

Murraylands and Riverland Landscape Board

Water Allocation Plan for the River Murray Prescribed Watercourse



Government of South Australia

Murraylands and Riverland
Landscape Board



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Aboriginal Cultural Knowledge

No authority is provided by First Peoples of the River Murray and Mallee, Peramangk and Ngarrindjeri nations for the use of their cultural knowledge contained in this document without their prior written consent.

¹ The SA Murray-Darling Basin Natural Resources Management Board has been replaced by the Murraylands and Riverland Landscapes Board as a result of changes in legislation. The *Natural Resources Management Act, 2004* has been repealed and is replaced by the *Landscapes Act, 2019* which came into effect on 1 July 2020. The role of the Board in relation to the development of water allocations plans remains unchanged.

Water Allocation Plan for the River Murray Prescribed Watercourse

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for the

River Murray Prescribed Watercourse

I, David Speirs, Minister for Environment and Water,
hereby adopt this Water Allocation Plan pursuant to section 56(2)(a)
of the *Landscape South Australia Act 2019*.



David Speirs

Minister for Environment and Water

Date: 24/09/2021

Acknowledgement

The South Australian Government acknowledges and respects Aboriginal people as the state's first peoples and nations, and recognises Aboriginal people as traditional owners and occupants of land and waters in South Australia. Aboriginal peoples' spiritual, social, cultural and economic practices come from their lands and waters, and they continue to maintain their cultural heritage, economies, languages and laws which are of ongoing importance.

It is acknowledged that the lands and waters of the River Murray Prescribed Watercourse forms part of the traditional Country of the First Peoples of the River Murray and Mallee Region (Ngaiaawang, Ngawait, Nganguruku, Erawirung, Ngintait, Ngaralte, and Ngarkat peoples), Peramangk and Ngarrindjeri nations and recognises the continuing connection to lands, waters and communities.

Whilst native title determinations have been made that give legal recognition to the First Peoples of the River Murray and Mallee and Ngarrindjeri native title holders over parts of the area of the River Murray Prescribed Watercourse Water Allocation Plan (the Plan), the area that is currently recognised as the traditional country of Peramangk is not currently the subject of a native title claim. Should a claim be made the Murraylands and Riverland Landscape Board (the Board) will have regard to the native title claimants.

The Board pays its respects to Aboriginal culture and to Elders both past and present. The recognition of the aspirations that the Aboriginal nations have to legal rights to Aboriginal water interests in this Plan was a starting point in 2018 for ongoing commitment to engage with Aboriginal nations in water planning. Aboriginal people should be aware that this document contains names of people who have since passed away.

The term "Aboriginal" is used throughout this plan instead of "Indigenous" as endorsed by the former SA Aboriginal State-wide Advisory Committee.

"Aboriginal nations" is also used throughout the Plan and is defined for the purposes of the Plan as a group or community of Aboriginal people who identify as descendants of the original inhabitants of the Plan area and may share a single common territory, or may be located as a nation within another larger nation. Where a native title determination has been made the native title holders will have native title interests within the nation and is the body that the Board will deal with for native title. It may also be the legal entity that represents the nation for other purposes or be included as a member of a wider group representing a nation (e.g. a Regional Authority).

Nations are recognised as holding traditional authority and responsibility to speak for Aboriginal culture and heritage within their traditional country. The three nations whose traditional country is within this water allocation plan area have distinct culture and identities and do not necessarily identify with the words 'Aboriginal' or 'cultural' as these are non-Aboriginal terms that do not capture the complexity of their culture and identity. Therefore, where possible, we identify nations and their objectives as either First Peoples of the River Murray and Mallee, Peramangk or Ngarrindjeri.

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1 THE WATER ALLOCATION PLAN

This document is the Water Allocation Plan (the Plan) for the River Murray Prescribed Watercourse (PWC). The Plan is a statutory instrument, and is written according to the legal requirements of the *Landscape South Australia Act 2019* (Landscape Act). The Landscape Act requires the Murraylands and Riverland Landscape Board (the Board) to prepare a water allocation plan for each of the prescribed water resources in its region. The Landscape Act also requires the Board to review a water allocation plan at least once within 10 years, following its adoption.

The Plan provides for the sustainable management of water resources in the River Murray in South Australia, in accordance with the requirements in the Landscape Act, and sets out the policies for a range of water allocation provisions including:

- managing consumptive pools
- water entitlements
- water allocations, and
- water trading.

The Plan is an essential instrument to help protect the economic, social, cultural and environmental needs of the River Murray PWC for future generations, and aims to provide clarity and equitable access to water for all users.

1.1 Objectives of the Water Allocation Plan

The Plan sets out the way in which the water resources of the River Murray PWC can be managed through principles addressing the take and use of water. Outlined below are the objectives of the Plan. To achieve and measure these objectives, the Plan sets out policies (see Chapters 5 to 8) and monitoring and evaluation requirements (see Chapter 9). The objectives of the Plan are to:

- a. Provide allocations that contribute to the water needs of water-dependent ecosystems (WDEs).
- b. Allocate water in a sustainable and equitable manner between different users.
- c. Promote efficient use of water from the prescribed watercourse.
- d. Contribute to fulfilling South Australia's obligations under Basin-wide plans and legislation.
- e. Contribute to the prevention of loss of condition, number or extent of refuge habitats and dependent aquatic biota of floodplains, wetlands, and sites of significance.
- f. Contribute to the prevention of adverse impacts on water quality.
- g. Contribute to the prevention of increased soil salinity and acid sulfate soils, and associated land management issues.

1.2 History of Water Management for the River Murray Prescribed Watercourse

The River Murray PWC was declared as a proclaimed watercourse on 10 August 1978 under the *Water Resources Act 1976* (now administered under the Landscape Act as a prescribed watercourse) and delineated in GRO Plan 926/78 (sheets 1 to 13). The first Water Allocation Plan for the River Murray PWC was introduced on 1 July 2002 and was adopted by the then Minister for Environment and

Conservation, the Hon John Hill MP. Since this time the Plan has been reviewed and amended on a number of occasions.

A brief history of the key statutory events since the prescription of the resource, is outlined below in Table 1.

Table 1: Statutory timeline for water management of the River Murray Prescribed Watercourse

10 August 1978	Prescription of River Murray Watercourse
1 July 2002	First Water Allocation Plan for the River Murray Prescribed Watercourse adopted
12 January 2004	Minor amendments to the first Plan
2007	Minor amendments to the first Plan
August 2008	Concept statement for second Water Allocation Plan for the River Murray Prescribed Watercourse adopted
15 July 2009	Amendments to the first Plan
January 2011	Minor amendments to the first Plan
25 November 2014	Draft of the second Water Allocation Plan for the River Murray Prescribed Watercourse released for public comment
3 October 2017	Adoption of the second Water Allocation Plan for the River Murray Prescribed Watercourse
13 July 2018	Draft of the third Water Allocation Plan for the River Murray Prescribed Watercourse released for public comment
28 February 2019	Adoption of the third Water Allocation Plan for the River Murray Prescribed Watercourse
7 January 2020	Draft of the fourth Water Allocation Plan for the River Murray Prescribed Watercourse released for public comment
15 April 2020	Adoption of the fourth Water Allocation Plan for the River Murray Prescribed Watercourse
28 September 2020	Draft of the fifth Water Allocation Plan for the River Murray Prescribed Watercourse released for public comment
24 September 2021	Adoption of the fifth Water Allocation Plan for the River Murray Prescribed Watercourse

1.3 Review Process

An amendment of the 2017 Plan was undertaken to be consistent with the Commonwealth *Water Act 2007* (Cth)(Water Act) and the requirements of the Murray-Darling Basin Plan (Basin Plan). For more information about Basin Plan requirements, see Section 2.3.2. A number of other policy areas were also revisited as a result of feedback on the draft 2017 Plan.

Preparation of the Plans has been undertaken with the community through the River Murray Advisory Committee (RMAC) – an advisory committee to the Board consisting of representatives with a range

of skills and diversity of social, economic, environmental and cultural interest in the River Murray. RMAC's involvement in the development of the Plan has included:

- providing advice to the Board on development of the Plan
- ensuring broad stakeholder involvement
- facilitating key stakeholder input on content of the Plan, and
- assisting with engaging and educating stakeholders on the Plan.

The amendment processes began with RMAC considering the key policies within the Plan and, with the support of government and subject matter experts, considered trade-offs and consequences of proposed policies. RMAC worked with government to arrive at agreed policy outcomes, demonstrating a collaborative approach to policy making.

Amendments have also been made to improve the inclusion of South Australian Aboriginal river nations' interests and worldviews as part of meeting Basin Plan requirements and to improve recognition of Aboriginal values and perspectives. The South Australian Government recognises the importance of, and is committed to, seeking and incorporating Aboriginal values in the development of water allocation plans where possible.

The amendments incorporated into the 2019 Plan have been done in consultation with the First Peoples of the Murray and Mallee through River Murray Mallee Aboriginal Corporation (RMMAC), Peramangk through Mannum Aboriginal Community Association Incorporated (MACAI) and Ngarrindjeri through Ngarrindjeri Regional Authority (NRA). They are a starting point to an ongoing conversation and involvement of Aboriginal nations in water planning.

In preparing amendments to the 2019 Plan with South Australian Aboriginal river nations, the Board has given regard to the:

- River Murray Water Resource Plan (Department for Environment and Water (DEW), in prep)
- River Murray and Mallee Aboriginal Corporation Strategic Plan 2013
- Ngarrindjeri Regional Authority Yarlwar-Ruwe Sea Country Plan 2006
- Water Resources Planning Statement of Commitment 2015, and associated Cultural Knowledge agreement
- Kungun Ngarrindjeri Yunnan Agreement 2009 (Ngarrindjeri/South Australian Government)
- Ngarrindjeri Regional Partnership Agreement 2011, and
- Ngarrindjeri Yannarumi – Speaking as Country Deed 2014.

A further amendment of the Plan was undertaken to incorporate changes to the private carryover policy after a public consultation period in early 2020.

Following adoption of the 2020 Plan, subsequent amendments to the Plan were also undertaken in late 2020 to incorporate new information related to Environmental Land Management Allocation (ELMA). For further information on ELMA refer to section 2.4.3.4 and 2.5.2.

This Plan replaces the *Water Allocation Plan for the River Murray Prescribed Watercourse (adopted April 2020)*.

1.4 Future Plan Reviews

Pursuant to the requirements of the Landscape Act, the Board is required to review the Plan within 10 years of the Minister adopting the Plan.

As part of its review, and in developing any required amendments, the Board will consult with the community, key stakeholders and Aboriginal nations.

The Board will directly consult with the First Peoples of the River Murray and Mallee, Peramangk, and Ngarrindjeri nations and native title holders and claimants in relation to Aboriginal objectives and desired outcomes.

2 THE RIVER MURRAY PRESCRIBED WATERCOURSE

The River Murray PWC, covered by this Plan, encompasses the River Murray channel from the Victorian border down to and including Lakes Alexandrina and Albert, and portions of Currency Creek and the Rivers Finniss, Angas and Bremer. The boundaries of the area covered by the Plan are shown below, in Figure 1.

