA 2020b).

Water Act 2007 and Basin Plan

In recognition that further water recovery was required to halt the decline of the health of the Murray Darling Basin, the Commonwealth's *Water Act 2007* (*Water Act*) was enacted to enable the Australian Government, in conjunction with the

Basin States, to manage the Basin water resources in the national interest, and to promote the use and management of the Basin water resources in a way that optimises economic, social and environmental outcomes.

The *Water Act* provided for the development of the Murray-Darling *Basin Plan 2012* (Cth) (MDBA, 2012). The aim of the *Basin Plan* is to bring the Basin back to a healthier condition, while continuing to support industries for the benefit of the Australian community. To achieve this, the *Basin Plan* sets the amount of water that can be taken from the Basin each year, while leaving enough for the rivers, lakes and wetlands and the plants and animals that depend on them (MDBA 2019a). This is referred to as the sustainable diversion limit.

Most significantly, following amendments to the Basin Plan, the decision was made to commit to returning a minimum volume of 2,075 GL plus 450 GL of efficiency measures to the environment of the Murray-Darling Basin system by 2024. The MDBA estimates that the contracted surface water recovery in the Murray–Darling Basin, as at 30 June 2020, is 2,106.4 GL per year (MDBA 2020b).

Figure 1: Sharp-tailed sandpiper in Narrung wetland, Lower Lakes, photo John Kruger.

2. Key legislative obligations and policy drivers

The hierarchy of environmental water legislation and plans presented in Figure 3, guide environmental water management. Environmental water management along the River Murray in SA is co-ordinated by the Department for Environment and Water (DEW), with significant involvement from First Nations, non-government organisations and other stakeholders. This portfolio of work includes:

- the development of a Long-Term Environmental Watering Plan, Annual Environmental Watering Priorities, the Annual Water for the Environment Plan and Annual Water for the Environment Report
- the development of the State's environmental watering policies and procedures
- the State's contribution to Basin-wide environmental watering policy and planning reform
- management and operations of environmental water and works
- communication of planning, prioritisation and environmental outcomes to stakeholders and the broader public
- monitoring the impact of environmental water delivery and long-term ecological outcomes.

The Basin Plan

As part of the *Basin Plan*, an Environmental Management Framework (EMF) was established, and is intended to: co-ordinate the planning, prioritisation and use of environmental water on both a long-term and an annual basis; enable adaptive management principles to be applied to the planning, prioritisation and use of environmental water; and, facilitate consultation, co-ordination and co-operative arrangements between the Murray-Darling Basin Authority (MDBA), the Commonwealth Environmental Water Holder (CEWH) and Basin States.

The key components of the *Basin Plan* EMF are the Basin-Wide environmental watering strategy (BWEWS), the regional Long-Term Watering Plans (LTWPs), the Basin annual environmental watering priorities, and the State annual environmental watering priorities. Together, these documents aim to provide clear objectives and guidance for the coordinated management of environmental water across the Basin. The four planning documents have been developed collaboratively by the Commonwealth and State governments to form a cohesive framework which covers multiple temporal and spatial scales.

South Australian River Murray Water Resource Plan

The *Water Act* requires a water resource plan (WRP) be prepared for each water resource plan area identified in the *Basin Plan*. The WRPs must provide for the management of the water resources of the WRP area and set out the rules on how much water may be taken from the area to ensure the sustainable diversion limit is not exceeded. The WRP also provides for environmental watering to occur in a way that is consistent with the *Basin Plan*.

The SA River Murray WRP (SAMDB NRMB 2019c) is informed by a detailed risk assessment, development of policies, and amendments to the Water Allocation Plan for the River Murray Prescribed Watercourse (River Murray WAP), to ensure consistency with the *Basin Plan*.

The River Murray WAP is a statutory instrument prepared under the *Natural Resources Management Act 2004* (SA) [ceased] and now has effect under the *Landscape South Australia Act 2019* (SA). The River Murray WAP provides for the sustainable management of water resources in the River Murray in South Australia through principles addressing the take and use of water. Whilst the information within the two plans are complementary, the SA River Murray WRP addresses water use within a different geographical boundary to that of the River Murray WAP.

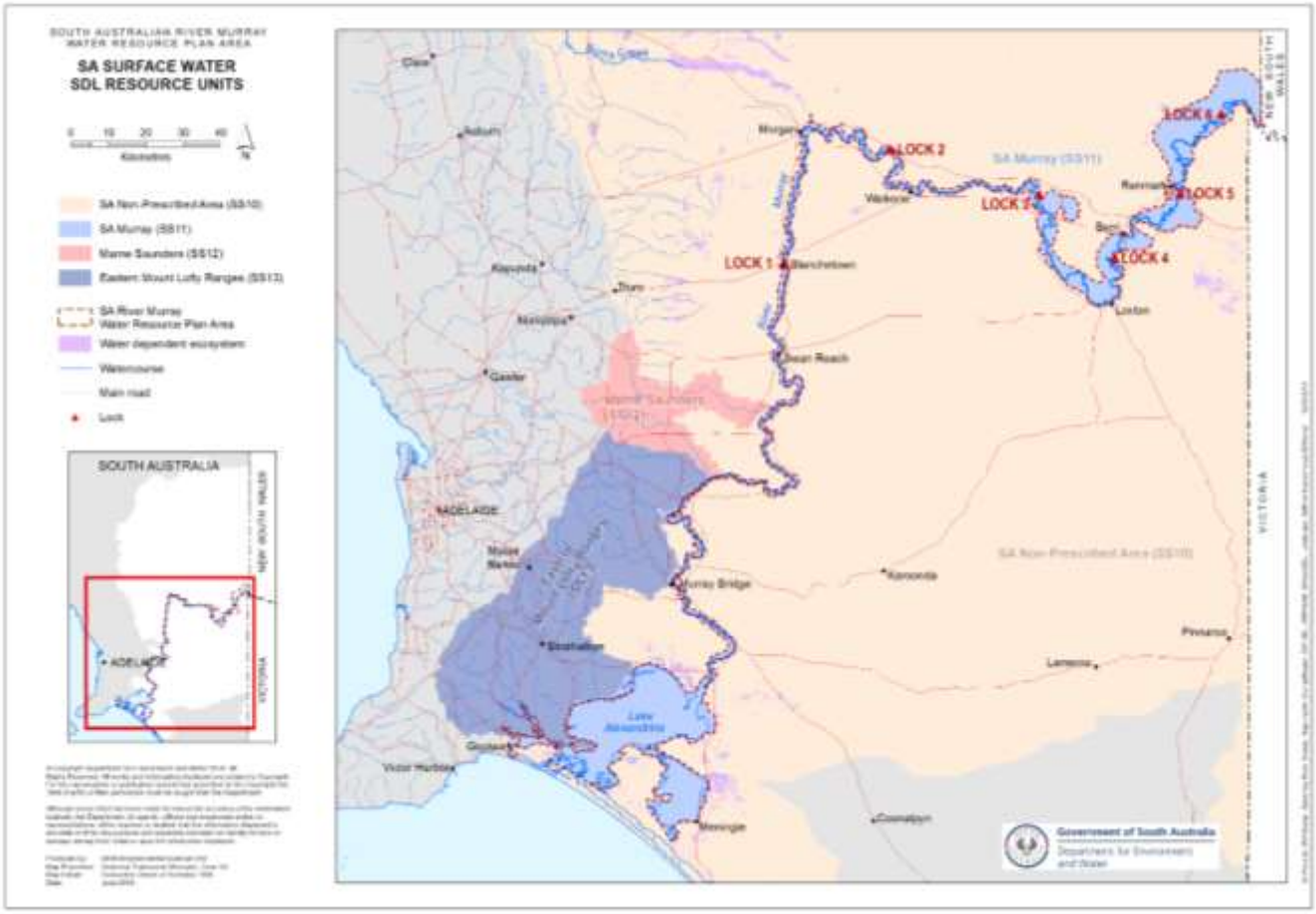

Figure 2: Water Resource Planning boundaries in South Australia

The Long-Term Watering Plan for the River Murray WRP area

As part of the EMF, the *Basin Plan* requires long-term environmental watering plans (LTWPs) to be developed by Basin State governments to guide the long-term management of environmental water at Water Resource Plan Area scale. LTWPs set ecological objectives, targets and environmental watering requirements for priority environmental assets and ecosystem functions consistent with the *Basin Plan* requirements and objectives.

The SA River Murray LTWP (DEW 2020c) sets out the priority environmental assets (PEAs) of the SA River Murray WRP Area and describes the ecological objectives, targets and environmental water requirements (EWRs) for those assets over the longer term.

The EWRs describe a desired long-term and variable hydrological regime that enables flexibility and adaptive management in response to climate and ecological condition. The EWRs can be used in annual planning, together with results from ecological monitoring that indicate current condition, to identify priority watering actions.

Three priority environmental assets have been identified for the SA River Murray WRP Area:

- the Coorong, Lower Lakes and Murray Mouth (CLLMM) Priority Environmental Asset[1]
- the South Australian River Murray Channel Priority Environmental Asset
- the South Australian River Murray Floodplain Priority Environmental Asset.

[1] This asset includes the Coorong even though it falls within the Murray Region WRP Area as its management cannot be separated from the SA River Murray WRP Area assets. Information on the other two SA WRP plans are provided in section 6.3.

In total, 45 ecological objectives, 98 ecological targets and 16 EWRs were identified for the three priority environmental assets.

International Agreements, inc. Ramsar

The *Basin Plan* requires that LTWPs not be inconsistent with relevant international agreements (s8.20 (5)) including the Ramsar Convention, the Bonn Convention, Japan-Australia Migratory Bird Agreement (JAMBA), China-Australia Migratory Bird Agreement (CAMBA) and Republic of Korea-Australia Migratory Bird Agreement (ROKAMBA).

The CLLMM PEA is recognised as a Wetland of International Importance under the Ramsar Convention. The Channel and the Floodplain PEAs intersect two Ramsar-listed Wetlands of International Importance - the Riverland Ramsar Site and Banrock Station Wetland Complex.

Where an asset is a declared Ramsar wetland, then the objectives must be directed towards maintaining the ecological character of the wetland. The ecological character of each of the three Ramsar wetlands was taken into account when developing the ecological objectives and targets of the PEAs within the SA River Murray LTWP.

SA River Murray Annual Environmental Watering Priorities

The preparation of annual environmental watering priorities for surface water in the SA River Murray occurs each year in accordance with the *Basin Plan*. This involves the identification of watering priorities for the PEAs and PEFs for the SA River Murray. The priorities are prepared via the annual environmental watering planning steps outlined in this Framework (sections 6 and 7) and are developed having regard to the Basin Wide Environmental Watering Strategy (BWEWS) (MDBA 2019c), and are consistent with the SA River Murray LTWP (DEW 2020c).

Other policies and procedures

Part of DEW's obligations under the *Basin Plan* is to develop policies and procedures that demonstrate compliance with *Basin Plan* requirements. This includes the implementation of policy measures to help guide environmental watering in SA. The policies and procedures that have been developed support: the protection of environmental water from the SA border to the Coorong; the efficient and effective use of environmental water consistent with *Basin Plan* objectives; statutory reporting under Schedule 12; the development of watering priorities; the delivery and use of water for the environment and associated water accounting processes. The purpose of the policies and procedures is to provide clear guidance on the responsibilities associated with management of water for the environment within SA, to protect and enable the use of return flows and unregulated flows, and to avoid the consumptive use of water for the environment.