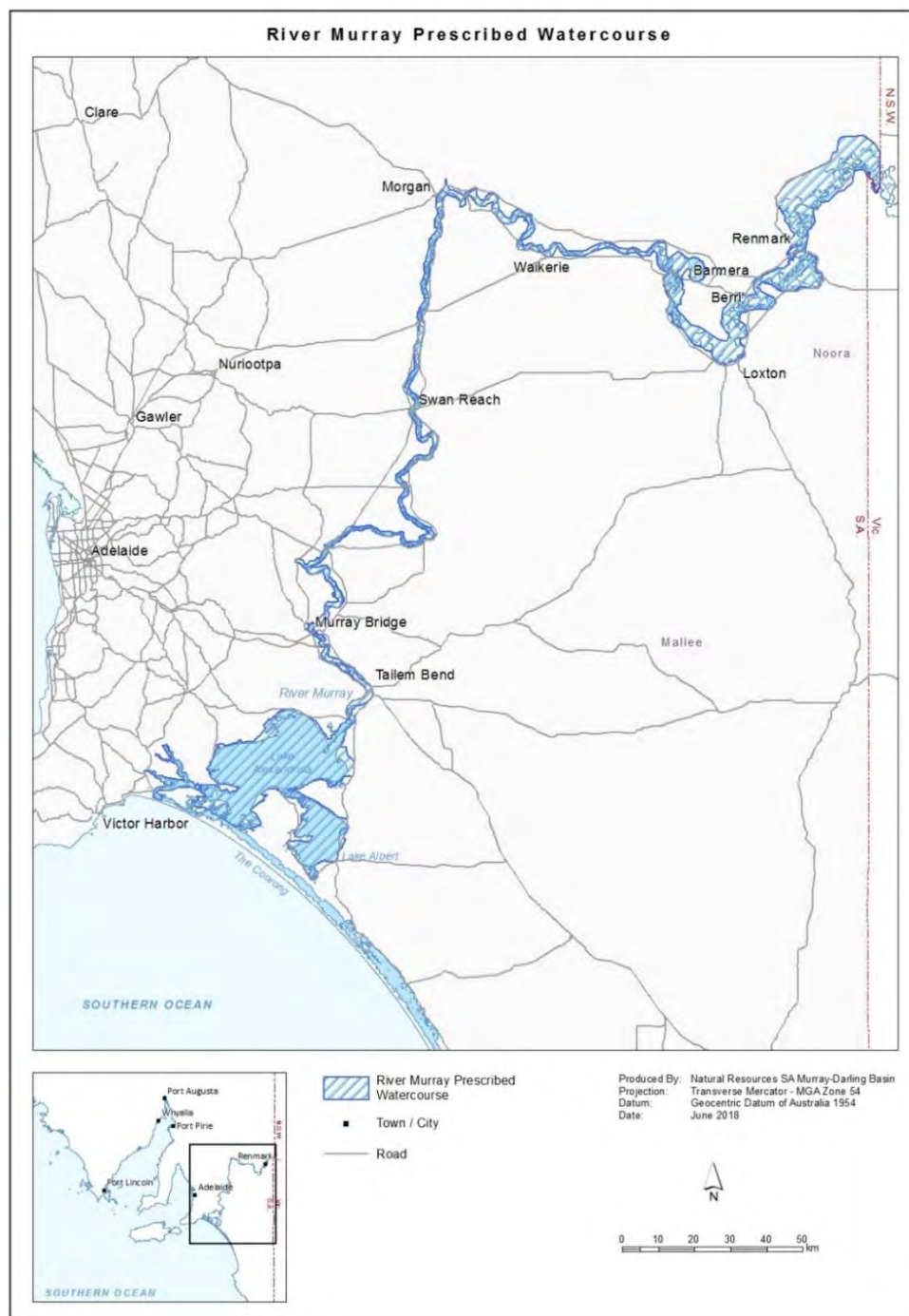


Figure 1: The River Murray Prescribed Watercourse boundary

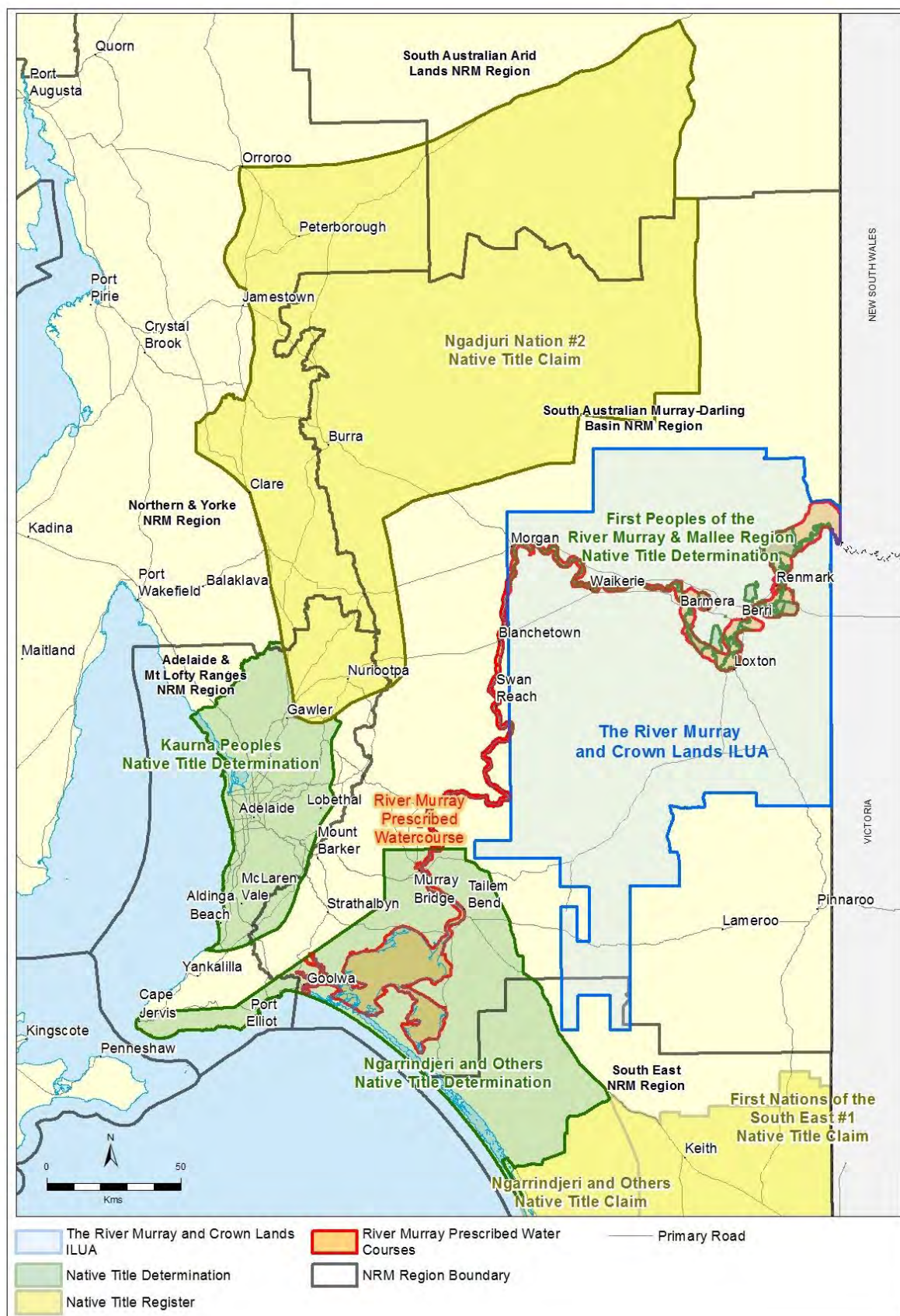


Figure 2: Native Title and Indigenous Land Use Agreement areas associated with the surface waters and groundwaters of the River Murray, Lower Lakes and Coorong

The River Murray PWC is the traditional lands and waters of Aboriginal people of the South Australian river nations, being the First Peoples of the River Murray and Mallee (Ngaiaawang, Ngawait, Nganguruku, Erawirung, Ngintait, Ngaralte, and Ngarkat peoples), Peramangk and Ngarrindjeri. It is the obligation of these Aboriginal river nations to maintain kinship through the interconnectivity between these lands, waters, spirit and all living things (Ngarrindjeri refer to this as Ruwe/Ruwar).

First Peoples of the River Murray and Mallee are recognised native title holders in the Riverland region of South Australia (SAD6026/1998 determined 18 November 2011) and entered into the River Murray and Crown Lands Indigenous Land Use Agreement (ILUA) with the Crown of South Australia in 2012. A native title determination was made in favour of the Ngarrindjeri (SAD6027/1998) on 14 December 2017. These areas are outlined in Figure 2, but are not intended to be definitive of the boundaries of an individual nation's Country, recognising that some nations such as Peramangk have not claimed native title. The Ngarrindjeri native title claimants will have an ILUA registered in the near future and the Plan will have regard to both the rights recognised in the native title determinations and any relevant provisions in the ILUAs.

2.1 Aboriginal Lands and Waters

For thousands of generations Aboriginal people of the river nations have cared for Murrundi (River Murray). The lands and water was formed by creation ancestors and is the cultural responsibility of the river nations of First Peoples of the River Murray and Mallee, Peramangk and Ngarrindjeri. The management of water sources shaped this cultural landscape that sustained Aboriginal culture and economy.

Historically, the river provided abundant natural resources and was probably among the most densely populated parts of Aboriginal Australia prior to European colonisation, supporting a more sedentary lifestyle than other parts of the country. The river has sustained Aboriginal people for many thousands of years and is a vital part of the living Aboriginal culture of today and into the future (RMMAC, 2013).

Aboriginal connection to this area is expressed through creation stories (cultural and spiritual histories) about the Country, which reveal the significance of the relationship between the Country and the people, both practically and spiritually. Ngarrindjeri describe this connection in the following statement:

The land and waters is a living body. We the Ngarrindjeri people are a part of its existence. The land and waters must be healthy for the Ngarrindjeri people to be healthy, spoken by Ngarrindjeri Elder, Tom Trevorrow (deceased), quoted in Ngarrindjeri Nation Yaruluwar-Ruwe Plan, 2006.

The following Creation Story is reproduced with authorisation from the Ngarrindjeri Nation Yarluwar-Ruwe Plan (2006) and Sugar Shack Complex Management Plan (NRA, 2015):

Ngurunderi the Creator

A long, long time ago Ngurunderi our Spiritual Ancestor chased Pondi, the Murray Cod, from the junction where the Darling and Murrundi (River Murray) meet. Back then, the Murrundi was just a small stream and Pondi had nowhere to go. As Ngurunderi chased him in his bark canoe he went ploughing and crashing through the land and his huge body and tail created the mighty Murrundi. When Ngurunderi and his brother-in-law Nepele caught Pondi at the place where the fresh and salt water meet they cut him up into many pieces, which became the fresh and salt water fish for the Ngarrindjeri people. To the last piece Ngurunderi said—you keep being a Pondi (Murray Cod). As Ngurunderi travelled throughout our Country, he created landforms, waterways and life. He gave to his people the stories, meanings and laws associated with our lands and waters of his creation. He gave each Lakalinyeri (clan) our identity to our Ruwe (country) and our Ngartjis (animals, birds, fish and plants) - who are our friends. Ngurunderi taught us how to hunt and gather our foods from the lands and waters. He taught us, don't be greedy, don't take any more than what you need, and share with one another. Ngurunderi also warned us that if we don't share we will be punished.

Ngarrindjeri have written in their Yarluwar-Ruwe Plan (2006) that *we must respect and honour the lands, waters and all living things. Ngurunderi taught us our Miwi, which is our inner spiritual connection to our lands, waters, each other and all living things, and which is passed down through our mothers since Creation. Ngurunderi taught us how to sustain our lives and our culture from what were our healthy lands and waters. Our lands and waters must be managed according to our Laws to make them healthy once again.*

2.2 Aboriginal Water Interests

For Aboriginal nations, water is life – it provides life to everyone and everything that ever lived, and everyone and everything that ever will live. In this way, water is the lifeblood of the landscape and is connected to all the other elements of the landscape, supporting a wide range of spiritual, cultural, environmental, social and economic activities. Water, and all of the connected elements, must be managed as parts of the same living body of the landscape to allow it to remain healthy, and continue to function and support people to live as it has for many thousands of generations.

Aboriginal people have expressed a desire for a future that maintains the continuation of their culture upon Country, and that continues to give life to their people who live and work in and outside of the region. An important part of this objective that was articulated by all nations consulted was that access and use of cultural flows should be enabled through the inclusion and allocation of water for this purpose.

The following definition of cultural flows is currently used by the Northern Murray-Darling Basin Aboriginal nations (NBAN) and the Murray Lower Darling Rivers Indigenous nations (MLDRIN):

Water entitlements that are legally and beneficially owned by the Indigenous nations and are of sufficient and adequate quantity to improve the spiritual, cultural, environmental, social and economic conditions of those Indigenous nations. This is our inherent right. The provision of cultural flows will benefit Indigenous people in improving health, wellbeing and provides empowerment to be able to care for their Country and undertake cultural activities.

2.2.1 Recognition of Aboriginal Water Interests

European colonisation of South Australia significantly disrupted Aboriginal nations' care, control, maintenance and governance of their Country. Water flow and connectivity has been disrupted with obstructions such as dams and weirs being constructed, and water quality and quantity has changed due to extraction and introduction of pest animals such as European carp. Aboriginal people's way of life significantly changed when they were forcibly removed from their Country and their lands, and waters were granted to European settlers. This has impacted the ability of Aboriginal people to pass down knowledge of cultural connection, values and practices to the next generation. There has been minimal consideration of Aboriginal values and uses of water through the water allocation planning process for the River Murray in South Australia to date. Today Aboriginal nations are strengthening their identity through language, native title, indigenous land use agreements and the formation of Aboriginal organisations, and are taking on community roles to be recognised as a voice in water planning. Today the management of water unites all people, communities and users for a more sustainable future.

2.2.2 Aboriginal Cultural Objectives and Outcomes

Water resource planning undertaken pursuant to the Basin Plan has recognised a number of Aboriginal cultural objectives and outcomes. These have been identified by South Australian Aboriginal nations based on their cultural values and uses, and should be referred to when undertaking water planning. Further information about water resource planning requirements is provided at Section 2.3.2.

The Plan is able to address some of these objectives and outcomes, along with additional cultural objectives that were identified by the river nations during the consultation process. Incorporating Aboriginal nation's objectives and outcomes into water planning is an iterative process that requires ongoing engagement and investment over time.

The progress made towards meeting Aboriginal objectives and outcomes that are within scope of the Plan are described in Table 2. Cultural objectives and outcomes that are considered to be outside the scope of the Plan are not referred to within the table.

Table 2: An outline of the progress made towards meeting Aboriginal cultural objectives and outcomes that are within the scope of the Plan.

Aboriginal cultural objective/outcome	Progress of the Plan towards addressing Aboriginal cultural objective/outcome
<p>The contribution of Aboriginal nations to caring for Country, including water resources management is valued.²</p> <p>To promote awareness and respect for Aboriginal cultural values, perspectives and worldview of water and its critical importance to the health of nations cultural waters and cultural living landscape.³</p>	<p>Through the amendment of the Plan, relationships and meaningful engagement with the South Australian river nations has progressed to establish stronger partnerships between the Board and First Peoples of River Murray and Mallee, Peramangk and Ngarrindjeri nations. Awareness of Aboriginal values, perspectives and worldviews has been included in this Plan. Consideration of how Aboriginal water interests and future water needs can be met is discussed in Section 2.4.7.3. Recognition and respect for Aboriginal nations views and values contribute to fulfilling South Australia's obligations under Basin-wide plans and legislation.</p>
<p>To see our lands and waters healthy¹.</p> <p>That the hydrological and ecological condition of the landscape, resemble as closely as possible, those experienced by nations ancestors³.</p>	<p>The Plan's objectives include providing allocations that contribute to the water needs of water-dependent ecosystems; the prevention of the loss of condition; number or extent of refuge habitats; and the prevention of adverse impacts on water quality.</p> <p>Chapter 3 outlines the Environmental Water Planning Framework, which sets out policies to facilitate the provision and use of environmental water, guides the delivery of environmental water to water-dependent ecosystems and sets out the expected outcomes from the delivery of the water (see Section 3.3).</p> <p>Chapter 5 sets out consumptive use limits to ensure that the take of water is within the limits set out in the Plan. Water is allocated within these limits.</p> <p>A portion of the water provided to South Australia is set aside for the environment and cannot be taken for consumptive purposes.</p> <p>Two consumptive pools are established in Chapter 5 that provide water for wetland and environmental purposes. Entitlements within these pools contribute to meeting (in part) the environmental water requirements set out in Chapter 3.</p> <p>Environmental water is also held in All Purposes consumptive pool as set out in Chapter 5 and detailed in Table 13.</p>

Aboriginal cultural objective/outcome	Progress of the Plan towards addressing Aboriginal cultural objective/outcome
	<p>Chapter 6 of the Plan aims to contribute to the prevention of adverse impacts of the taking and use of water on the environment, land and water by specifying conditions for works and site approvals. For example:</p> <ul style="list-style-type: none"> ○ an extraction limit applies to works approvals in the Upper Pike Management Zone ○ ecosystems and third parties are protected by provisions related to works approvals and water level variability projects are supported ○ Salinity risks are managed through site use approvals in the River Murray and more specifically the Plan requires salinity impacts to be offset by planting of deep rooted vegetation in the Angas Bremer Irrigation Management Zone to reduce the risk of shallow rising groundwater levels. ○ Environmental Land Management Allocations are granted in the Lower Murray Reclaimed Irrigation Area to contribute to the prevention of the risk of land salinization and manage soil cracking and acid sulfate soils. <p>Transfer rules in Chapter 7 allow for restrictions on trade where there is a need to address hydrologic connections or to protect the needs of the environment, consistent with provisions in the Basin Plan (Section 12.18).</p> <p>Water affecting activity principles are contained within this Plan and the Murraylands and Riverland Water Affecting Activities Control Policy. Water affecting activity principles will minimise impacts of construction on water-dependent ecosystems and water quality.</p>
<p>To maintain our cultural connections between nations, and to the lands and waters and all living things.¹</p> <p>To establish and maintain strong and productive relationships and partnerships built on mutual respect and agreement-making.¹</p>	<p>Through the amendment of this Plan and review of future plans, the Board will consult with relevant Aboriginal nations and their representative organisations, and will facilitate opportunities for Aboriginal perspectives to be heard and recognised during water resource management (Section 1.4).</p>

Aboriginal cultural objective/outcome	Progress of the Plan towards addressing Aboriginal cultural objective/outcome
	Through consultation for the amendment of this Plan in 2018, and the development of the South Australian River Murray Water Resource Plan, nations were engaged collectively at on-Country meetings and workshops. This engagement process continues to develop relationships between nation representatives and government agency staff.
<p>To achieve the social and economic outcomes and wellbeing desired by the nation.¹</p> <p>To ensure Aboriginal water interests are equitably recognised along with other stakeholders in water resources plans, research and policy.¹</p> <p>Aboriginal cultural heritage values and sacred water sites are protected and enhanced in the planning and implementation of water resource management activities.²</p> <p>Water resources to be managed in a way that supports the ongoing spiritual, cultural, environmental, social and economic needs of current and future generations of Aboriginal nations.³</p>	<p>A section 105 authorisation² under the Landscape Act regulates the native title right to take and use water by native title holders for personal, domestic, cultural, spiritual or non-commercial communal needs for native title holders (see Section 2.4.4.1).</p> <p>Raising awareness and promoting protection of Aboriginal cultural heritage as set out within the Plan (see Sections 2.2.3.1 and Chapter 8).</p> <p>The Plan identifies current and future Aboriginal water needs (see Section 2.4.2 and 2.4.7.3).</p>
For adequate monitoring and evaluation to be undertaken to ensure compliance with water management rules and to assess whether objectives are being achieved. ³	Monitoring and evaluation of the Plan to ensure compliance with water use is discussed in Chapter 9.

¹RM WRP Chapter 14 identified Objectives (DEW, 2019)

²RM WRP Chapter 14 identified Outcomes (DEW, 2019)

³RM WAP Aboriginal river nation's objectives identified during WAP consultation

² In accordance with schedule 5, clause 101 of the Landscape Act, an authorisation in force under section 128 of the repealed Act (and in effect immediately before 1 July 2020) will continue to have effect as if it had been issued under section 105 of this Act.

2.2.3 Incorporation of Aboriginal Water Interests in Water Planning

The process of integrating Aboriginal interests into water management is a complex and ongoing matter. Amending this Plan is a preliminary step towards recognising Aboriginal understanding of the relationship between healthy water, lands and all living things. The Plan makes some progress to addressing Aboriginal objectives and outcomes (see Table 2, and Section 2.2.3.1, Chapter 8 and Chapter 9). However some objectives are outside the scope of a water allocation plan, which sets out the rules for managing the take and use of prescribed water resources as set out in sections 52 and 53 of the Landscape Act.

The South Australian Aboriginal river nations knowledge of the connection between flow, water dependent ecosystems and sustainable livelihoods is a valuable addition to scientific knowledge, and addresses gaps in the understanding of water resources. In relation to water allocation planning, this knowledge has only been partially taken into account.

As Aboriginal nations build capacity in water planning, then future iterations of this Plan can make more progress towards achieving the Aboriginal cultural objectives set out in Section 2.2.2, Table 2, and the South Australian River Murray Water Resource Plan (DEW, 2019). From a cultural perspective water provides inter-related benefits, connectivity and renewal rather than the notion of use. There is a need for ongoing discussion on how the notion of use and Aboriginal cultural perspective can co-exist within the Plan to achieve water management outcomes that have integrity and demonstrate respect for Aboriginal and non-Aboriginal communities.

The approach of Aboriginal nations to caring for the Country that all South Australians live in can be understood through the words of Ngarrindjeri Elder, Tom Trevorrow (deceased):

Our traditional management plan was: don't be greedy, don't take any more than you need and respect everything around you. That's the management plan – it's such a simple management plan but so hard for people to carry out (Murrundi Ruwe Pangari Ringbalin, River Country Spirit Ceremony: Aboriginal Perspectives on River Country, 2010).

2.2.3.1 Protection of Aboriginal Cultural Heritage

First Peoples of the River Murray and Mallee, Peramangk and Ngarrindjeri have identified a desired outcome that Aboriginal cultural heritage values and sacred water sites are protected and enhanced in the planning and implementation of water resource management activities. The Board is supporting this desired outcome in Chapter 8 [Permits] by:

- Raising awareness of landholder legal obligations in the *Aboriginal Heritage Act, 1988*, and
- Ensuring compliance with the *Native Title Act, 1993* (Cth), determinations of native title and any future Indigenous Land Use Agreements that may be registered.

2.2.4 Aboriginal Engagement

South Australia's three water resource plans, including the South Australian River Murray Water Resource Plan (DEW, 2019), provides six engagement principles for engaging Aboriginal nations during the review of water allocation plans in the South Australian Murray-Darling Basin.

Aboriginal nations have also developed their own engagement principles. The RMMAC Strategic Plan 2013–2016 sets out objectives and strategies for working with government agencies and other stakeholders to achieve those objectives. MACAI have outlined a set of engagement principles in the Sugar Shack Complex Management Plan (NRA, 2015). Ngarrindjeri engagement principles are well progressed through the development of Kungun Ngarrindjeri Yunnan Agreement (KNY Agreement) in 2009 between the Ngarrindjeri Regional Authority (NRA) and the South Australian Government.