As of 1 July 2019, the MDBA considered that South Australia's Prerequisite Policy Measures (PPMs) were in effect. PPMs are legislative and operational rule changes designed to maximise the beneficial outcomes of the water recovered for the environment under the *Basin Plan*, without impacting on the reliability for other water users (DEW 2019c). These policy measures are embedded in statutory instruments, river operating procedures and/or policy or planning documents (a number of these overlap with the policies mentioned in the paragraph above). These policy settings will continue to be refined as part of the adaptive management approach to improving environmental water arrangements in SA and the Basin.

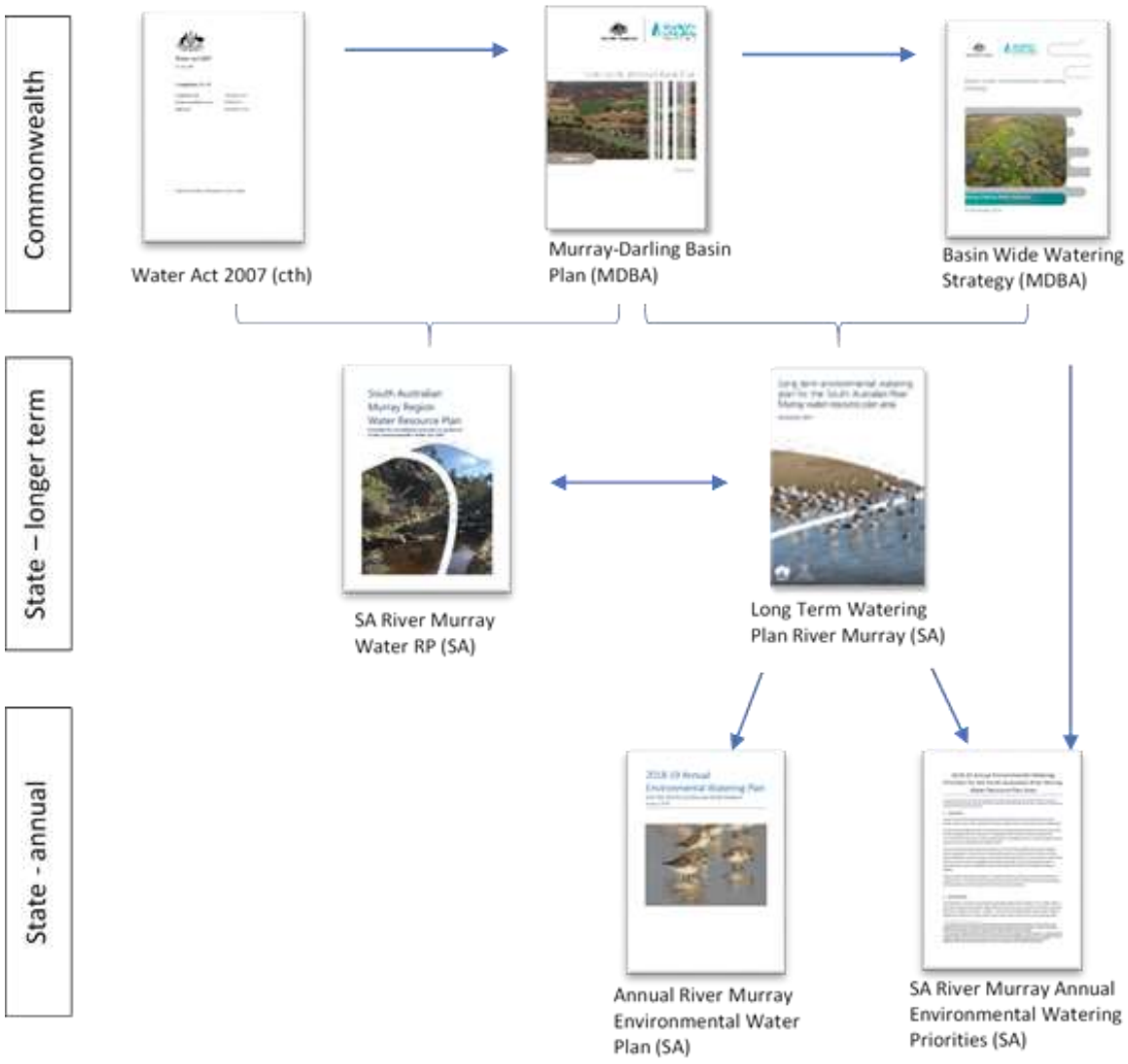

Figure 3: Overview of the hierarchy of legislature and plans for environmental water across the Murray-Darling Basin

3. Governance arrangements

This Framework outlines the governance arrangements, decision making processes and responsibilities for the management of water for the environment within the SA River Murray. This section provides an overview of the key decision making roles and responsibilities.

The DEW has the responsibility to coordinate, plan for and report on water for the environment within the SA River Murray on behalf of the SA Government.

The SA Minister for Environment and Water has the authority to approve SA's annual environmental watering priorities for the SA River Murray WRP Area. The Executive Director, Water and River Murray, DEW is authorised by the Minister to approve these priorities.

Under appointment by the Minister for Environment and Water, SA Water is responsible for the physical operation of the major River Murray Assets, including the weirs, locks, barrages and regulating structures, which are controlled through the MDBA Joint Venture (DEW 2019a). DEW may also engage SA Water for the operation of state owned assets such as environmental regulators at Pike and Katarapko floodplains.

The responsibility for the development of the annual environmental watering proposals sits with the specific water managers. Within DEW, proposal development is undertaken with input and advice from stakeholders (e.g. operational groups, landholders, First Nations, scientists etc.). The water managers have the responsibility for the management of the 'real time' delivery of environmental water and the decision making associated with infrastructure operations, with input from stakeholders. First Nations are represented on, and their members participate in, governance structures relating to DEW water management and planning on their Country.

The authority for approval for DEW to undertake specific watering events rests with the SA Minister for the Environment and Water, and the relevant executives delegated within DEW. This authority includes the delegation to issue an instruction to SA Water, to operate infrastructure for the delivery of water for the environment. Table 1 below summarises the governance arrangements and responsibilities for River Murray environmental water management.

Non-government organisations (NGOs) involved in environmental water management also develop and implement watering proposals, liaising directly with the CEWO on use of CEWH water. NGOs work collaboratively with DEW during planning and implementation, and are subject to the same approvals required of all environmental water managers in SA.

Table 1: SA governance and responsibilities for SA River Murray environmental water management (including operations).

Entity	**Authority**	**Responsibility**
Minister for Environment and Water	The Minister responsible for the *Murray-Darling Basin Act 2008* (SA) is appointed as a State Constructing Authority under the MDB Agreement.[2] The operation of assets not included in Schedule A of the MDB Basin Agreement is authorised by the *River Murray Act 2003* (SA).	The Constructing Authority is to carry out the obligations of the State of South Australia under the Murray-Darling Basin Agreement approved by the *Murray-Darling Basin Act 2008* (SA), and in particular to construct, operate and maintain works and to implement measures authorised by the MDBA The Minister has conferred on SA Water and DEW the function of acting as an operational agent of the Constructing Authority in accordance with a Memorandum of Administrative Arrangement (MAA) dated 19 January 2018.

[2] Section 9 (b)

Entity	Authority	Responsibility
		The *River Murray Act 2003* (SA) authorises the Minister to institute, supervise or promote programs to protect, maintain or improve the River Murray[3].
DEW	The Chief Executive of DEW has a delegation made pursuant to section 18 of the *Murray-Darling Basin Act 2008* for the operation and control of works for the purpose of implementing the Annual Environmental Watering Priorities for the South Australian River Murray Water Resource Plan Area. The Chief Executive of DEW has a delegation pursuant to section 12 of the *River Murray Act 2003* for the construction, maintenance and operation of works under this Act.	DEW facilitates environmental water delivery and watering events within the River Murray Water Resource Plan Area including management of environmental and water quality risks. As part of this role, DEW convenes: - stakeholder workshops during annual planning, - site specific groups involved in water planning and delivery, including community advisory groups, operating groups and scientific advisory groups. DEW is responsible for accounting of environmental water in South Australia. DEW supports the statutory responsibilities of e-water holders in the use of Held Environmental Water (HEW) delivered into SA. DEW reports on environmental outcomes in SA. DEW has the primary responsibility for PPM implementation in South Australia through the instruments outlined in this document (policies, procedures and water accounting practices). DEW operates a number of environmental regulating structures.
SA Water	Under the MAA, SA Water is responsible for the construction, operation and maintenance of infrastructure related works and measures authorised under the Agreement funded either by the Authority in accordance with the terms of the Agreement (except the programmes DEW is responsible for listed above) or by the Constructing Authority.	SA Water Operate the Structures in accordance with the Operations Plan and further instructions from DEW regarding the operation and control of works for the purpose of implementing the Annual Environmental Watering Priorities for the South Australian River Murray Water Resource Plan Area.
MDBA	The MDBA is the manager of RMO assets and River Murray operations as prescribed by the MDB Agreement.	Determines procedures and directions for the operation of works constructed or measures implemented pursuant to the MDB Agreement.[4] Assesses the possible effect of any proposal on the flow, use, control or quality of the water in the River Murray in South Australia and authorises works for the benefit of State Contracting Governments.[5] Provides advice on flows to the South Australian border and other relevant matters, such as Annual Operating Outlooks (AOOs).

[3] Section 9 (1) (f)
[4] Clauses 61, 65, 66, 68 MDB Agreement
[5] Clauses 49, 63, MDB Agreement

Entity	Authority	Responsibility
		Convenes the interjurisdictional Southern Connected Basin Environmental Water Committee (SCBEWC), which oversees advice and agreement on the use of TLM and RMIF water. MDBA also convenes the Water Liaison Working Group (WLWG) and Barrage Operations Advisory Group (BOAG), which contributes to water planning each year,
CEWH	Role of the CEWH was established under the *Water Act 2007* to manage water acquired by the Australian Government as part of a suite of national water reforms.	The Commonwealth Environmental Water Office (CEWO) develops Portfolio Management Plans at the start of each water year, which identify broad environmental demands within a catchment and the how the water portfolio can be managed in response to these demands. The CEWH commits volumes of Commonwealth environmental water to specific activities, through the development of watering schedules.

4. What is Water for the Environment?

Water for the environment (or environmental water) is water that is used to achieve environmental outcomes, including benefits to ecosystem functions, biodiversity, water quality and system health. Management of environmental water aims to restore the health of rivers, wetlands and floodplains by delivering water when and where the system needs it.

Environmental watering is the delivery or use of water to achieve environmental outcomes. Delivering the right amount of water for the environment, in the right places and at the right times is complex and can be difficult to achieve. Environmental watering often involves the use of 'works' or water-control structures, including dams, weirs, locks, levee banks, pumps and regulators— to enable water to be delivered to sites.

Within SA, environmental watering aims to maintain the important values of the SA River Murray, its wetlands and floodplains, Lakes Alexandrina and Albert, the Coorong and Murray Mouth.

During dry years there may be limited amounts of water for the environment available across the whole Basin. There are also physical and policy constraints that can limit the delivery of water in adequate volumes or at the preferred times of year. Therefore, it is important that the environmental water available within each year is delivered strategically, so that water is used effectively to achieve the best environmental outcomes possible. This requires a well-informed and coordinated decision-making process, based on best available science.

Figure 4: Southern Bell Frog, photo MRLB.

5. Sources (types) of environmental water

The environmental water available for use within the SA River Murray WRP Area consists of both 'held' and 'planned' environmental water, where:

- held environmental water (HEW) is water available under a water access right or held on a water licence for the purposes of achieving environmental outcomes (*Water Act 2007* (Cth) s4), and
- planned environmental water (PEW) is water that is not held on a licence but is committed or preserved for achieving environmental outcomes through a plan or legislation and cannot be used for any other purpose unless required for emergency purposes (*Water Act 2007* (Cth) s6).

The full definitions for held and planned environmental water, are as per the *Water Act*. The SA River Murray WRP identifies the held and planned environmental water in the SA River Murray WRP area (DEW 2019d).