The KNY Agreement seeks to support the integration of Ngarrindjeri cultural values into management planning and implementation in native title areas, with a taskforce of state government and NRA representatives meeting on a regular basis to support consultation. Specifically to progress the involvement of Ngarrindjeri in water planning, a Statement of Commitment (SOC) between the NRA, the former Board, the former South-East Natural Resources Management Board and the Minister's Department was signed in 2015. The SOC sets out a framework for how the parties will work together in water resource planning, particularly to meet the requirements of Chapter 10 Part 14 of the Murray-Darling Basin Plan. In conjunction with this SOC is a cultural knowledge protection agreement that enables Ngarrindjeri to work with government on planning and be confident that Ngarrindjeri cultural knowledge will be respected and understood as belonging to Ngarrindjeri.

Engagement is also conducted with native title holders and claimants as required under the *Native Title Act* or where modified by an ILUA according to the terms of the ILUA.

Following-on from the engagement principles referred to above, engagement with nations occurs through various mechanisms based on the needs, interests and capacity of each nation. A key objective for good engagement is to build on and develop previous engagement principles. Specific engagement mechanisms for the individual nations may vary and it is recognised that some Aboriginal nations also desire to work and be engaged collectively at some stage in whole river water planning. Collective engagement was undertaken at the start and end of the consultation process for development of the South Australian River Murray Water Resource Plan (DEW, 2019) and amendment of the Plan.

2.3 Overview of the South Australian River Murray

Freshwater flows down the Murray-Darling system are seen by Aboriginal nations as the life blood of the living body of the River Murray, Lower Lakes and Coorong. Sufficient water flows into water dependent systems is crucial to bringing life to Country and the wellbeing of river nations. Aboriginal people have observed the draining of wetlands along the rivers, and the disconnection of the living body of the River Murray, Lower Lakes and Coorong. The installation of locks, levee banks and barrages, and water use from the River Murray and lakes have collectively contributed to reduced flows. This prevents the mixing of salt and freshwater, which is crucial to connectivity, flow, reproduction and the sustenance of the life of the waterways, lands, birds, fish and people within land and waters (DEWNR, 2017).

The River Murray in South Australia sits at the end of the Murray-Darling Basin system and is the state's largest reliable surface water resource. The River Murray is essential to supporting internationally significant ecosystems, nationally important economies, culture, and way of life. South Australia diverts around 7 percent of the Basin's extracted surface water resources.

As the River Murray is heavily utilised by other states before reaching South Australia, water sharing arrangements and inter-jurisdictional agreements largely dictate the volume and pattern of River Murray flow to South Australia. This means there are constraints on how South Australia manages its take and use of water from the River Murray PWC.

During the drought that occurred between 2001 and 2010, over-allocation and resultant low flows had significant negative impacts on the River Murray in South Australia, with parts of the system on the brink of collapse. The *Water Act 2007* (Cth) (the Water Act) provides the framework for the Basin Plan and is a step towards securing a healthy and sustainable working river for the future of all that rely on it, including the environment.

The *Murray-Darling Basin Agreement 2008* (the Agreement) is now incorporated into the Water Act and sets out the arrangements for sharing the waters of the River Murray system between the Basin states.

The Water Act introduces the Basin Plan (see Section 2.3.2) - a mechanism for a coordinated approach to the management of water resources within the Murray-Darling Basin. The Basin Plan aims to build upon existing approaches for managing the River Murray system, and recognises that a balance between the environment, economies and communities is important to provide for a healthy working river.

The water available to South Australia is determined by the Murray-Darling Basin Authority (MDBA) in accordance with the Agreement. The Plan details how South Australia manages the water it receives pursuant to the Landscape Act and with consideration of the Agreement and the Basin Plan.

2.3.1 The Murray-Darling Basin Agreement

Water sharing arrangements for the River Murray have been in place since 1914, with the introduction of the River Murray Waters Agreement between the Commonwealth Government, New South Wales, Victoria and South Australia. Water sharing arrangements have fundamentally remained the same over time, until the 1914 agreement was superseded by the current Agreement.

The Agreement was first signed in 1987 and has the purpose of promoting and coordinating effective planning and management for the equitable, efficient and sustainable use of the water, land and other environmental resources of the Murray-Darling Basin. The Agreement has evolved, with arrangements built on over time, including incorporating Queensland and the Australian Capital Territory. The 2008 version of the Agreement is now incorporated into the Water Act.

Since the 2002 Water Allocation Plan for the River Murray Prescribed Watercourse, a number of Agreement components have been introduced that provide greater water security to South Australia. Critical Human Water Needs (CHWN) are now given the highest priority (see Section 2.3.5). Storage rights are now available to ensure CHWN can be met in dry times, as well as allowing storage for private carryover purposes (see Section 2.3.6).

2.3.2 The Murray-Darling Basin Plan

The Basin Plan was adopted by the Commonwealth Minister on 22 November 2012. It now provides for integrated water resource management across the Murray-Darling Basin through the development of water resource plans (WRPs).

South Australia is required to develop WRPs for the following areas:

- South Australian River Murray (all surface water resources in the area, which replicates the River Murray PWC boundary)³
- South Australian Murray region (all surface and groundwater water resources in the area, excluding the surface water resources of the South Australian River Murray) and
- Eastern Mount Lofty Ranges (all surface and groundwater resources in the area).

WRPs align water management with elements of the Basin Plan and are made up of several components, including water allocation plans. This Plan is a key component of the South Australian River Murray WRP. Where the Plan contributes to the Basin Plan (listed below), the relevant section of the Plan is referenced in the WRP.

The Basin Plan is put into effect through the following key elements:

- Water resource planning requirements to guide the development of water management arrangements consistent with the Basin Plan are:
 - sustainable diversion limits (SDLs) that limit the amount of surface water that can be taken from the Basin for consumptive use (see Section 2.3.3 and Section 5.3.3)
 - providing for environmental watering to occur in a way that is consistent with the environmental watering plan
 - describe and have regard to Aboriginal objectives and outcomes relating to water management based on Aboriginal values and uses (see Section 2.2.2)
 - a water quality and salinity management plan to guide river management and longer term planning and management
 - a monitoring and evaluation plan to measure the effectiveness and efficiency of the WRP implementation
- Water trading rules to facilitate efficient and effective water markets across the Basin (see Chapter 7)
- An SDL adjustment process which allows SDLs to be adjusted up or down within defined limits, and
- The development of a constraints management strategy to identify projects to remove or relax physical and operational constraints to environmental water delivery.

The Basin Plan also identifies the volumes of water required for Critical Human Water Needs (CHWN) for those areas that are dependent on the water resources of the River Murray system.

Importantly, the Basin Plan includes management objectives to help guide the achievement of improved environmental outcomes in South Australia, including maintaining an open river mouth and flows to the Coorong, supporting healthy floodplains, and maintaining water levels in the Lower Lakes above 0.0 metres AHD for 100 percent of the time and above 0.4 metres AHD for 95 percent of the time.

³ It is noted that geographically the Coorong is located within the planning boundary of the South Australian Murray Region WRP area and it is a priority environmental asset for both the South Australian River Murray and the South Australian Murray Region WRPs. Due to its intrinsic link to the River Murray and Lower Lakes, for environmental planning purposes this asset is included in this Plan and the Long-Term Environmental Watering Plan for the South Australian River Murray WRP area as part of the Coorong, Lower Lakes and Murray Mouth asset. Further information on priority environmental assets is provided at Chapter 3.

WRPs are required to identify the objectives and outcomes of Aboriginal people related to the management of water resources, and to have regard to Aboriginal values and uses of water as well as cultural flows. WRP must also have regard to a range of other matters set out in Section 10.53 of the Basin Plan. Section 2.2.2 of this Plan outlines how progress has been made towards meeting cultural objectives and outcomes identified in the WRP that are within scope of the Plan.

The Basin Plan requirements build on from the Intergovernmental Agreement on a National Water Initiative⁴, which includes a commitment to include Aboriginal representation in water planning to incorporate Aboriginal social, spiritual and customary objectives and strategies, and to take account of the possible existence of native title rights to water.

Long term environmental watering plans and annual environmental watering priorities for each WRP area are now required to guide the delivery of environmental water. Long term environmental watering plans are reviewed every five years with the latest revision reflecting the most up to date knowledge. The first *A Long Term Environmental Watering Plan for the South Australian River Murray Water Resource Plan Area* was published in November 2015 (DEWNR 2015), with the latest revision due to be published in 2021 (DEW in prep).

The Commonwealth of Australia holds a significant volume of water for environmental purposes through water recovery programs (see Section 2.3.9). Environmental water is also held on licence for The Living Murray program (TLM)⁵, for managed pool-connected wetlands and the state minister's reserve. Non-government organisations and private donors also contribute to water delivered for environmental purposes. For more information about environmental water, see Chapter 3.

2.3.3 Sustainable Diversion Limits

In 1969, the South Australian Government decided to limit consumptive diversions from the River Murray, based on the ecological and water quality needs of the river under low flow conditions. On 1 July 1997, the Murray-Darling Basin Ministerial Council established a permanent Cap on diversions of water used for consumptive purposes in river valleys within the Basin to protect and enhance the river environment, and to ensure security to existing water users (see Table 3).

Sustainable Diversion Limits (SDLs) have been set within the Basin Plan and will be implemented through accredited WRPs. For the River Murray in South Australia, the Basin Plan requires implementation of the new SDLs by 2019. From 1 July 2019, all diversions from the South Australian River Murray will be managed under a single SDL limit rather than four separate limits as occurs under the Cap on diversions. Principles in Chapter 5 of the Plan set out the rules for allocating water from the South Australian River Murray and the requirement to operate within SDLs.

The Australian Government is investing in irrigation efficiency infrastructure and previously water purchase to recover water and 'bridge the gap' to the new SDLs. It is also possible to adjust the SDLs. The Basin Plan includes a mechanism for SDLs to be increased or decreased, but must ensure equivalent or better environmental, social and economic outcomes result from any adjustment. More information on SDLs is available at www.mdba.gov.au.

For historic reference purposes, the details of the former Cap are set out in Table 3. The Wetland consumptive pool and Environmental consumptive pool were not part of the Cap, as the Cap was on diversions for consumptive purposes.

⁴ An agreement that is a blueprint for water reform between the Commonwealth of Australia and the Governments of New South Wales, Victoria, Queensland, South Australia, the Australian Capital Territory and the Northern Territory.

⁵ For more information on the TLM program, please refer to Section 2.4.3.6

Table 3: South Australia's right to divert water from the River Murray for consumptive purposes under the former Schedule E of the Agreement

Consumptive Purpose	Maximum Volume of Water (Gigalitres)
Water supply purposes delivered to metropolitan Adelaide and associated country areas through the Swan Reach-Stockwell, Mannum-Adelaide, and Murray Bridge-Onkaparinga pipeline systems	650 over any consecutive five-year period (average 130 per year)
Lower Murray Swamp Irrigation	94.2 per year consisting of: <ul style="list-style-type: none"> • 72.0 for irrigation, stock and domestic • 22.2 for environmental land management
Country Town Water Supply Purposes	50 per year
Other Purposes	449.9 (long-term average annual diversion, with annual cap targets calculated at the end of each water year, taking into account the climate, trade and held environmental water)

2.3.3.1 Sustainable Diversion Limit Compliance

Each year the annual permitted take will be calculated and compared to the annual actual take, following the methodology outlined in the WRP for the SA Murray SDL Unit. If annual actual take is greater than the annual permitted take, then the difference is recorded on a Basin Plan register as a debit. If annual actual take is less than the annual permitted take, then the difference is recorded as a credit. This credit or debit is added to a cumulative balance. The Basin Plan register will commence with a cumulative balance of zero, meaning that historical Cap credits or debits are not transferred into the new register.

Non-compliance would only arise if the cumulative balance, adjusted to account for any disposal or acquisition of held environmental water, is a debit amount equal to or greater than 20 percent of the long-term annual diversion limit for the SDL resource unit, and the state government does not have a reasonable excuse for the excess.

A reasonable excuse does not mean that no action is required. A state government is still required to put in place a process to *make good* and return the cumulative balance to zero. If this does not occur then the state government could be deemed non-compliant.

If the provisions of this Plan are applied, taking into account assumptions about increasing levels of use over the life of this Plan, it is not expected that non-compliance would occur. Should there be unanticipated growth in use or other unforeseen events then the provisions in Chapter 5 would apply to manage non-compliance risk.

2.3.4 South Australian Entitlement

Each year South Australia receives Entitlement of up to 1,850 GL (the Entitlement), plus other 'required flow' including unregulated flows, water traded to South Australia (including environmental water deliveries) and other dilution flows as determined by the Agreement (see Section 3.6.3 for more about other required flow to South Australia).

Water provided to South Australia pursuant to the Agreement (including unregulated flows) is the only recognised source of water that is available from the River Murray Prescribed Watercourse. Principles in this Plan therefore relate only to these volumes. Rainfall and inflows to the river in South Australia are not considered a significant input, including from the Mount Lofty Ranges⁶.

The Entitlement is provided pursuant to the Agreement and is up to 1,850 GL per annum. The components of the Entitlement are shown in Figure 3 and are as follows:

- Clause 88(a) – Consumptive Entitlement up to 1,154 GL per year;
- Clause 88(b) – Dilution and Loss Entitlement of 696 GL per year (58 GL per month); and
- Clause 88(c) – additional quantities for dilution as determined by the Ministerial Council.

Consumptive Entitlement (up to 1,154 GL per year) is the maximum volume of entitlement for non-dilution and loss purposes provided to South Australia in any year and is distributed under the provisions in this Plan. This volume is only reduced during periods of low water availability across the River Murray system. While this component is commonly referred to as the 'consumptive' component of the Entitlement, it is not solely for consumptive purposes – some is specifically for the environment (see Section 3.5), and some must remain unallocated due to limits on surface water diversions in South Australia that are required under the Basin Plan (see Section 2.3.3).

Dilution and Loss Entitlement (696 GL per year) is provided to meet conveyance losses to Wellington and provide salinity dilution. Under clause 88A of the Agreement, up to 13.92 GL (2 percent) may be used for other purposes if the available Entitlement is ≤ 900 GL. This volume includes the evaporative losses from wetlands permanently connected to the river.

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. Unallocated water 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. For information on storage rights, see Section 2.3.6.

The Plan provides objectives and principles for consumptive pools, water access entitlements and water allocations. The consumptive pools, associated unit shares and allocation criteria are set out under Chapter 5 of this Plan.

⁶ These flows, however, are important locally. Further discussion is provided at Section 3.6.3.

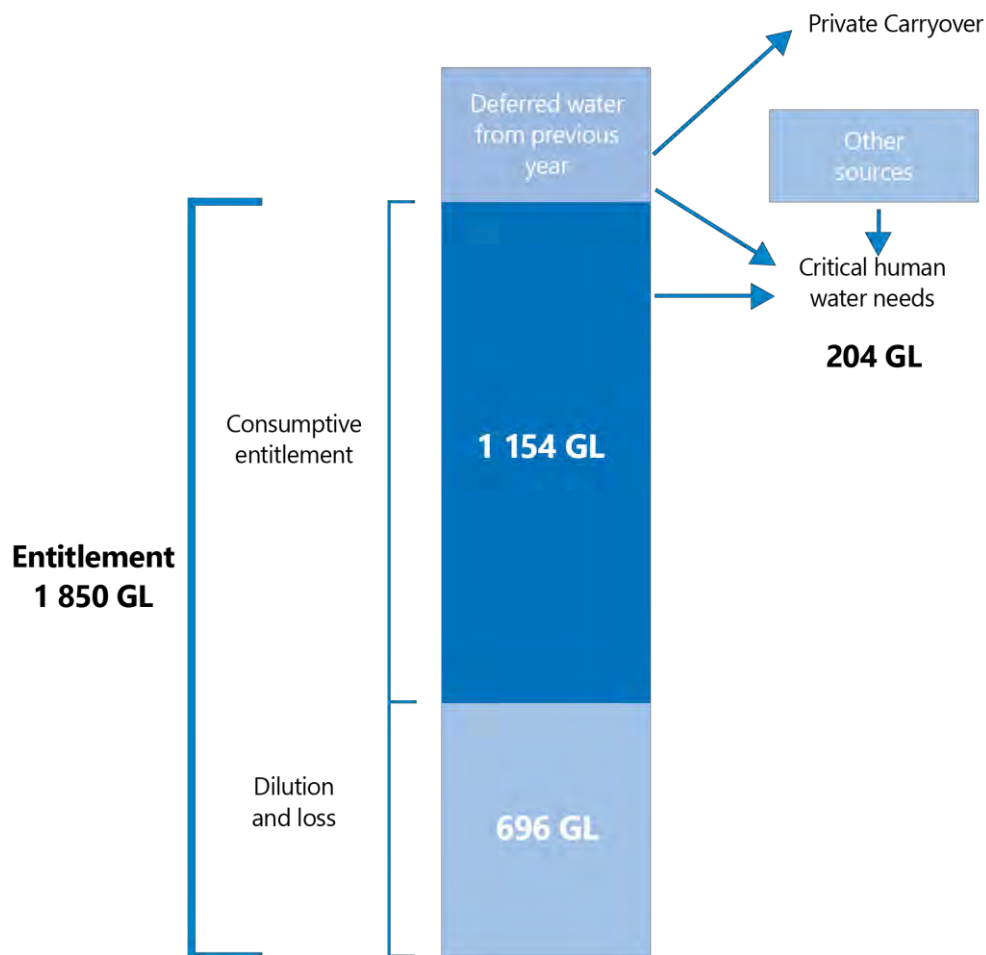


Figure 3: Maximum entitlement components

2.3.5 Critical Human Water Needs

The Water Act, Basin Plan and Agreement include obligations around CHWN, recognising the importance of having explicit arrangements in place for low water availability conditions. CHWN are considered the highest priority water use, and water sharing arrangements between Basin states ensure that water is set aside to deliver CHWN. The Basin Plan sets out the volumes required to meet the CHWN of the communities that are dependent on the waters of the River Murray system, however each state is responsible for meeting its own needs. The stated volume for South Australia's CHWN is 204 GL. This figure factors in the volume required for metropolitan Adelaide during periods of very low water availability in both the River Murray system and the Mount Lofty Ranges.

The actual required CHWN volume will be determined annually and provided from the Entitlement first and from deferred CHWN water held in the upstream major storages after this (see Section 2.3.6). Water stored for CHWN is unlikely to be required when South Australia is receiving the Entitlement of 1,850 GL, however it will be important when South Australia receives less than the Entitlement.

The consumptive pools set out in Section 2.3.7 are distinguished by whether they include CHWN water. The Metropolitan Adelaide (Class 6) and All Purpose Consumptive Pools (Class 1, 2 and 5) are the consumptive pools that relate to CHWN water. When South Australia is receiving less than the Entitlement of 1,850 GL, CHWN will be given priority over other consumptive uses. The principles for allocating water, including during dry conditions (see Section 5.5) incorporate the Basin Plan requirement that CHWN be given the highest priority.

2.3.6 Storage Rights

South Australia's storage rights are reflected in clause 91, clause 130 and Schedule G of the Agreement. The Agreement provides South Australia with the right to store (defer) part of the Entitlement in the upstream major storages and subsequently deliver it for CHWN and private carryover in a future year. South Australia can defer and store part of the 1,154 GL consumptive component of the Entitlement. When the Entitlement volume is known, the relevant Minister can make decisions on how much of the consumptive component to defer and store.

South Australia is required to advise the Murray-Darling Basin Authority on a monthly basis of its plans to defer and deliver the Entitlement, via a 12-month Deferred Water Storage and Delivery Plan. Planning to defer and later deliver stored water is subject to operational and river system considerations and constraints.

Decisions by South Australia to defer and store the Entitlement take into account a number of factors, including but not limited to:

- available space in upstream storages
- risks of spill or pre-release for flood mitigation
- potential effects on other water users (including the environment)
- volume of underuse in the previous water-use year
- the opening water allocation in the current water-use year, and
- potential water availability the following year.

The volume of the Entitlement that has been deferred and stored by the State in a given year, as CHWN or private carryover, forms part of the volume available for delivery for consumptive purposes in a subsequent year (in addition to the Entitlement). Deferred water will only be delivered from storage once the Minister has made it available for use. Particularly in times when South Australia receives less than its full Entitlement, the Minister may decide to make volumes deferred for CHWN and private carryover available for use in the current water-use year.

The private carryover arrangements and how these allocations are calculated for individual water users are provided in Section 5.5.2 of the Plan – see Principles 62 to 77.

2.3.7 River Murray Consumptive Pools

The Landscape Act requires that water allocation plans determine, or provide a mechanism for determining, from time to time, a consumptive pool or pools for the water resource. Water allocation plans are also required to set out principles associated with the determination of water access entitlements and for the taking and use of water, so that:

- an equitable balance is achieved between environmental, social and economic needs for the water, and
- the rate of the taking and use of the water is sustainable.

The Plan also needs to take into account the arrangements set out under the Agreement as outlined in Section 2.3.1.

A consumptive pool is defined by the Landscape Act as the water that will from time to time be taken to constitute the resource, within a particular part of a prescribed water resource. A consumptive pool is generally comprised of water available for allocation for licensed purposes, water for stock and domestic use under section 100 of the Landscape Act (where the River Murray adjoins or runs through the land), and water authorised for use by the Minister under section 105 of the Landscape Act.

The Plan provides objectives and principles for the management of water access entitlements within consumptive pools, and the principles for allocating water based on the water access entitlement held. This allows for a licensing system which regulates the taking of water from the resource within sustainable limits.

A number of consumptive pools are set out for the River Murray, and water access entitlements are established within each consumptive pool. A water access entitlement provides a right to a share of the consumptive pool it is from, and allocations are granted against that entitlement based on the volume of water made available to that consumptive pool.

See Table 4 for a breakdown of the volumes in each consumptive pool and class. The reason for multiple consumptive pools is to apply different rules for each pool relating to accessing water and making water available.

2.3.7.1 Metropolitan Adelaide Consumptive Pool

The former Class 6 now forms the Metropolitan Adelaide Consumptive Pool, and relates to the supply of water to metropolitan Adelaide and associated country areas through the Swan Reach – Stockwell, Mannum – Adelaide, and Murray-Bridge – Onkaparinga pipelines. This Plan recognises that water access entitlements that relate to this consumptive pool cannot be traded. The first 150 GL in this consumptive pool is recognised as being for CHWN in dry periods.

2.3.7.2 All Purpose Consumptive Pool

The former Classes 1, 2, 3a, 3b, 4, 5, 7 and 8 are now included in the All Purpose Consumptive Pool. This consumptive pool includes, but is not limited to:

- licensed purposes - CHWN, stock and domestic, urban water use (country towns), industrial, industrial dairy, irrigation, recreational, environmental and environmental land management within the Lower Murray Reclaimed Irrigation Area (LMRIA);
- unlicensed stock and domestic use, and
- purposes permitted under section 105 authorisations - such as use by native title holders and claimants, road making, firefighting and application of chemicals to non-irrigated crops.

This consumptive pool consists of water access entitlements for Classes 1, 2, 3 (High Security), 5 and 8. See Table 4 for a breakdown of each consumptive pool and class.