5.1 Environmental water

The three key environmental water holders that hold water access rights in the SA River Murray WRP Area are the CEWH, TLM and Minister for Environment and Water (SA). South Australia may also receive water held by environmental water holders in the upstream states.

Commonwealth Environmental Water

The role of the Commonwealth Environmental Water Holder (CEWH) was established under the *Water Act 2007* to manage water acquired by the Australian Government as part of a suite of national water reforms, including the *Basin Plan* (DEE 2019a). The CEWH, supported by the Commonwealth Environmental Water Office (CEWO), manages the Commonwealth's environmental water portfolio, which has been created through water buy-backs or investment in water-saving infrastructure.

The total Commonwealth environmental water holdings within the Southern Connected Basin as at 30 June 2020, are approximately 1,589 GL Long Term Annual Average Yield (LTAAY) (registered entitlements). The holdings in the non-Southern Basin are approximately 401 GL LTAAY (DAWE 2020).

Of this volume, approximately 161 GL of registered entitlement is held in SA and forms part of South Australia's Entitlement Flow. The availability of this water is guided by the River Murray Allocation Framework (SAMDB NRMB 2019c). This water is considered HEW under the River Murray WRP and will be recorded on the Register of HEW, as required under the *Basin Plan* as part of the WRP accreditation.

Decisions on the use of Commonwealth environmental water holdings are made independently by the CEWH, but also involve considerable consultation with SA, other jurisdictions, scientists, First Nations peoples and local communities.

The Living Murray and River Murray Increased Flows

The Living Murray (TLM) program has recovered approximately 489 GL LTAAY of water (MDBA 2019e), of which approximately 45 GL is held in SA and forms part of South Australia's Entitlement Flow.

As part of the corporatisation process for the Snowy Hydro Scheme in 2002, the NSW, Victorian and Australian Governments agreed to fund a program of water efficiency and water entitlement purchases in the Murrumbidgee and Goulburn river systems. The water recovered would allow up to an additional 70 GL each year to be released to the River Murray for environmental purposes. This water is known as River Murray Increased Flows (RMIF) and has rules governing its release.

Advice and agreement on the use of TLM and RMIF water are provided through Southern Connected Basin Environmental Water Committee (SCBEWC), an inter-jurisdictional forum convened by the MDBA, (where SA is represented by DEW). In deciding the use of TLM and RMIF, SCBEWC works closely with the CEWO and other environmental water holders to maximise the benefits of the available environmental water.

Water held by South Australian Minister for Environment and Water

As at June 2020, the SA Minister for Environment and Water holds approximately 45.2 GL of water access entitlements that are committed to environmental purposes and form part of South Australia's Entitlement Flow. Of this total, 37.6 GL is within the Wetlands Consumptive Pool (Class 9) described in the River Murray WAP (SAMDB NRMB 2019c). This water is held on licence for managed pool-connected wetlands within the River Murray WRP area and is sourced from the 'dilution and loss' component of South Australia's Entitlement Flow. This volume does not affect water available for consumptive use. The Wetlands Consumptive Pool water is tied to the management of specific wetlands within the SA River Murray WRP Area, and this water may only be used at wetlands listed on the licence.

Approximately 6.6 GL has been committed for environmental use through the Implementation Plan for Augmentation of the Adelaide Desalination Plant, and the location of its use is flexible (within the SA portion of the Murray-Darling Basin). In addition to this, approximately 1 GL (Class 3) is committed to the management of Tolderol Wetland for environmental outcomes. These volumes are subject to rules in the River Murray Allocation Framework (SAMDB NRMB 2019c).

In accordance with Section 10.09(2) and (3) of the Basin Plan, South Australia is required to publish a Held Environmental Water Register (HEW) for each accredited water resource plan (WRP) under the Water Act 2007 (Cwlth) (DEW 2020f).

Decisions on the use of environmental water held by the SA Minister for Environment and Water are made by DEW under the delegation of the Minister, consistent with approved policies and procedures and in line with the State's annual priorities.

Water held by Non-Government Organisations

Accolade Wines holds 1.38 GL of Wetlands Consumptive Pool water (Class 9) for the management of the pool-connected areas of Banrock Station Wetland Complex. A number of NGOs hold small volumes of class 3 water that may be used for environmental purposes. Class 3 water will be available in line with the River Murray Allocation Framework (SAMDB NRMB 2019c).

5.2 South Australia's Entitlement Flow

Under the Murray-Darling Basin Agreement 2008 (*Water Act 2007* (Cth) Schedule 1), SA is entitled to receive up to 1,850 GL per annum. The 1,850 GL comprises:

- a volume of 58 GL per month (696 GL per annum) for dilution and losses (clause 88b), unless the Ministerial Council determines otherwise
- a variable monthly volume of up to 1,154 GL per annum (clause 88a), unless restricted in a period of special accounting (clause 128) or at the request of the SA Basin Officials Committee member (clause 90). This volume is provided over a water year, in monthly quantities that vary according to the historic consumptive (irrigation) pattern of demand. Lesser volumes are provided in the cooler months (April to September), and peak volumes are delivered in the warmer months (December and January). The monthly pattern is described in the Murray-Darling Basin Agreement (clause 88).

South Australia's Entitlement includes both HEW and PEW. The majority of the HEW has been recovered through TLM and by the CEWH under the Basin Plan. A small amount of environmental water is held by Accolade Wines and the Minister for Environment and Water (SA). The PEW component of SA's entitlement includes the dilution and loss (excluding the water access entitlement shares in the Wetland and Environmental Consumptive Pools, which are HEW) and unallocated portions of South Australia's Entitlement Flow.

Rules regarding allocation of water, including when SA receives less than 1,850 GL in a year, are governed by the River Murray WAP allocation framework (SA MDB NRMB 2019c).

Dilution and Loss

The dilution and loss component of South Australia's Entitlement (696 GL) is established under clause 88A of Murray-Darling Basin Agreement (*Water Act 2007* (Cth)). It is provided to meet conveyance losses to Wellington and provide salinity dilution, and is critical for the delivery of water of a suitable quality to support Critical Human Water Needs (CHWN) and other consumptive purposes. It also provides environmental and water quality benefits, including water for all pool-connected wetlands, salinity dilution flows and base flows in the river. This water is fundamental to supporting any additional environmental outcomes being sought through the *Basin Plan*. Dilution and loss water is the highest priority water delivered to South Australia as it underpins delivery of CHWN.

5.3 Flow above South Australia's Entitlement

River Murray flow in excess of normal Entitlement flow may be provided to SA as:

- interstate water trade
- River Murray Unregulated Flow
- deliveries of deferred water
- Additional Dilution Flow
- Lindsay River Allowance.

Interstate trade

Held environmental water allocations may be traded to SA from elsewhere in the Southern Connected Basin, and vice versa, as direct trade or as return flow from an upstream watering event. These allocations are generally from the Commonwealth Environmental Water (CEW) portfolio or TLM portfolio. Under some circumstances, the Victorian Environmental Water Holder (VEWH) or NSW may also trade environmental water to SA. These traded volumes are in addition to the HEW and PEW that are part of South Australia's Entitlement Flow, and as a result there are periods when the flow to the SA border can be higher than what would be expected from entitlement alone.

Unregulated Flow

Entitlement Flow (up to 1,850 GL per year) is insufficient to meet the environmental requirements of South Australia's River Murray. Higher flows that arrive as unregulated flow events, and which may be enhanced by environmental water delivered from upstream, are critical for the health of the environmental assets along the SA River Murray. They are essential for the protection and restoration of ecosystems, management of salinity and maintenance of ecologically appropriate water levels.

Within SA, the River Murray WAP preserves River Murray Unregulated Flow (RMUF) for the purpose of achieving environmental outcomes, unless required under emergency circumstances (SAMDB NRMB 2019c). The policy and procedure for the use of RMUF in the SA River Murray (DEW 2020d) outlines the need to preserve RMUF water from extraction for consumptive use. It may be used for environmental purposes in accordance with the SA annual environmental watering priorities and the River Murray WAP.

The announcement of a RMUF generally occurs in response to high rainfall events upstream of SA when storages are at or near capacity and inflows are unable to be captured or re-regulated. When there is flow in the Murray-Darling Basin that cannot be captured and stored, the MDBA may declare an RMUF event depending on the volume involved. It will be declared for specific reaches on the River and for a specific period. This includes locations upstream of the South Australian border. Use of RMUF in NSW and Victoria will affect how much unregulated flow is available to South Australia. The SCBEWC has delegated authority from the Basin Officials Committee (BOC) to coordinate use of RMUF for environmental purposes in the River Murray.

Deferred water

South Australia has the right to store (defer) part of the Entitlement in the upstream major storages to meet requirements for future CHWN and private carryover (SA MDB NRMB 2019c). Unallocated Entitlement may be required to help build South Australia's CHWN reserve, as required by the *Water Act*. When deferred entitlement is delivered to South Australia in a later year, it is additional to the Entitlement available in the current year (SA MDB NRMB 2019c). South Australia's storage rights are reflected in clause 91, clause 130 and Schedule G of the Agreement (SA MDB NRMB 2019c).

Additional Dilution Flow (ADF)

ADF is a volume of 3 GL per day that is provided to South Australia when the combined storage in Hume and Dartmouth Reservoirs exceeds 2,000 GL and Menindee Lakes Storage volumes exceed between 1,300 to 1,650 GL (MDBA 2020a). SA most recently received 201 GL of ADF in 2016-17.

Lindsay River Allowance (LRA)

LRA is the residual of 250 ML per day that is provided to the Lindsay River anabranch, via the Mullaroo Offtake (above Lock 7), to meet water supply demands (of an acceptable quality) and losses in the Lindsay River. The residual is treated as an unaccounted return flow to South Australia and is additional to the SA's Dilution and Loss (~70 GL per annum).

5.3 Eastern Mount Lofty Ranges Inflows

Flows into Lake Alexandrina from the Eastern Mount Lofty Ranges (EMLR) tributaries (including Currency Creek, Tookayerta Creek and the Finniss, Angas and Bremer rivers) are considered PEW once they are within the River Murray WRP area. Inflows to the site from the EMLR tributaries average 78 GL per year and are less than 2 percent of the flows from the River Murray (average 5,685 GL per annum) (Alcorn 2010).

The Flows for the Future Program was established to restore critical environmental flows in the Eastern Mount Lofty Ranges and Marne Saunders catchments to ensure the long-term sustainability of the region, improve catchment health, and contribute additional inflows to Lake Alexandrina. It is a supply measure under the Sustainable Diversion Limit (SDL) Adjustment Mechanism and contributes to the total SDL offset of 605 GL.

5.4 South East Flows

The DEW South East Flows Restoration Project was established to manage water release from Morella Basin via Salt Creek, to improve outcomes for South East wetlands and increase flows to the Coorong when required for salinity management. The management of Morella Basin and Salt Creek releases are driven by the needs and potential outcomes at Morella Basin, and the need to pass water to avoid flooding of neighbouring properties. However, the pattern of releases can be altered in consideration of potential outcomes and impacts within the South Lagoon of the Coorong, including salinity, nutrients and biotic responses (particularly *Ruppia tuberosa*). This project is a supply measure under the SDL Adjustment Mechanism and contributes to the total SDL offset of 605 GL.

5.5 Return Flows

An environmental return flow is water that is released as part of an environmental watering event, such as to inundate a floodplain or pulsed down a tributary that is not fully used and returns to or remains in the river during or at the conclusion of the event. The balance of water not used by the event through evaporation, infiltration and floodplain storage, re-enters or remains in the river system, therefore increasing flow downstream of the watering site. Policy measures have been put in place in the Southern Connected Basin to ensure these flows are reserved for future environmental use downstream, rather than re-regulated for consumptive purposes. The returned environmental water volume is defined as a return flow.