A total of 6.2 GL is included in the All Purpose Consumptive Pool for unlicensed uses authorised under the Landscape Act. Although a water licence is not required, the volume needs to be recognised within a consumptive pool. A volume of approximately 6.1 GL is included in Class 1 for unlicensed stock and domestic use, and for water use authorised under section 105 for the purposes of exercising native title rights and interests. The volume for exercising native title rights and interests is indicative only and may be refined after engaging with relevant Aboriginal groups (see Section 2.4.4.1). A volume of approximately 0.1 GL is included in Class 3 (High Security) for other non-licensed use including road making, firefighting and application of chemicals to non-irrigated crops.

Classes 1, 2 (up to 34 GL) and 5 are recognised as being for CHWN in dry periods. The previous Classes 3a, 3b, 4 and 7 are now included in the All Purpose Consumptive Pool, as Class 3 (High Security). Class 3b related to the historical administration of the *Ground Water (Qualco-Sunlands) Control Act 2000* prior to the unbundling of water rights. A separate class for water used within the Qualco-Sunlands irrigation area allowed a set volume of irrigation water to be traded within the scheme, with no other irrigation water to be traded in. The need for a separate class of water was in recognition of the high risk of waterlogging and salinisation of land, and increased levels of salinity in the River Murray caused by irrigation of land in the Qualco-Sunlands irrigation area. Since unbundling, this distinction is no longer required as the application of water is managed through site use approvals within the Qualco-Sunlands irrigation area.

The previous Class 8 is retained, and is included in the All Purpose Consumptive Pool. The volume of water in this class is set out in the Agreement and is specifically for environmental land management in the Lower Murray Reclaimed Irrigation Areas (LMRIA). Water access entitlements and water allocations related to Class 8 cannot be traded and expire upon the change in owner or occupier of land on which the water allocation is used.

2.3.7.3 Wetland and Environmental Consumptive Pools

Two consumptive pools arise from the former Class 9 entitlements – the Wetland Consumptive Pool and the Environmental Consumptive Pool. The Wetland Consumptive Pool is for the purpose of managing wetlands within the 1956 flood boundary that are permanently connected at normal pool level; the Environmental Consumptive Pool is for environmental purposes as defined in the Water Act 2007.

The annual evaporative losses from the wetlands permanently connected at normal pool level have been estimated to be 200 GL. Without any regulation, this 200 GL is effectively diverted and taken from the river to replace evaporative losses. Hydrologically this water must be taken from the first water provided to the state, that is, from the 696 GL Dilution and Loss Entitlement.

Prior to the adoption of the River Murray Water Allocation Plan in 2002, there was no licensing of wetlands, nor any allocations made to them (with the exception of a National Parks and Wildlife Service licence for pumping into Tolderol). For those wetlands managed for environmental purposes, the actual approach was generally determined by individual wetland managers and was not subject to formal regulation. As the number of wetland management projects along the river increased, implementation of a coordinated approach became important.

The 2002 Water Allocation Plan for the River Murray Prescribed Watercourse established a maximum of 200 GL for wetland management purposes. In 2009, when the 2002 Water Allocation Plan for the River Murray Prescribed Watercourse was unbundled, this became 200,000,000 unit shares (at 1 kL per share) in Class 9.

Water access entitlements could be granted by the Minister for wetlands that could be managed (explained below), with the remaining water access entitlements for unmanaged wetlands remaining unassigned.

Following a review of how wetland water is accounted for, it is recognised that the 200 GL of evaporative losses is accounted for from the Dilution and Loss Entitlement (696 GL). The portion that can be managed is included in a consumptive pool and requires a licence. Water access entitlements are issued to reflect the volume required for managed wetlands.

The volume attributable to unmanaged wetlands is accounted for from the Dilution and Loss Entitlement, and is not included in a consumptive pool. This is because the evaporation of water in these wetlands cannot be managed. This volume is approximately 153.9 GL.

Construction of regulating infrastructure on wetlands allows them to be managed with a more natural wetting and drying regime. This results in water savings, as less water is needed for a wetting and drying regime than if the wetlands remained permanently connected to the river. The evaporation

volume for that wetland (based on when it was connected to the river) is placed on a licence, with water access entitlements being assigned based on that volume (at 1 kL per unit share).

A portion of the water access entitlements arising from managed wetlands has been transferred to the Commonwealth of Australia, as a result of water savings achieved via wetland works undertaken through the Riverine Recovery Project (RRP). The volume transferred is the evaporation volume for that wetland (based on when it was connected to the river) less the volume now required to manage that wetland through a wetting and drying regime. The number of water access entitlements in the Environmental Consumptive Pool that the Commonwealth of Australia will hold may increase as the RRP progresses.

The Wetland Consumptive Pool comprises of the portion of water access entitlements attributable to managed wetlands, less the water access entitlements transferred to the Commonwealth of Australia. This reflects the volume required to manage South Australia's wetlands with a wetting and drying regime going forward. The water access entitlements are likely to increase over time as more regulating infrastructure is built through RRP.

As at 30 April 2018, approximately 46.1 GL from Class 9 has been placed on licence for managed wetlands. Of this volume, 7.2 GL of water savings have been transferred to the Commonwealth of Australia. The 46.1 GL for managed wetlands is a portion of the 200 GL originally assigned to evaporation from all connected wetlands.

While the number of water access entitlements are likely to change over time as more wetlands become managed, the total of the two consumptive pools and the volume attributable to unmanaged wetlands will remain equal to the original 200 GL volume for evaporative losses. See Figure 4 for a breakdown of the wetland volumes.

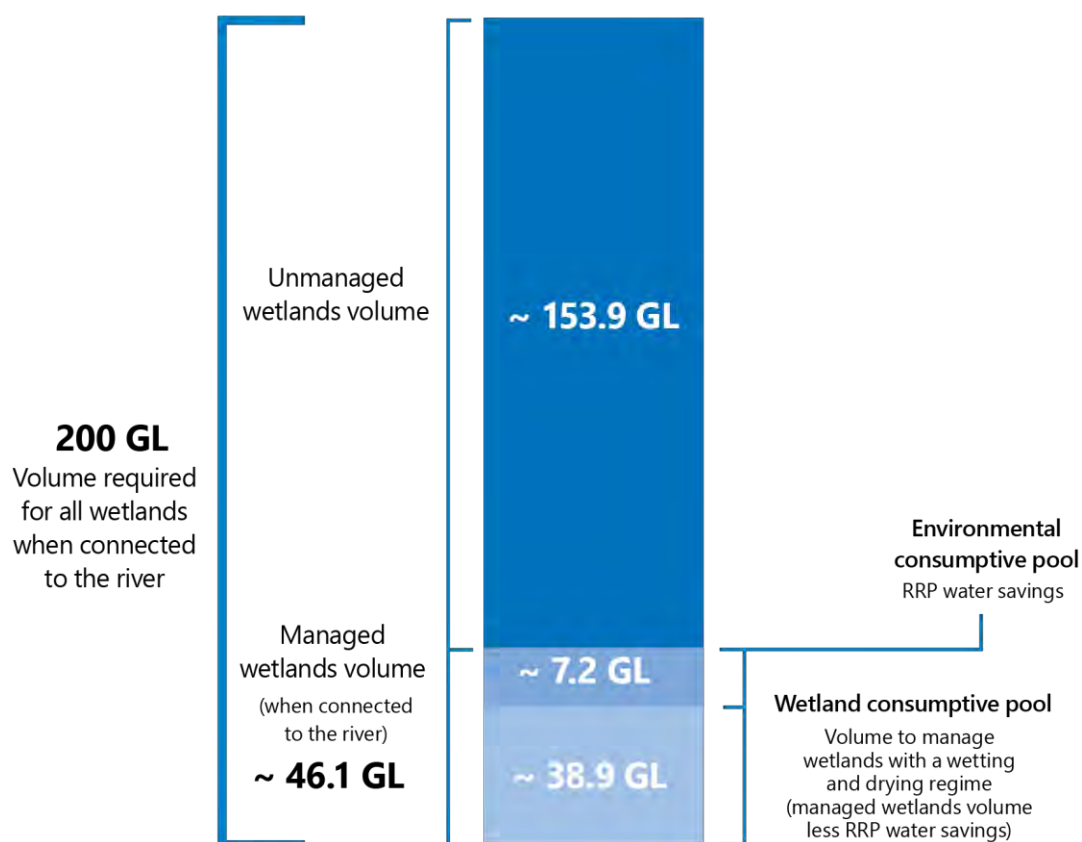


Figure 4: Breakdown of wetland volumes

2.3.7.4 Consumptive Pools Breakdown

Table 4 shows the history of water access entitlements, which were originally reflected as a *purpose* in the 2002 Water Allocation Plan for the River Murray Prescribed Watercourse, then a *class* in the 2009 unbundled Water Allocation Plan for the River Murray Prescribed Watercourse, and then as *consumptive pools* in this Plan. The table also shows the volumes included in the All Purpose Consumptive Pool for unlicensed water use (Classes 1 and 3). This water use was previously part of the unallocated portion of the Entitlement, but it requires inclusion in a consumptive pool. Table 4 also indicates where a consumptive pool is recognised as relating to CHWN.

Table 4: Breakdown of consumptive pools

Consumptive Pool	Previous Class	Previous purpose	Unit Shares ⁷	Volume (GL)	CHWN	Comments ⁸
Metropolitan Adelaide Consumptive Pool (Class 6)	Class 6	Urban water use – metropolitan Adelaide and associated country areas	130,000,000	130.000	Y up to 150 GL	
All Purpose Consumptive Pool (Class 1)	Class 1	Stock, domestic, stock and domestic	8,368,662	8.369	Y	0.012 GL is held for TLM 0.075 GL is held by the Commonwealth of Australia
	Nil	Unlicensed stock, domestic, stock and domestic, section 105 authorisations for native title purposes	Nil	6.063	Y	Previously part of unallocated portion of the Entitlement
All Purpose Consumptive Pool (Class 2)	Class 2	Urban – country towns	50,000,000	50.000	Y up to 34 GL	
All Purpose Consumptive Pool (Class 5)	Class 5	Industrial & dairy	5,568,841	5.569	Y	
All Purpose Consumptive Pool (Class 3 – High Security)	Class 3a	Irrigation (other than Qualco)	543,969,767	543.970	N	6.614 GL is held for TLM 148.1 GL is held by the Commonwealth of Australia
	Class 3b	Irrigation in Qualco	21,038,369	21.038	N	
	Nil	Section 105 authorisations (other than for native title purposes)	Nil	0.100	N	Previously part of the unallocated portion of the Entitlement
	Class 4	Recreation	4,423,526	4.423	N	0.043 GL is held by the Commonwealth of Australia
	Class 7	Environment (TLM)	38,366,550	38.367	N	The majority of shares are held for TLM
All Purpose Consumptive Pool (Class 8)	Class 8	Environmental land management	22,200,000	22.200	N	
Wetland Consumptive Pool	Class 9	Wetlands	38,953,915	38.954	N	38.9 GL is held on licence for managed wetlands. This is a portion of the 200 GL included in the 2002 Plan for wetlands (formerly Class 9). The unmanaged portion of the 200 GL is not included in the consumptive pool (see Section 2.3.7.3).
Environmental Consumptive Pool	Class 9	Wetlands (water savings achieved through RRP)	7,244,800	7.245	N	The Commonwealth of Australia holds entitlements through water savings achieved from RRP (7.2GL), formerly Class 9.
TOTAL			870,134,430	876.298		

⁷ Number of unit shares available as at 30 April 2018

⁸ Entitlements held for TLM and by the Commonwealth of Australia are as at 18 February 2018

2.3.8 Allocating Water from the River Murray

As outlined in Section 2.3.7, the River Murray Consumptive Pools and classes allow for water allocations to be provided to water access entitlements held within a consumptive pool, and water can be prioritised to different classes within a pool if necessary. The principles in Chapter 5 step through the process of determining the consumptive pools, calculating the volume within each consumptive pool, guiding the Minister in determining how much water may be made available for allocation from each consumptive pool, and making allocations to entitlement holders within each of the consumptive pools and classes.