Within SA

The River Murray WAP protects environmental water within the SA River Murray from extraction. The return flow policy and procedure, in conjunction with procedures relating to accounting and reporting, provide additional protection for water that is delivered or traded to SA for environmental benefit, and has subsequently flowed back into the river as return flow, from consumptive use.

Upstream watering events

Environmental water allocations may be traded to SA from elsewhere in the Southern Connected Basin due to the direct allocation of environmental water to an action in the SA River Murray WRP Area or as return flows from an upstream watering action. These allocations are generally from the CEW portfolio or TLM portfolio, and under some circumstances, the Victorian Environmental Water Holder (VEWH) may also trade environmental water to South Australia. These traded volumes are in addition to the held and planned environmental water that is part of South Australia's Entitlement, and result in an increase in the flow to the South Australian border.

For example, the Victorian Environmental Water Holder (VEWH) manages environmental water holdings in the Murray, Goulburn and Campaspe rivers. Under some circumstances, they may trade HEW to SA, generally as a result of return flows from upstream environmental watering events. This water is protected within the River Murray and delivered through to the end of the system.

6. South Australian River Murray Environmental Water Management

6.1 Objectives of Water for the Environment

The overarching environmental objectives for the water-dependent ecosystems outlined in the LTWP of the SA River Murray are derived from those identified in the *Basin Plan* for the Murray-Darling Basin (*Basin Plan* Chapter 8.04).

For the SA River Murray, the LTWP outlines the objectives and targets for a healthy, functioning river, and these inform the environmental water planning and management in the South Australian River Murray.

6.2 Types of environmental watering sites and events in SA

Environmental watering within the SA River Murray incorporates a suite of watering events that can occur at a range of sites, including small scale individual wetlands, large scale floodplains, Lock reaches and the River Murray channel scale.

The number of environmental watering sites in the SA River Murray, and the types of watering events that can occur at these sites, has expanded over the past 15 years. They include:

- The operation of regulators within floodplain anabranches, e.g. Chowilla, Pike and Katarapko floodplains.
- Weir pool manipulations, including raising and lowering.
- River channel and floodplain via augmentation of unregulated flows or creation of in-channel flow events (e.g. spring pulses).
- Pumping and water delivery via infrastructure to temporary wetlands.
- Wetting and drying of managed pool connected wetlands.
- CLLMM management, including lake level variations, lake cycling, fishway operations and barrage releases.

Most of these watering sites and events are guided by individual site management plans, operating plans and ecological monitoring programs, which provide guidance on the development of environmental watering proposals and management decisions. The LTWP acts as on overarching plan for the whole of system watering events. Many of the watering events involve the operation of infrastructure such as floodplain and wetland regulators, locks and weirs, fishways and barrages to enhance water delivery.

Management of environmental water delivery

DEW is responsible for the management of TLM Icon Sites within SA – the Chowilla Floodplain, the SA River Murray Channel and CLLMM. Management of the SA river channel includes weir pool manipulations and augmentation of river flows and spring pulses. DEW also has responsibility for the environmental water management of the Katarapko and Pike floodplains, and the broader SA River Murray floodplain.

Many of the smaller wetlands and floodplains located along the length of the River Murray in SA, including fringing wetlands of the Lower Lakes, are managed via the Murraylands and Riverland Landscape Board (MRLB) in conjunction with a range of stakeholders.

Several non-government organisations (NGOs) also manage a number of wetland and floodplain sites, either as the landholders or in conjunction with the landholders. Nature Foundation South Australia, Renmark Irrigation Trust (RIT), Ngarrindjeri Aboriginal Corporation (NAC), Accolade Wines (Banrock Station), and Australian Landscape Trust (ALT) are all active managers of environmental water.

A range of sources of environmental water may contribute to watering events at any site along the SA River Murray and environmental water holders aim to maximise environmental outcomes with the water available within their portfolio.

6.3 Co-operative Watering Arrangements

Within SA River Murray

Environmental water management within the SA River Murray WRP Area continues to evolve. There is a growing number of environmental water managers responsible for managing sites, including multiple areas within the LTWP priority assets, and a variety of mechanisms for delivering environmental water.

Cooperative arrangements are important to ensure all environmental asset and site managers, environmental water holders and environmental water managers are working towards the common goal of a healthy, functioning and resilient SA River Murray ecosystem. These arrangements ensure that decisions are transparent, priorities and trade-offs are understood, and outcomes at the site-scale contribute to desired outcomes at the LTWP asset and WRP Area scale. With a finite volume of environmental water available, it is not always possible to deliver all desired actions; however the benefits of environmental water management can be maximised if a single allocation of environmental water is used efficiently and effectively to achieve multiple outcomes at multiple sites.

Mechanisms to assist with coordinating environmental watering within the SA River Murray WRP area are described throughout this Framework document, in particular Section 3 – Governance and Section 6 - Annual Environmental Water Management. Coordination involves water managers working closely with river operators, water holders, scientists, landholders, community groups and traditional owners, as well coordinating with whole of system planners and upstream states, in the planning and delivery of water for the environment within SA.

In recent years, DEW has developed a "multisite" approach to facilitate the coordinated delivery of environmental water to and within SA. This approach seeks to align site-specific watering events that have been identified in the annual planning process to maximise the effectiveness of environmental water delivery and enhance ecological outcomes throughout the system. The annual SA multisite watering proposal is provided to the MDBA, water holders and relevant environmental managers, and is also incorporated within the SA annual priorities and plans.

Between Water Resource Planning Areas

The *Intergovernmental Agreement on Implementing Water Reform in the Murray Darling Basin* (COAG 2019) between Commonwealth and the states, supports the objectives of the *Basin Plan* and encourages all parties to cooperate and use their best endeavours in its implementation. Under the agreement, environmental water holders and managers work collaboratively and in close consultation with each other in the delivery of water for the environment.

The *Basin Plan* has made provision for connectivity between all Water Resource Planning Areas and accounting procedures have been developed to ensure that this occurs. The South Australian River Murray WRP is hydrologically connected to the surface water of the Southern Connected Basin of the Murray–Darling Basin, which connects it to the Victorian Murray WRP, the New South Wales Murray and Lower Darling WRP and the Wimmera–Mallee WRP. In South Australia, surface water connections have been identified between the SA Murray Region WRP and the EMLR Region WRP area (DEW 2019d).

Interstate

Water holders and managers of water for the environment have worked together for several years to plan and coordinate system scale multisite environmental watering events. These multisite events aim to maximise the use of environmental water and return flows at multiple sites as water moves through the Southern Connected Basin. In 2013, the Basin Officials Committee (BOC) agreed on a long-term objective for the events to work towards incorporating environmental delivery into normal River Murray operations. To date, the multisite events have tested a range of actions including new accounting methods, addition of environmental water to unregulated flow, use of loss factors, and coordination of environmental releases with natural flow peaks. Each year, the planning for the multisite event has built on the lessons learned from previous years and has enhanced understanding of the outcomes. Where appropriate, the actions are codified and included in the MDBA Objectives and Outcomes for River Operations document (MDBA 2019d).

An example of a multisite event is the cross-jurisdictional River Murray channel watering events, which have been coordinated with the aims of providing longitudinal connectivity and ecological benefits along the whole River Murray system. This has involved the jurisdictions and partners working together to align the timing of flows in the Murray with flows from major tributaries e.g. Murrumbidgee and Goulburn, to maximise benefits to biota, habitat and functions along

the length of River Murray system. These events have enhanced spring flow delivery to SA by coordinating upstream environmental water releases.

As the River Murray relies on environmental water from the broader connected river system of the Southern Connected Basin, the environmental water planning, coordination and delivery supported through SCBEWC is critical to meeting environmental objectives in South Australia (DEW 2019d). SCBEWC has representatives from individual states in the Southern Connected Basin, the MDBA and CEWO. The Water Liaison Working Group (WLWG) is another inter-jurisdictional forum convened by the MDBA that contribute to multisite planning each year. SA has representatives on these cross jurisdictional committees and participates in the planning for all large-scale environmental watering events.

SA Operational Advisory Groups also hold regular teleconferences to ensure coordination and communication during events and rapid response to any issues that may arise. Membership of these groups includes water holders, managers of environmental assets and river operators.

Intrastate

There are cooperative environmental watering arrangements between SA's three WRP areas.

1. Eastern Mount Lofty Ranges Water Resource Plan Area

There is no active management of water for the environment within EMLR Region WRP Area as the system is unregulated. Instead, long term cooperative arrangements have been established through policies within the relevant water planning documents (e.g. Water Allocation Plans (WAPs)). The EMLR Region WRP Area has two prescribed water resource areas, and hence two WAPs, within its boundary: EMLR and Marne Saunders.

Flows from the EMLR tributaries (average 78 GL per year) are received into the River Murray (DEW 2019d). The Water Allocation Plan (WAP) development process for the EMLR assessed whether taking or using water from the prescribed resource of the EMLR has an impact on adjacent water resource areas. It was concluded that the EMLR contributes small volumes to the lower River Murray and Lake Alexandrina and ultimately to Lake Albert, the Murray Mouth and the Coorong. The consumptive use limits for the EMLR (Section 3.4 of the EMLR WAP (SAMDB NRM 2019a)) have been set to provide water to the local environment, including the terminal wetlands where the EMLR streams meet the River Murray and Lake Alexandrina. Protecting low flows has been identified as a key tool for providing part of the EWRs in the Eastern Mount Lofty Ranges (SAMDB NRMB 2019a) and is being addressed through the Flows for the Future Program and requirement to pass low flows within the WAP. The monitoring and reporting arrangements for the EMLR WAP policies are described in Section 8 of the EMLR WAP.

The EMLR WAP notes that conditions in the River Murray and Lake Alexandrina can also directly affect the environmental condition of the lower reaches of the EMLR streams as occurred during the millennium drought. To minimise this impact the River Murray WAP incorporates principles that prevent increased extractions from the tributaries of Lake Alexandrina (SAMDB NRMB 2019c). There are two additional mechanisms that will assist with minimising the impacts of low water levels in Lake Alexandrina on the lower reaches of the EMLR streams. The first mechanism is the inclusion of a particular objective in the Basin Plan (s8.06) to maintain water levels in the Lower Lakes above 0.4 m AHD for 95% of the time and above 0.0 m AHD all of the time. The second mechanism is a documented decision-making process for the management of the Lower Lakes during extreme drought (MDBA, 2014).

The WAP for the Marne Saunders PWR Area includes policies to protect the spring flow for the Marne Mouth Wetland located at the junction of the Marne River with the River Murray (SAMDB NRM 2019b). Reductions in spring flow from the Marne River have reduced discharge to the Marne Mouth Wetland. The Flows for the Future Program and low flor requirements also exist in the Marne Saunders WAP.

2. SA Murray Region Water Resource Plan Area

Decisions on the release volume, flow rate and timing of releases are made each year by the South Eastern Water Conservation and Drainage Board (SEWCDB) following advice from DEW and South East Drainage Operations (SEDO) staff. The SEWCDB consists of an eight member statutory body established under the *South Eastern Water Conservation and Drainage Act 1992* (SA). The SEDO staff use a digital elevation model and seasonal weather conditions to provide advice to the Board. DEW staff seek advice from the Lower Lakes, Coorong and Murray Mouth Scientific Advisory Group on the potential risks and benefits to the Coorong of the proposed release patterns.

7. Annual Environmental Water Management

The development of the SA River Murray Annual Environmental Watering Plan is undertaken each year and reflects key planning and prioritisation requirements under the Murray-Darling *Basin Plan*. It is the primary document in which SA identifies the water requirements and ecological objectives for priority environmental watering sites and events under a range of climatic conditions for a particular year.

Each 'water year' commences on 1 July and finishes on 30 June. The environmental water management process begins with planning approximately six months prior to a water year commencing, e.g. in January or February. The completion of accounting, data analysis and evaluation and reporting of environmental water outcomes can continue for approximately six months after the completion of the water year. Hence, the whole process from planning through to delivery and reporting for any particular water year can be up to a two-year period. This process becomes cyclical as it is repeated every water year, and there are overlaps where the planning for the following year commences while the delivery of environmental water is still being undertaken for the current year.

Following annual planning, environmental water is sought, principally CEWH, TLM and RMIF, to support priority watering actions. After water has been agreed for delivery to a site for a specific watering event, operational event plans that set out the specifics of infrastructure operations and water delivery are finalised and implemented.

Delivery of water for the environment is undertaken at any time during the water year. There is also a need for 'real time' water delivery planning, approvals processes, water delivery, infrastructure operations, monitoring and consultation to adapt to current conditions. The collection of data as part of the monitoring activities are undertaken during the water year, but often data analysis, evaluation and reporting on outcomes are completed in the six months following the end of a water year. Importantly, the monitoring data results and outcomes provide feedback for decision-making processes and planning in the subsequent year (under an adaptive management framework).

The annual environmental water management process (Figure 5) is outlined in more detail in the following sections. The process involves:

1. annual planning – development of environmental watering priorities and plans, consultation
2. environmental water provision – approvals, trades
3. water delivery and 'real time' management - infrastructure operations, monitoring
4. reporting and evaluation – water accounting and data analysis.

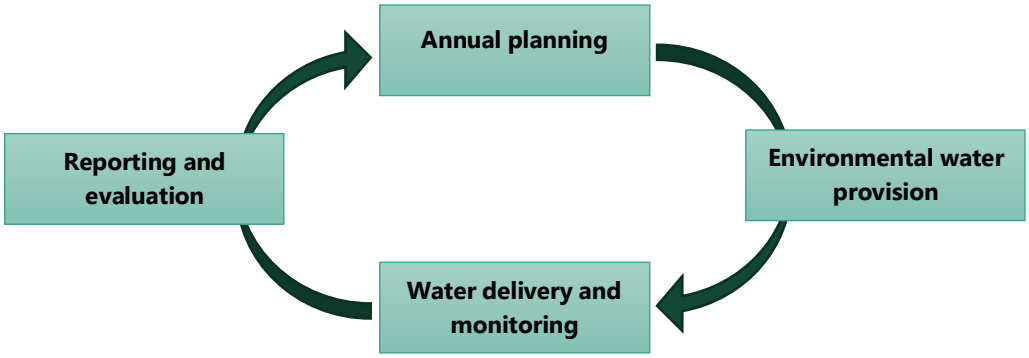

Figure 5: Overview of the annual environmental water management process

7.1 Annual planning

Within SA, annual environmental water planning for the SA River Murray is led by DEW, with input from environmental water managers, water holders, river operators, traditional owners and other stakeholder groups. The final outputs of the planning phase are the SA River Murray annual environmental watering priorities which form the basis of the SA River Murray annual environmental watering plan. Planning for water for the environment in SA is undertaken for a range of water resource availability scenarios.

Water resource availability scenarios

The MDBA produces probabilistic flow forecasts for the upcoming water year (the water resource availability scenarios) in each Basin catchment based on the past year's climate conditions (rainfall, runoff and soil moisture), current water in storage and the Bureau of Meteorology's climate outlook.

Up to seven water resource availability scenarios may be provided, ranging from 99% (extreme dry), 95% (very dry), 90% (dry), 75% (moderate), 50% (near average), 25% (wet) and 10% (very wet). These scenarios are referred to as Annual Operational Outlooks (AOO). The percentages refer to the likelihood of occurrence of different water resource conditions based on previous records, current volumes in storage and operational considerations for the upcoming year. The water resource outlook for a given year is typically different to the previous year's outlook, and the volumes of available environmental water also vary. The initial AOO is estimated without the inclusion of environmental water (with the exception of environmental water within SA's Entitlement) and is provided to environmental water holders to assist in planning for watering proposals. The demands from the watering proposals are then used as an input to update the MDBA AOO report to include environmental water delivery assumptions. Figure 6 shows the Flow to SA AOOs provided by the MDBA in 2019-20.

The MDBA AOO scenarios are usually provided to the states in February of each year. This scenario-based approach is used by SA in the development of proposed watering options for each water year. Watering options are developed for a range of sites/actions for each of the AOO water resource scenarios. The AOO is then published by the MDBA in July and updated in October each year.

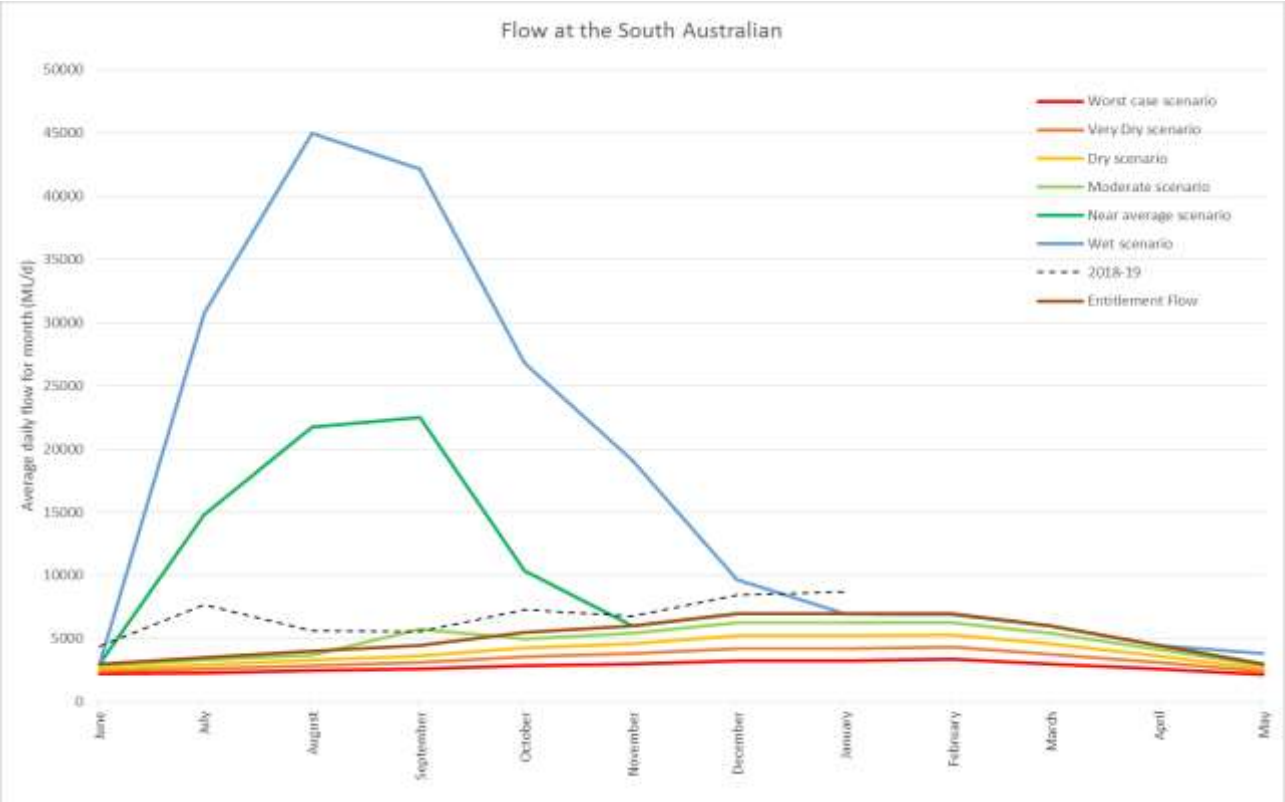

Figure 6: Annual Operational Outlook (AOO) scenarios for South Australia provided by MDBA in 2019/20

Annual planning steps

The annual planning steps for water for the environment are outlined below and in Figure 8. These steps provide an overview of the tools, decision points and outputs.

1. **A workshop with stakeholders** is organised by DEW in January-February to begin developing the SA River Murray Annual Plan and priorities. The workshop provides an outline of the water resource forecast, environmental water availability and priorities of the environmental water holders for the coming year. Stakeholders include environmental water managers, traditional owners, non-government organisations involved in environmental watering and water holders. The workshop includes advice from water holders as to the forecast environmental water availability and their overarching priorities for the year.

2. **Development of site-based watering proposals** is undertaken by the respective site water managers. The watering proposal template (provided by the MDBA) is used to capture this information. Generally, the proposals for each site outline a preferred watering option (including management levers and ecological objectives) for each of the AOO scenarios. The information used to develop the watering options include: monitoring data on site condition, past watering history and outcomes, site operating or management plans and modelling outputs. The outcomes and evaluations of previous years' monitoring projects, and the lessons learnt, are incorporated into the decision making process for site proposals.

   The site and event managers seek advice and input from all stakeholders including but not limited to scientific experts, water holders, landholders, traditional owners and community groups.

   Watering proposals are developed for the following sites:

   a. CLLMM
   b. floodplain sites: Chowilla, Katarapko and Pike
   c. river channel and floodplain assets (whole of River)
   d. weir pool manipulations: Locks 1 to 6
   e. managed wetlands (excluding pool connected wetlands).

3. **Collation of the site (and event) watering proposals** is undertaken for each of the AOOs. The watering actions, timing and environmental water demands for each of the sites is collated and the monthly and annual water demand for SA is calculated to feed into the multi-site proposal and modelling tasks.

4. **Modelling** is undertaken for the collated suite of watering proposals for each of the AOOs to assess the potential alignment of actions and the influence on flows in the main River channel. The water requirements for individual wetlands are often bundled together as a bulk water demand for the purpose of modelling.

5. **Integrated Operations Planning**. The modelling outputs of the collated watering options are assessed against flow and water quality thresholds, and other operational guidelines outlined in the Integrated Operations Strategy, to identify the risk of the combined operations (see *Integrated Operations Strategy* (DEW 2021)).

   Where thresholds or operational guidelines are not breached, then the combined suite of watering proposals will be incorporated into the SA annual environmental watering priorities and plan. Where modelling indicates that thresholds are expected to be breached, and not all site watering events can be undertaken, prioritisation and trade-offs between the site proposals will be undertaken.

6. **Prioritisation** is undertaken by DEW to determine which watering site event may need to be revised or deferred based on the modelling outputs. Environmental water prioritisation and trade-off processes are then used to assist in the refinement of the final suite of proposed watering options.

7. **Final suite of site watering proposals** for each AOO water resource scenario, including the multi-site proposal, is prepared by DEW for final consultation and review with stakeholders.

a. A document summarising the recommended final suite of watering activities for each AOO is provided as the SA watering priorities for the coming year. Following approval within DEW, the SA River Murray annual environmental watering priorities document is submitted to the MDBA by 31 May each year for consideration as part of their process for determining the Basin annual environmental watering priorities as per the *Basin Plan* requirements.

b. The **SA annual environmental watering priorities**, are also submitted to:
   - SCBEWC to inform MDBA planning processes for consideration in the allocation of TLM water as part of SCBEWC's Southern Connected Basin Operational Planning process, and
   - CEWH for consideration in the allocation of CEWH water.

These proposals also form the basis of the SA River Murray annual environmental watering plan (the Annual Plan).

8. **Annual Plan** for the SA River Murray is developed by DEW and is a consolidation of the approved watering proposals and expected ecological outcomes. It also describes the total environmental water delivery requirements for the SA River Murray for the coming year and a brief summary and evaluation of the previous year's watering.