Figure 5 sets out how the framework operates at full Entitlement of 1,850 GL and Figure 6 sets out the allocation priorities at less than full Entitlement. A summary is provided below.

The dilution and loss component of Entitlement is provided first, to meet operational losses and provide salinity dilution between the South Australian border and Wellington. A volume of 696 GL per annum is needed.

Up to 204 GL is then provided for CHWN, which comes from the All Purpose Consumptive Pool (Classes 1, 2 and 5) and the Metropolitan Adelaide Consumptive Pool (Class 6). CHWN is the highest priority for allocation after dilution and loss. The actual volume of CHWN required can change from year to year depending on how much water can be provided to metropolitan Adelaide from other sources, such as the Mount Lofty Ranges. In dry years, when Entitlement is less than 1,850 GL, the volume provided to Metropolitan Adelaide Consumptive Pool (Class 6) will be limited to 100 GL, thereby allowing for 50 GL to instead be allocated to the All Purpose Consumptive Pool (Classes 3 (High Security) and 8).

A maximum volume of 693.9 GL may be allocated from the All Purpose Consumptive Pool. After CHWN are met (Classes 1, 2 and 5), water is made available to Classes 3 (High Security) and 8.

Water for the Wetland Consumptive Pool is provided from the dilution and loss component. This volume does not affect water available for consumptive use.

Water for the Environmental Consumptive pool is provided from the unallocated portion of Entitlement, when Entitlement is 1,850 GL, and from the dilution and loss component when Entitlement is below 1,850 GL. This is to ensure that when South Australia is not receiving full Entitlement, the volumes held against entitlements in this consumptive pool are used in South Australia.

As set out in Section 2.3.6 South Australia can also defer and store water from its Entitlement. This deferred water can be made available for CHWN and private carryover in a subsequent year, in addition to Entitlement for that year.

The framework aims to provide transparency to water users, with information being provided at the start of the water use year to help all water users plan for the year ahead. The framework applies at all levels of water availability. The Minister will make allocation and carryover announcements at the start of each water use year.

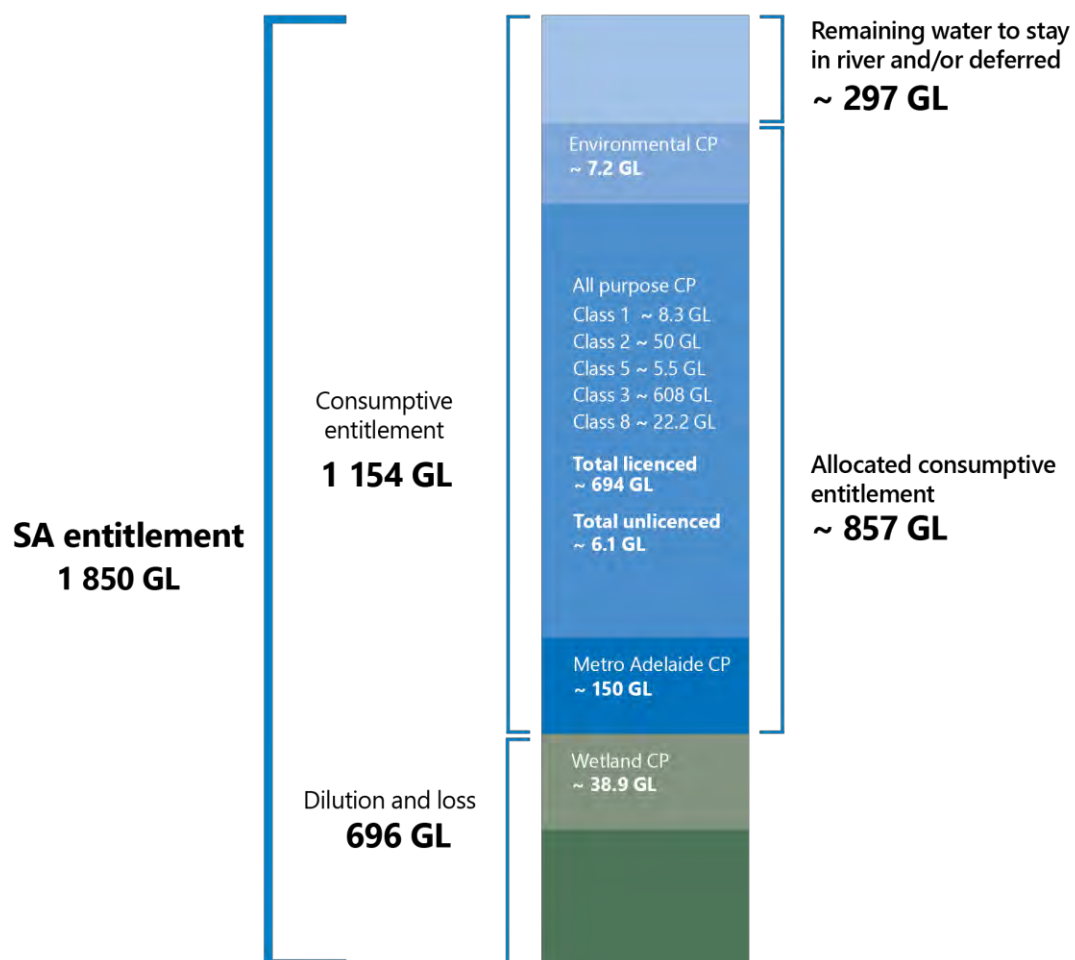
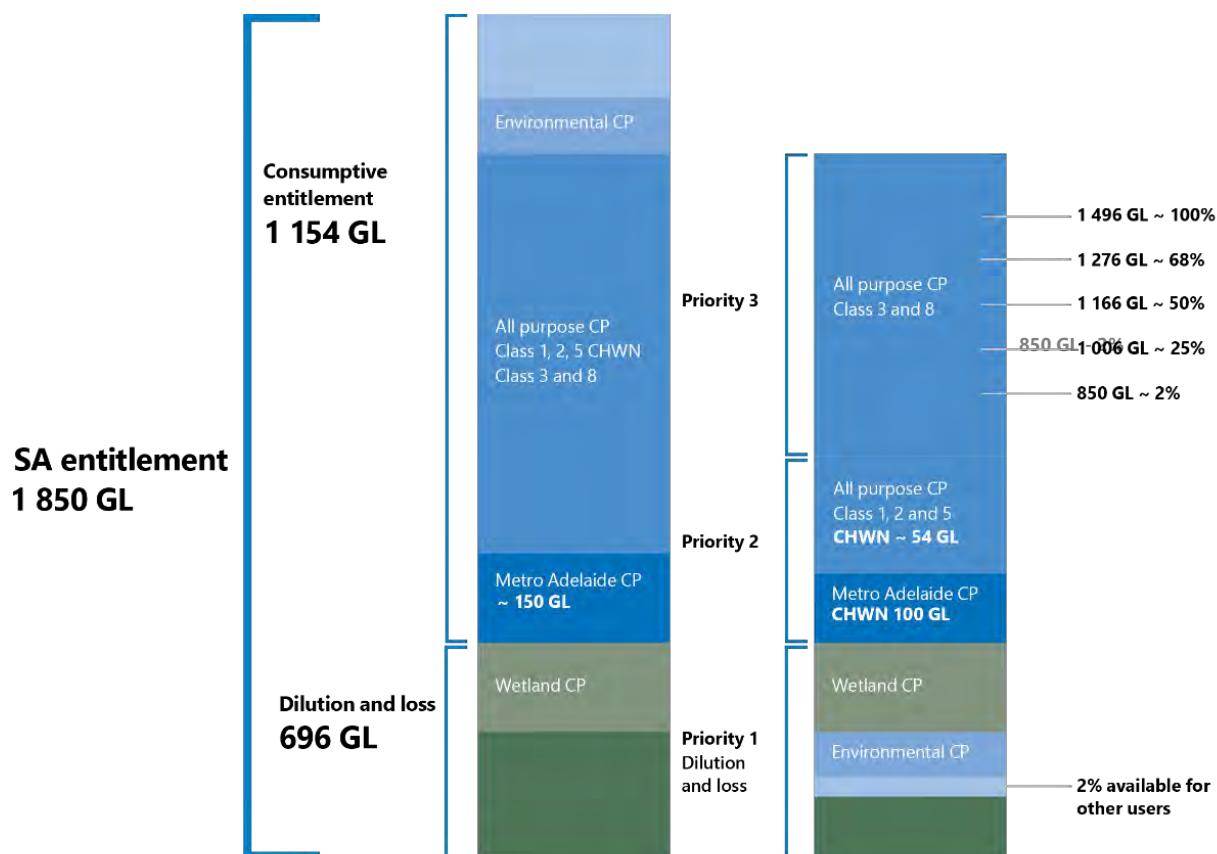


Figure 5: Water allocation framework at Entitlement of 1,850 GL



NB. The volumes and corresponding percentages set out in figure 6 are displayed as a rough guide and for illustrative purposes only and will vary subject to the volume of entitlement available, volumes of water available in storage, and volumes of water deferred for CHWN and private carryover purposes.

Figure 6: Water allocation framework and priorities at below Entitlement of 1,850 GL

2.3.9 Commonwealth Environmental Water Holder

The Water Act established the position of Commonwealth Environmental Water Holder (CEWH). The Commonwealth Environmental Water Office (CEWO) assists the CEWH to manage environmental water to protect or restore the environmental assets of the Murray-Darling Basin and to meet a number of objectives, including to give effect to international agreements (Water Act 2007).

The CEWH manages water that has been recovered by the Commonwealth of Australia in the form of water entitlements, either through water buy backs or projects funded to create water savings. As at 18 February 2018, the Commonwealth of Australia holds a total of 2,672,408 ML of registered entitlements across the Murray-Darling Basin (CEWH, 2018).

The Commonwealth of Australia holds approximately 155 GL of South Australian water access entitlements (as at 30 April 2018). The majority of water access entitlements are held in the former Class 3a (148.1 GL), a portion is held in the former Class 9 (7.2 GL) with the remainder held in the former Class 1 (0.075 GL) and Class 4 (0.043 GL).

Under the Basin Plan, the CEWH is required to manage and deliver water in accordance with the Basin-wide environmental watering strategy. The development of long-term watering plans by Basin states will also inform the planning and use of environmental water.

The Basin Plan contains a number of matters that the CEWH must have regard for when planning environmental watering. The MDBA, the CEWH and Basin states need to work together to ensure the best possible use of environmental water. Water recovered from within South Australia by the Australian Government may be used for environmental purposes across the Basin, and in accordance with the provisions in the Water Act.

In South Australia, water set aside for the environment in this Plan will also be needed to complement other sources of environmental water such as that held by the Commonwealth of Australia to protect and restore ecological assets (see Section 3.6 for more on environmental water provisions). South Australia will work closely with the CEWH and the MDBA in environmental water planning and delivery processes to ensure the best environmental outcomes for the state, recognising that during periods of low flow, water available to the CEWH is limited and water must be shared between ecological assets across the Basin.

2.4 Assessment of Demand on Water Resources

Section 53 (1)(f) of the Landscape Act provides that a water allocation plan must assess the capacity of the resource to meet the demands for water on a continuing basis. This section assesses the demand for water from the River Murray PWC and the capacity of the resource to meet that demand.