Following the annual planning process, implementation is undertaken, which includes:

- environmental water provision
- environmental water delivery and 'real time' management time management
- monitoring.

Figure 7: vegetation growth at Overland Corner wetland following environmental watering, photo MRLB.

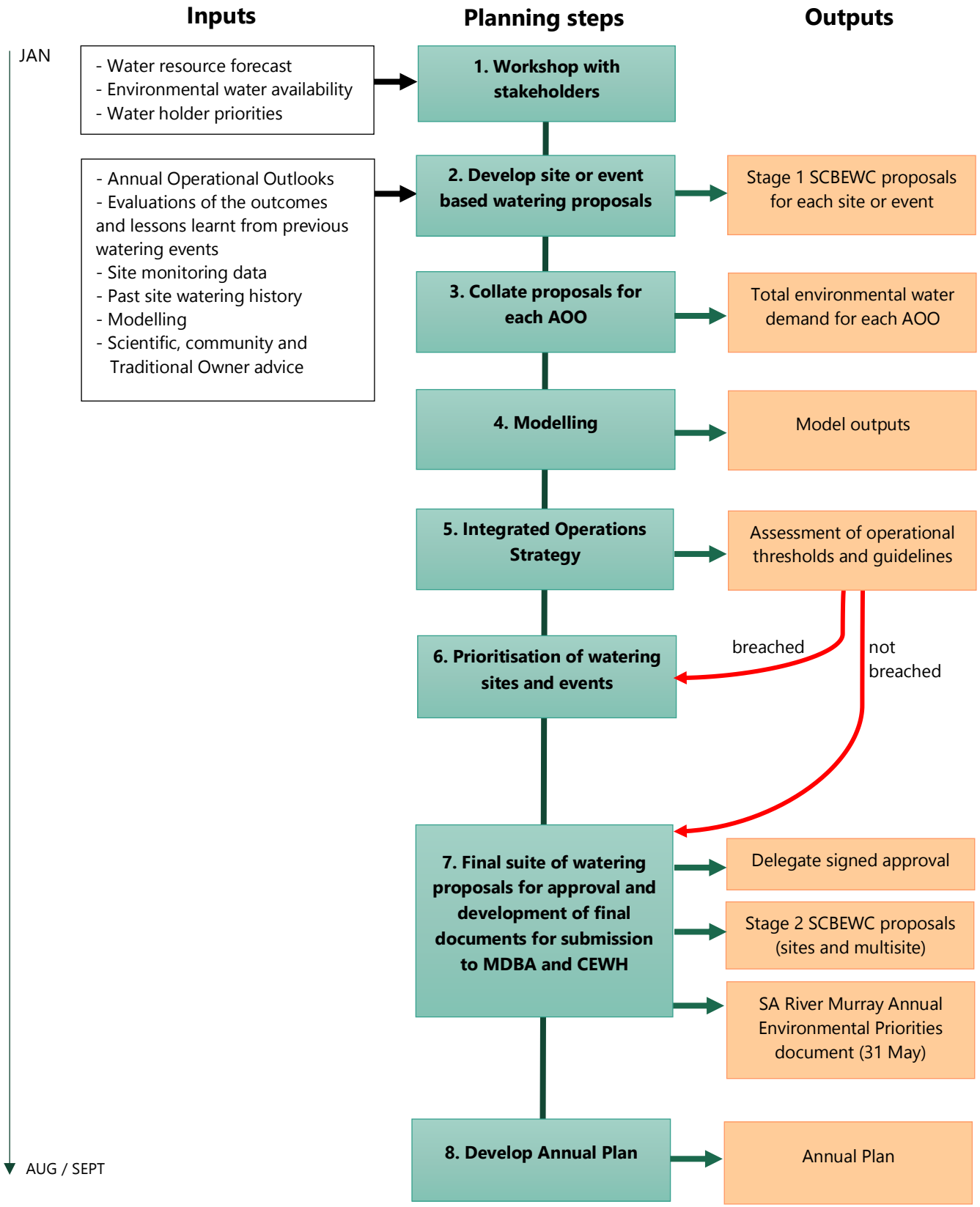

Figure 8: Annual Environmental Water Planning Process

Integrated Operations

Integrated operations is a term used to describe the coordination of large scale environmental watering and associated site infrastructure operation to manage the potential risks of adverse impacts and, where possible, achieve cumulative benefits across the SA River Murray. The main watering events incorporated within the scope of Integrated Operations planning are River channel pulses, weir pools 1 to 6, Pike, Katarapko and Chowilla Floodplains. Under some river flow conditions there may be cumulative risks (e.g. high salinity, low dissolved oxygen) that could lead to unacceptable changes in conditions in the River Murray if all possible watering site events were implemented. Operations under these conditions may cause threshold exceedances, which need to be considered during planning.

An *Integrated Operations Strategy* (IOS) (DEW 2021) has been developed to support the decision-making complexity associated with an increasing number of large scale watering events. The IOS document will identify the operational thresholds, in particular levels of concern for surface water risks, that may arise through the combination of different watering events and River flows. Forecast modelling that estimates a range of surface water parameters will be undertaken each year as part of annual planning, with the results assessed against the thresholds to determine the potential risks. Where risks are identified as unacceptable, changes to planning for operations and watering events may be revised, and this will be reflected in the SA River Murray Annual Environmental Priorities.

Environmental Water Prioritisation and Trade Off

In those scenarios where the thresholds and operational guidelines identified in the IOS have been exceeded due to the combination of the proposed watering options, the operation of one or more sites may need to be revised (or potentially excluded). This requires environmental water managers to assess the trade-offs between achieving outcomes at the different sites and to prioritise watering options. Prioritisation and trade-off methods will incorporate a range of factors including environmental watering requirements, past watering history, watering objectives and the condition of sites. Where trade-off and prioritisation methods are applied, the decisions from these processes will be reflected in the SA River Murray Annual Environmental Priorities.

Multisite watering proposal

The multisite proposal is based on the final suite of watering proposals identified at steps 3 and 6 (Figure 8). The multisite proposal outlines the delivery of environmental water in a way that increases the effectiveness of watering by aligning the timing, magnitude and duration of watering events at multiple locations throughout the SA River Murray. The proposal documents how the site watering objectives will be achieved, while also providing additional landscape-scale outcomes such as improved connectivity and enhanced dispersal of resources, propagules and water-dependent biota.

The multisite proposal is underpinned by the objectives, targets and EWRs in the SA River Murray LTWP and the expected outcomes in the BWEWS (MDBA 2019c). The multi-site benefits include:

- Coordination of the delivery of water for the environment to maximise the potential outcomes throughout the SA River Murray system.
- Provision of pathways for the dispersal, migration and movement of native water-dependent biota and organic and inorganic sediment.
- Delivery of water for the environment to the CLLMM while providing benefits to upstream environmental assets on-route.
- Maximisation of environmental outcomes through the operation of infrastructure where feasible.

7.2 Environmental Water Provision

The decisions to supply environmental water to meet identified demands in the watering proposals are made by environmental water holders. This includes the Commonwealth Environmental Water Holder (in relation to Commonwealth environmental watering holdings), the Southern-Connected Basin Environmental Watering Committee (in relation to 'Joint Water', that is TLM, RMIF and RMUF), the DEW on behalf of the SA Minister for Environment and Water (who makes decisions on the use of water on the Minister's water licences).

CEWH Planning and Decision-making

Each year, the CEWH undertakes planning at the Basin and catchment scale, to support its decision on how to best use the available Commonwealth environmental water portfolio to meet identified environmental demands. The options available

to the CEWH include delivering water to a river or floodplain to meet an identified environmental demand (use); leaving water in storage and carrying it over for use in the next water year (carryover); and/or buying and selling water (trade). This planning is guided by the Commonwealth Environmental Water Portfolio Management Framework (DEE 2019b).

All decisions by the CEWH must be consistent with Part 6 of the *Water Act*. All Commonwealth environmental water use must be consistent with and give effect to the *Basin Plan*'s environmental watering plan (including the Principles to be applied to environmental watering) and the Basin-wide Environmental Watering Strategy, and have regard to the Basin annual environmental watering priorities. This is guided by the Framework for determining Commonwealth environmental water use (CEWO 2013).

The CEWH-DEW Partnership Agreement (in prep) sets out the agreed process for planning and managing the transfer, delivery and monitoring of Commonwealth environmental water by SA DEW, and a process for supporting ongoing improvement in operational arrangements for the effective and efficient use of held environmental water. Under this agreement, Watering Schedules are agreed each year by the CEWH and relevant SA DEW Executive Director. These schedules identify the volumes made available for watering, objectives, delivery timing and arrangements, monitoring and reporting requirements, delivery costs (where applicable) and any other additional conditions not already agreed in the Partnership Agreement.

SCBEWC Annual Watering decisions

SCBEWC is an inter-jurisdictional forum convened by the MDBA and comprised of representatives from the Commonwealth and Basin state governments, VEWH, MDBA, DPIE and CEWO. The SCBEWC has responsibility for the coordination of operational planning. It has delegated authority from the Basin Officials Committee (BOC) to authorise the use of Joint Water portfolio, including The Living Murray, RMUF for environmental purposes in the River Murray and to coordinate the use of RMIF. The committee coordinates the use of this water for the environment consistent with the *Basin Plan's* Environmental Water Plan and its objectives.

SA Ministers Reserve

The River Murray WAP (SAMDB NRMB 2019c) states that the Minister's Reserve is to be used at priority sites for the purpose of enhancing ecological outcomes in the SA River Murray. A DEW policy and procedure guide the decisions on annual use of water available on the Minister's Reserve Licence and Account (DEW 2020d). The environmental watering sites and events prioritised for use of the Ministers Reserve should be consistent with those identified in the SA River Murray Environmental Watering Priorities (DEW 2020b). Other factors considered include (but are not limited to) the certainty of environmental benefits, risks of not applying water and landowner support.

The DEW Environmental Water Team provide advice to the Minister/Minister's Delegate on the annual use of the Minister's Reserve. The Delegate is authorised by the Minister for Environment and Water to approve the use of the water on this licence.

7.3 Environmental water delivery and monitoring

The delivery and monitoring of water for the environment are undertaken during the water year. This includes the delivery of water (which may include environmental water or unregulated flows) to the SA border, and the subsequent management of the water, at the sites identified within the SA River Murray Annual Environmental Watering Priorities.

Environmental water delivery incorporates the following activities:

- development of water delivery plans
- approvals
- continuous 'real time' planning
- hydrological modelling
- water delivery in conjunction with infrastructure operation
- monitoring
- ongoing consultation as required.

Water Delivery Plans

Within SA, Event Plans are developed for a number of the larger scale site watering events (e.g. Chowilla floodplain and weir pool manipulation) prior to any action undertaken at a site, usually in the weeks leading up to operations.

The purpose of Event Plans is to outline the specific details of operations of the large infrastructure, including the timing of operations, required changes in infrastructure levels and rate of rise of water levels. Event Plans also outline roles and responsibilities, environmental objectives, monitoring programs, risk assessments and water accounting arrangements. The Event Plans (and the approval to proceed) are approved by the Minister or Delegate. The plans undergo consultation with the stakeholders such as MDBA, CEWH, SA Water, traditional owners, landholders and community groups.

The CLLMM site does not develop 'Event Plans', but as part of the arrangements with the CEWH and other environmental water holders, a three month forward plan is developed on a quarterly basis, which outlines how the water (including environmental water) that is likely to reach the CLLMM site in the coming months will be managed. The plan outlines the lake level management and barrage releases that will be undertaken to achieve ecological objectives at the site.

For the smaller-scale wetland sites that have been allocated CEWH water, CEWH watering schedules are developed which outline specific information regarding risks, roles and responsibilities and other delivery arrangements (similar to the Event Plans). Ongoing monthly consultation between the water holder and delivery partner (e.g. regional wetland team or NGO) is undertaken to discuss the specifics of water delivery and other issues.

Real time planning and operations

Held environmental water availability is subject to allocation frameworks within each jurisdiction. Updates to environmental water availability are provided during annual planning to account for changes in outlooks and changes in EWH portfolio availability resulting from watering events.

'Real time' planning is the short-term planning and decision making that occurs on an ongoing basis throughout the water year, particularly leading up to and during the delivery of environmental water. The timeframes are shorter than annual planning and the associated water resource forecasts are more accurate than the annual AOOs.

Real time planning is necessary where the River conditions and flows (QSA) differ from the AOO scenarios used in annual planning, resulting in the need to revise the proposed water events. The divergence from the planning AOOs may be due to:

1. environmental water requirements identified within the individual watering proposals or multi-site are not available, or are unable to be delivered at the required time due to constraints
2. relatively rapid changes in water resource and River conditions e.g. QSA increases or decreases at rates greater than anticipated for example the occurrence of unregulated flows
3. conditions have switched from one AOO outlook to the next, e.g. from dry to near average
4. there are significant changes in water quality, and/or
5. river conditions (flow) do not align with the specific AOO curves used in annual planning.

Environmental water managers are provided with information on the short-term forecasts of river conditions and environmental water allocations. This information is used by the water managers to determine which watering event (or scale of event) may be feasible to undertake.

Where real time planning has led to changes to a watering event, it may be necessary to undertake further modelling and apply the Integrated Operation Strategy (see Figure 8, Step 5 of annual planning) to ensure adverse impacts within the river channel are not a risk.

Real-time management - Operational Plans and Groups

Decisions related to real time management are guided by the individual site operation and management plans, and are made in conjunction with the stakeholders. In some cases it may be necessary to revise watering events where site data and observations indicate that a change is required.

Real time planning decisions take into account the following types of information (where it is available):

- site management and operational plans
- observations and field data
- water resource availability
- climate conditions, including tide and swell predictions
- hydrological modelling outputs
- advice from river operators, science experts, community and First Nations.

In making these decisions, the water managers work closely with the site operational groups, e.g. Floodplains Operations Advisory Group (FOAG), and community reference groups. These groups provide advice throughout the environmental water management process from planning through to delivery. These groups include representatives from the water holders, river operators, community, scientific experts and First Nations, and their advice is incorporated into event planning and 'real time' operational decision making.

Assessing emerging risks

With many actions occurring along the River Murray in SA, such as irrigation extraction and environmental watering, conditions within the main River channel (e.g. flow and water quality) can change quickly and sometimes in ways that are not expected. To ensure that the risks of adverse impacts to people, property and the environment as a result of environmental watering are managed, DEW collects information on the environmental watering event and infrastructure operations prior to any action commencing. This information is provided to the River Murray Operations Working Group (RMOWG) for consideration via the River Murray Action Request (RMAR) process. The RMOWG includes representatives from DEW, PIRSA, SARDI, SA Water and EPA.

Assessment of the RMAR is undertaken to determine if a River Murray action is likely to have a negative impact on the River Murray channel and/or downstream users. This process helps to assess the effects of the cumulative impacts of River Murray actions taking place at any one time along the length of the River Murray in SA. If the RMOWG considers that negative impacts may occur during the proposed event, liaison will be undertaken directly with the water manager to determine methods to ameliorate the risks.

7.4 Monitoring and evaluation

Monitoring data and findings are invaluable for improving our knowledge of floodplains, wetlands, CLLMM and the River Murray system. They are vital to understanding the physical and biological components of the river system and how these have responded over time to changing water and flow conditions.

Ongoing monitoring programs are essential in being able to assess the outcomes of the delivery of water for the environment. In addition to this, the evaluation and interpretation of monitoring results are fed back into the planning process and are used to support future watering decisions in an adaptive management framework. This continuous improvement in knowledge and learning increases the effectiveness of environmental water planning and delivery and helps to achieve management and ecological outcomes.

Real time or operational monitoring

Real time monitoring (sometimes referred to as operational monitoring) is undertaken during an event to assess risks and inform decisions on infrastructure operations, particularly where results may require operations to be changed or revised. Usually the parameters of real time monitoring are related to water quality, hydrology and infrastructure operations, and may include water levels, flow rates, discharge, volumes, salinity, dissolved oxygen, water temperature and turbidity. Monitoring and the assessment of data is often undertaken frequently (daily to weekly), so that decisions on operations and water delivery can be made in a timely basis.

Site scale ecological monitoring

Site specific monitoring is undertaken at all watering sites, with the methods used, data management and analysis based on the site monitoring plans developed through the water managers, in conjunction with advice from scientific and community stakeholders. The methods undertaken across the sites for each of the parameters are aligned wherever feasible, e.g. tree health condition at all sites is assessed using the TLM method (Souter et al. 2010).

Long-term monitoring datasets are particularly important for understanding ecological condition of ecosystems such as understanding trends over time. These data sets are supported by the various programs within SA (e.g. TLM and regional Wetland and Floodplain Teams). An example of a long-term dataset is The Living Murray condition monitoring program, which has been undertaken since 2008. TLM condition monitoring data and findings have been invaluable in improving knowledge of the icon sites, their physical and biological components, and how they have responded over time to changing environmental water and flow conditions.

The level of monitoring undertaken depends on the size and complexity of the site, the objectives and expected outcomes of watering, resources available, risk assessments, requirements of water holders and legislative requirements. Types of monitoring include:

- Condition monitoring, and
- Intervention monitoring.

Condition monitoring assesses trends in the condition of a site over time, based on the objectives and targets that have been identified for environmental watering.

Intervention monitoring assesses the ecological responses to specific management actions. The aim of intervention monitoring is to improve understanding about the causal links between environmental watering and other management actions, and ecological responses at icon sites. This knowledge enables managers to continually adapt and improve management of sites and watering into the future to optimise ecological outcomes (Maunsell 2009).

As well as supporting site specific watering decisions, the data collected through various site monitoring programs have been instrumental in annual environmental water planning, the development of the LTWP for the SA River Murray, the assessment of environmental water delivery outcomes along the river, and supporting the evaluation of the *Basin Plan*.

Larger scale monitoring

There are larger scale monitoring programs that are undertaken within the SA River Murray. Where possible, the data collected at the site scale is used by these larger scale programs.

Data from the various site-specific monitoring programs, as well as monitoring funded through the CEWH and MDBA have supported Basin Plan Schedule 12, Matter 8 reporting, which assesses outcomes from water for the environment at the LTWP priority environmental asset (PEA) scale and is a Basin Plan requirement.

Ecological outcomes arising from the delivery of Commonwealth environmental water to the Channel PEA and areas of the Floodplain PEA that are inundated by flows of less than 60 GL/day QSA (excluding Chowilla) are monitored and evaluated through the CEWH's Monitoring Evaluation and Research Program (Lower Murray River).

Figure 9: small-bodied threatened fish species monitoring within the Lower Lakes, University of Adelaide.

8. Reporting

8.1 Environmental water reporting requirements

Reporting on environmental watering activities undertaken in the SA River Murray is contained in site specific watering outcome reports, monitoring reports and the annual SA River Murray Environmental Watering Reports (DEW 2020a). Environmental watering data and reports produced as part of the environmental water management process are important for other reporting obligations including SA's *Basin Plan* reporting requirements.

A number of broader natural resource management reports are also produced to satisfy legislative obligations that incorporate information relating to the effect of environmental watering on the condition of the SA River Murray, e.g. Ramsar status assessment reporting (DEE 2018) and SA Trend and Condition Report Cards (DEW 2020e). Additional requirements may include reporting to funding bodies that have supported investigations and works for environmental outcomes such as the installation of flow regulators.

Basin Plan reporting requirements

The *Basin Plan* (Schedule 12) and *Water Act 2007* (Section 71) set out the legal obligations for reporting on the use and accounting of environmental water.

Schedule 12 of the *Basin Plan* lists four 'Matters' that relate to reporting against the implementation of the Environmental Watering Plan (*Basin Plan* Chapter 8), three of which SA is required to report on (Table 2). The MDBA and CEWH are responsible for reporting against the fourth Matter 7, which reports on the achievement of environmental outcomes at a Basin-scale, based on information provided by the Basin States. The first annual report on Matters 9 and 10 was undertaken for the 2013-14 water year. The first report on Matter 8 was submitted in 2020. All *Basin Plan* reporting is published on the MDBA website.

Matter 8 reports on the 'achievement of environmental outcomes at an asset scale,' every five years. The SA approach to Matter 8 environmental outcome reporting includes identifying priority targets for reporting from the SA River Murray LTWP, identifying existing data sources and collating data, defining expected environmental outcomes and assessing progress towards outcomes.

Table 2: Reporting requirements for Basin States relating to Basin Plan Chapter 8 Environmental Watering Plan

Item	Matter	Reporting Frequency	Due
8	The achievement of environmental outcomes at an asset scale	Five-yearly	First report due 2020
9	The identification of environmental water and the monitoring of its use	Annual	31 October each year
10	The implementation of the environmental management framework (Part 4 of Chapter 8)	Annual	31 October each year

Reporting of environmental watering activity and outcomes

Long-term environmental monitoring programs are in place at Chowilla and the CLLMM Icon Sites through the TLM program and are used to report on the benefits and ecological outcomes to environmental watering, and the environmental condition of the sites against the site ecological objectives and targets (DEWNR 2017a and 2017b).

Monitoring plans for the weir pool manipulation program, Katarapko floodplain and Pike floodplain have been developed. Many of the wetland sites that are pumped or managed for wetting and drying regimes are monitored by the MRLB staff. These monitoring programs provide the basis for reporting on site condition and the ecological outcomes resulting from operations and the delivery of water for the environment.

The reporting and evaluation of environmental watering events that occurs through individual site reports, in conjunction with the ongoing monitoring programs, contribute to the decision making processes in annual planning, 'real time' planning and water delivery. Lessons Learnt from past watering actions are applied to future planned events through an adaptive management framework.

Key ecological outcomes from along the River Murray in SA are also consolidated into the Annual Environmental Watering Reports that are published on the DEW website each year (DEW 2020a). This report summarises the volumes and timing of environmental water delivered within the SA River Murray, provides an evaluation of actual versus planned watering events and highlights some of the key environmental outcomes achieved through environmental water delivery. This report is provided as input to planning meetings for the following year to support adaptive management.

Ecological and operational reporting to water holders

In addition, to legislative requirements, there is routine reporting to environmental water holders tailored to the specific needs of environmental water holders. CEWO reporting requirements are outlined within the associated watering schedules for a specific watering event. As part of the CEWH water delivered to the CLLMM and SA river channel, a monthly report is provided to the CEWO, and this includes information on the planned versus actual operations and outcomes achieved for Lower Lakes, barrages and Coorong management. Final operational reports are provided to the CEWO for all watering events (including wetlands), and provide information on the volume of water for the environment delivered to a site, the delivery mechanism, consultation and communications, ecological outcomes, and any other issues, including risk mitigation, that may have arisen during management.

8.2 Environmental water accounting

The volume of environmental water delivered to South Australia is provided to DEW Water Delivery team by the MDBA in the form of a monthly water delivery spreadsheet. This spreadsheet is a key input to the environmental water accounting spreadsheet maintained by Water Delivery, DEW as part of the commitment to implement Prerequisite Policy Measures (PPMs) in the River Murray, South Australia.

As of 1st July 2019, South Australia's Prerequisite policy measures (PPMs) were assessed by the MDBA as in effect. The PPMs include legislative and operational rule changes that improve the use and accounting of water for the environment in the southern-connected Murray–Darling Basin. The procedure for environmental water accounting in South Australia was developed with an associated spreadsheet (Environmental water accounting spreadsheet in South Australia), designed to track all forms of environmental water delivery and use from the South Australian border to the Coorong. Environmental water accounting and reporting within the SA River Murray is supported by DEW policies and procedures, including:

- Policy and procedure for Application of Losses to Environmental Water Entitlements
- Policy and procedure for Environmental Water Return Flow
- Policy and procedure for the use of River Murray Unregulated Flow (RMUF) in the SA River Murray
- Policy and procedure for Use of Entitlement and Allocation on the Minister's Reserve License and Account
- Procedure for environmental water accounting in South Australia.

Within South Australia, DEW coordinates and directs the *on-ground delivery* of environmental water in the River Murray on behalf of the Minister for Environment and Water, and provides direction to SA Water and other parties such as private landowners / management partners on how and when environmental water is physically delivered to a site, where necessary.

All environmental water managers (including DEW and non-government organisations) provide water use figures (estimated and/or actual) to DEW Water Delivery to enable recording in the environmental water accounting spreadsheet to assist in meeting reporting requirements. A copy of the environmental water accounting spreadsheet is provided to environmental water holders on a monthly basis (or as requested) by DEW Water Delivery as part of routine reporting requirements under PPMs. Water holders review and provide comment on the spreadsheet and associated reports and Water Delivery make any necessary changes required. Non-government organisations generally operate through their own water licences and accounts, and have their own record keeping and water accounting arrangements in place to ensure that water use remains within availability and to fulfil compliance and reporting requirements. Accounting of environmental water may be guided by modelled estimates of water use, meter readings (where applicable) and the barrage discharge calculator.

The DEW is committed to the ongoing refinement and improvement of environmental water accounting and PPM implementation, and will continue to work with environmental water holders and stakeholders to provide confidence and assurance that environmental water is managed consistently with *Basin Plan* requirements and objectives. Ongoing adherence to the policies and procedures will ensure that environmental water accounting is accurate, reliable and credible.

Water Licensing

DEW licensing requirements are outline within the River Murray WAP prepared under the *Natural Resources Management Act 2004* (SA) [ceased].

DEW are required to comply with water licensing requirements for the River Murray Prescribed Watercourse. There are five water accounts held by the SA Minister for Environment and Water that are managed by DEW and are committed to supporting environmental outcomes. Allocations on these accounts include the water recovered under the Desalinisation agreement (Minister's Reserve), TLM water held in SA, environmental water in the Wetland Consumptive Pool for managed pool-connected wetlands, an allocation for the management of Tolderol Wetland and other water traded for environmental watering actions including from interstate. As part of the water licensing requirements within South Australia there is quarterly reconciliation of water accounts. Water use is managed within available allocation at all points in time.

Water use reporting

Environmental water accounting data is used to report to environmental water holders, reconcile the Minister's licences and water accounts, report on environmental water management to stakeholders and other interested parties and meet state obligations for water use compliance and annual reporting against Matter 9 of the *Basin Plan*.

Site based water use and environmental outcomes are reported to the stakeholders, such as operations advisory groups and community groups (see Section 9). There are also internal and external processes for sharing information on environmental water use and management including:

- River Murray Flow Reports and monthly water resources update.
- Monthly water use and operations reports to the CEWO and other water holders on request.
- Quarterly reporting to Water Licensing.
- Matter 9 reporting required annually under the Basin Plan.
- Final annual water use acquittal report, special purpose environmental water accounting report and section 71 reporting.
- Annual water for the environment report for the SA River Murray.

Information on the volumes of environmental water use is reported via the publicly available River Murray Flow Reports distributed each Friday and the comprehensive monthly water resources update.

Information on the volumes of water for the environment delivered to each site within SA, as well as information on the purpose of watering and how it aligns with the Basin Wide watering priorities, is collated and reported to the MDBA on an annual basis as part of *Basin Plan* reporting on Matter 9. Environmental water use information provided for licensing and Matter 9 requirements also contribute to section 71 of *Basin Plan* reporting.

The annual water for the environment report for the SA River Murray is published on DEW's website and meets the South Australian Government's commitment to the Council of Australian Governments (COAG) to provide transparency and accountability for public information sharing of River Murray environmental water use in South Australia (COAG 2010).

Figure 10: Chowilla environmental watering, photo DEW

9. Engagement with stakeholders

A wide range of stakeholders and community groups are consulted throughout the environmental management process, including the initial workshop, the development of site proposals, the delivery of water and reporting on the ecological outcomes and benefits.

The stakeholders consulted during the annual environmental water management process include the MDBA, CEWO, Traditional Owner groups, MRLB, SA Water, Local Action Planning Associations, Landcare organisations, local government, private landholders, industry groups and the general public. A substantial portion of the consultation is undertaken by the respective site or water managers via longstanding arrangements and collaborative relationships.

At the site and event level, consultation often occurs via formal committees and meetings at which watering proposals and annual priorities are presented and discussed. Groups have the opportunity to provide input into watering proposals and event plans. These groups include:

- LLCMM Scientific Advisory Group
- Barrage Operations Advisory Group
- Floodplains Operations Advisory Group
- Chowilla Community Reference Committee
- Katarapko Community Reference Committee
- Pike Community Reference Committee
- Environmental Water Coordination Forum
- River Murray Operations Working Group
- CLLMM Community Advisory Panel
- Traditional Owner groups in particular the First Peoples of the River Murray and Mallee Region Working Group, Mannum Aboriginal Community Association Inc (MACAI) and the Ngarrindjeri Aboriginal Corporation (NAC)
- NGO's and industry groups involved in environmental watering in SA including Nature Foundation SA and Renmark Irrigation Trust
- Water Statement of Commitment Working Group
- Southern Connected Basin Environmental Watering Committee.

Engagement with stakeholders and committees is undertaken on an ongoing basis prior to, during and after environmental water delivery has been undertaken.

Other engagement activities targeting the broader community include wetland tours, monitoring training days, site visits, field days and social media. Media releases are developed on a regular basis for inclusion in print and radio media to provide the broader public with information on environmental water management within the SA River Murray.

DEW also consults with non-government organisations (NGOs) that deliver environmental water to wetlands to provide support and assist with the coordination of wetland management activities across the region.

9.1 Aboriginal engagement

South Australian Murray–Darling Basin Aboriginal Nations are involved in the management of water for the environment through a range of consultation and engagement activities including:

- First Nations Representation at environmental watering stakeholder workshops
- First Nations Representation on floodplain operational groups
- consultation regarding environmental water proposals and delivery
- On Country site visits and tours
- ongoing communication via workshops, presentations and other materials such as handouts and fact sheets
- working closely with Water Coordinators and Officers
- support for further involvement in monitoring programs
- support for Aboriginal Waterway Assessments, Yannarumi Assessments and cultural heritage surveys

- aligning with the Yannarumi framework (NRA 2016).

The First Nations of the SA River Murray have had significant input into the development of the SA River Murray Water Resource Plan and Water Allocation Plan for the River Murray Prescribed Watercourse, as well as site plans such as Sugar Shack and Katarapko. The Water Resource Plan and Water Allocation Plan provide guidance on how the Incorporation of Aboriginal Water Interests in Water Planning and Aboriginal Engagement should be undertaken.

Aboriginal nations have also developed their own engagement principles for working with government agencies and other groups in the RMMAC Strategic Plan 2013–2016 and MACAI have outlined engagement principles in the Sugar Shack Complex Management Plan. Ngarrindjeri engagement principles are being progressed through the Ngarrindjeri Aboriginal Corporation and the South Australian Government.

Engagement as part of the environmental water management framework aligns with the Aboriginal engagement principles outlined in all of the above plans, including The River Murray and Mallee Aboriginal Corporation Aboriginal Water Interests Program Logic (Appendix 1).

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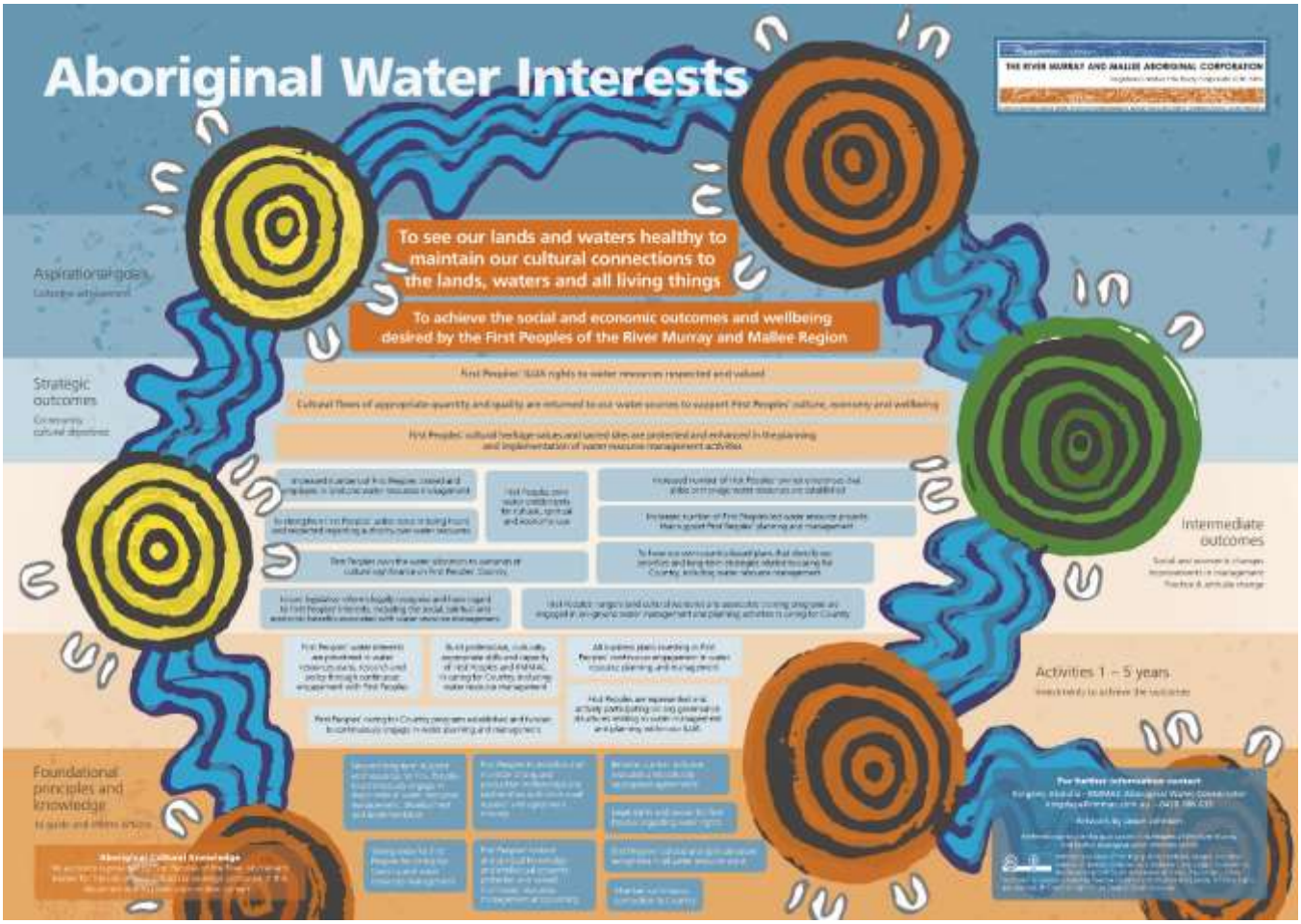
Appendix 1

The River Murray and Mallee Aboriginal Corporation Aboriginal Water Interests Program Logic



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