2.4.1 Needs of Water Users

The River Murray PWC area is part of a region that is home to approximately 70,000 people (RDA 2018), or 4 percent of South Australia's population. The River Murray supports another 1.5 million South Australians, or 89 percent of the state's population, supplying water for industries and urban and town water use. The River Murray supports high value ecological communities, and is important to social and cultural needs. There is a high demand for consumptive use from the River Murray, and the river also supports nationally and internationally important wetlands and floodplains.

The River Murray is important to the beliefs, culture and business needs of all Aboriginal people in the region. From a cultural perspective, water provides inter-related benefits, connectivity and renewal rather than the notion of use. As described in DEWNR (2017), the lands and waters must be able to provide life for Aboriginal people; there are fishing, hunting, gathering, drinking, swimming, walking, feeling, tasting and smelling implications, as well as the fundamental role that the lands and waters provide the basis for a healthy life. South Australian river nations perceive many 'supporting' services as significant, because ecological and cultural services are seen as fundamentally interconnected. They consider services such as recreation, tourism, and scientific research a significant opportunity for producing social and economic wellbeing for Aboriginal people. These services will generally have an indirect benefit to humans or a direct benefit over a long period of time. For Aboriginal people however, these benefits are not viewed separately nor seen as water needs or uses; they are seen as an interconnected system of services providing direct benefits to the health of people and their lands and waters.

The main economy for communities along the length of the River Murray is primary production, followed by value adding manufacturing, with approximately \$2.2 billion produced through food and wine production (Regional Development Australia 2013). Tourism is a major industry in the region, providing \$200 million annually to the Murraylands and Riverland. Agriculture (including irrigated horticulture) is the main industry in the Riverland. While retail and health care have become the dominant industries towards the lower end of the Murray, agriculture is still a large economy in this region (Regional Development Australia 2013).

The River Murray underpins the majority of the South Australian economy as an essential part of the public water supply. Some of the larger industry sectors supported by the public water supply include manufacturing, construction, financial services and healthcare/social services sectors. Together these industries contribute more than \$23.3 billion to the Gross State Product.

River Murray water is provided through five pipelines supplying Adelaide and a number of regional towns, as well as direct offtakes for the major towns along the river. River Murray water services the Lower North, Barossa Valley, Eyre Peninsula, Yorke Peninsula, Clare and Whyalla, Port Augusta, and Woomera. The upper area of the south-east is also serviced by River Murray water, through the Taillem Bend to Keith pipeline. SA Water supplies horticulture, industry, farming, commercial and residential customers.

The River Murray is recognised as two irrigation regions – the Riverland and the River Murray below lock 1. The Riverland region has a high dependence on irrigation, with wineries, packing sheds and food processing being reliant on a consistent supply of irrigated crops. The Riverland is a large wine producing region, and is also well known for the production of citrus, stone fruit, almonds and vegetables.

The main industries in the River Murray below Lock 1 region are agriculture (both irrigated and dryland), retail trade and manufacturing. Boating, fishing and tourism industries are also important around Lake Alexandrina and Lake Albert. The dairy sector in the Lower Murray Swamps and Lake Alexandrina and Lake Albert region has declined in recent years, with dryland farming and viticulture now dominating.

Irrigation trusts (Trusts), which involve the sharing of infrastructure between a number of irrigators, are a common method of distributing River Murray PWC water for licensed purposes. There are two types of Trusts, those that are officially established under the *Irrigation Act 2009*, and those that are established through a private operating arrangement between neighbours or districts.

The Trust is the holder of all water entitlements – members are not licensed individually, but hold sub-allocations within the Trust. Trusts established under legislation are responsible for the setting of charges, rates and by-laws, which can only occur by a majority vote of its members. It is up to the Trusts to establish rules and operating agreements with individuals within the Trust to ensure that the Trust can meet the conditions of any licensing instruments.

A significant number of unique ecosystems are dependent upon a healthy river too (see Chapter 3 for more information about environmental water requirements). The natural environment in the Riverland region consists of diverse flora and fauna, including river red gum and black box forests.

Wetlands are important to the river environment as they perform functions to improve water quality, reduce the impact of floods, provide vital refuge, nursery and habitat areas for many species, and replenish the groundwater (Department for Environment and Heritage & Department of Water Land and Biodiversity Conservation, 2003). Wetlands also provide cultural, economic and social benefits to the community.

As described in DEWNR (2017) Aboriginal river nations along Murrundi (River Murray) refer to freshwater wetlands as 'nurseries' in recognition of the important role these areas play in providing food and shelter for many types of ngartjis (animals, birds and fish). Submerged plants in these nursery areas are critical for food and shelter for animals and their young. The nurseries are regarded as the lungs of the river that cleanse the body (land).

There are three wetlands of International importance (designated under the Ramsar Convention) along the River Murray in South Australia. These are: the Coorong, Lake Alexandrina and Lake Albert; Riverland; and Banrock Station Wetland Complex. There are 14 nationally recognised wetlands and floodplains in the River Murray PWC area, including the three Ramsar sites (Environment Australia 2001).

The River Murray below Lock 1 includes the Coorong, Lake Alexandrina and Lake Albert, recognised under the Ramsar Convention. This region has significance for the life and culture of the Ngarrindjeri people. Low flows to Lake Alexandrina, Lake Albert and the Coorong have impacted on the health of the region, and during the drought severe effects were experienced.

Described within DEWNR (2017), pollution of the river, lakes and the Coorong from increased salinity and siltation has led to a decline in a number of ngartjis such as pondi (murray cod) and mullowi (mulloway), yabbies and many mrayi (birds). Important plant species used for Ngarrindjeri cultural weaving have also declined around the lakes, and changes in harvesting patterns and distribution patterns present challenges to contemporary Ngarrindjeri weavers. Siltation seriously affects swan weeds, causing their decline, which impacts on important spawning sites, nurseries and food for Ngarrindjeri ngartji such as ma:mi (fish) and mrayi species. It is recognised that the community, the environment, and social and cultural life would benefit from the restoration of flows in the River Murray (MDBA 2010).

The River Murray is vitally important for social, economic, cultural and ecological purposes to all South Australians.

Demand for water from the River Murray PWC can be broadly divided into the following categories:

- water use for licensed purposes (see Section 2.4.3);
- water use for non-licensed purposes (see Section 2.4.4); and
- environmental water requirements (see Section 3.4).

2.4.2 Aboriginal Water Needs

Aboriginal water needs span the categories of water needs described above, including the different forms of water demand described in Sections 2.4.3 to 2.4.4.

Aboriginal nations have a deep cultural and spiritual connection with traditional country, including the flora, fauna and other resources it provides. Water is extremely important to the way of life, supporting many different aspects of society and governance. From an Aboriginal perspective, historic and contemporary values and uses are seen as one, they do not need to be separated as they all form part of Aboriginal identity. Aboriginal cultural objectives and outcomes discussed in Section 2.2.2 are founded on Aboriginal cultural values and uses. Aboriginal values and uses in relation to water that have been discussed as part of this Plan's amendment include but are not limited to:

- Economy, trade and travel
- Storytelling and identity
- Healing, health and well-being
- Ceremonies and lore
- Hunting, fishing and collection of bush food, medicine and resources
- Drinking and preparation of food
- Bathing, swimming and other recreational enjoyment
- Supporting flora, fauna and culturally significant species, and the landscape

- Protecting important cultural heritage sites, remains and objects
- Forming relationships and understanding through reconciliation, education and awareness
- Supporting life – water as the lifeblood of the living body that is the landscape

Aboriginal nations call for environmentally sustainable management of their traditional country. Good health of water resources and the landscape as a whole living body has been identified by nations as critically important to achieving their Aboriginal cultural objectives and providing Aboriginal water needs into the future. A decline in the condition of water resources and the water-dependent ecosystems and species of the River Murray prescribed watercourse impacts on many of the values and uses of water of Aboriginal people, and through their connection to Country can also be understood as a threat to Aboriginal people's health and wellbeing.

An important part of Aboriginal water needs is the availability of sufficient water quantity and quality to support Aboriginal values and uses. Through consultation during the amendment of this Plan, Aboriginal nations stated they would like to see the River Murray and its water resources protected and restored to function as it did for previous generations, supporting all aspects of life.

2.4.3 Water Use for Licensed Purposes

2.4.3.1 Public Water Supply Purposes

The provision of water for public supply represents a significant licensed use of water from the River Murray PWC. SA Water can divert an average of 100 GL per year, to provide water to metropolitan Adelaide and associated country areas as part of the Metropolitan Adelaide Consumptive Pool (Class 6). Water is carried via the Swan Reach - Paskeville pipeline, the Mannum – Adelaide pipeline and the Murray Bridge – Onkaparinga pipeline. See Table 4 for more information.

An additional entitlement of 50 GL per annum is held by SA Water to supply urban water to other country towns under the All Purpose Consumptive Pool (Class 2). This is supplied via the Morgan – Whyalla pipeline, the Taillem Bend – Keith pipeline and through direct Riverland town water treatment plants. See Table 4 for more information.

The reservoirs of the Mount Lofty Ranges catchment are the preferred source of water to supply metropolitan Adelaide, however like the River Murray system, annual inflows to the Mount Lofty Storages are highly variable. Annual diversions from the River Murray to supplement the provision of water to Adelaide are also highly variable (between 10 percent and 90 percent). On average over the four years up to 2016-17, 50 percent of South Australia's urban water needs were supplied from the River Murray, ranging from 36 percent when the Mount Lofty Ranges were experiencing wet years to 83.5 percent during dry years (SA Water Annual reports).

Water is provided to SA Water customers across the state for a variety of purposes, such as residential, industrial and commercial use (manufacturers, horticulture, retail sites and offices), and for public or community purposes such as watering parklands, school ovals, open spaces and sporting grounds.

2.4.3.2 Irrigation, Industrial and Recreational Purposes

Irrigation, industrial and recreational water use requires a licence and a water allocation to take water from the River Murray. These uses include intensive animal farming, mining and commercial use. These uses are included in this summary.

As outlined in Section 2.4.1, primary production is the main economic sector along the length of the river, with irrigated horticulture dominating in the Riverland. Communities are heavily reliant on water using industries and the River Murray is critical to the economy of the region.

The amount of water used for irrigation fluctuates depending on the following factors: water availability, market forces, and crop types and areas irrigated. For information on how these allocations have been used recently and in the past, see Section 2.4.5 (Historic Demand) and Section 2.4.6 (Present Demand).

2.4.3.3 Stock and Domestic Purposes

A water licence is required to take water from the River Murray PWC for stock and domestic purposes, except for occupiers of land where the River Murray adjoins or runs through. In the 2019-20 water-use year, a total of 8.3 GL of entitlements were attributable to licensed stock and domestic use.

Stock and domestic purposes includes the watering of stock (not kept through intensive animal farming), and household use including the watering of less than 0.4 of a hectare of land for non-commercial purposes.

2.4.3.4 Environmental Land Management Purposes

The Plan provides for 22,200,000 shares in the All Purpose Consumptive Pool (Class 8), which can be held by owners or occupiers of land within the Lower Murray Reclaimed Irrigation Areas (LMRIA).

Land within the LMRIA is low lying, typically below the level of the River Murray, and is a natural discharge point for saline regional groundwater. Soils are also clay based and prone to cracking. Unlike many other soil types, LMRIA soils require active management in order to maintain their productive capacity, for example by regular irrigation, levelling and drainage.

An Environmental Land Management Allocation (ELMA) is provided to landholders to minimise the effects of cracking and soil salinity on irrigated pasture or on land that has been retired from irrigation within the LMRIA. Since the Millennium drought, it has also become evident that the application of ELMA helps to minimise oxidation of acid sulfate soils during drought when groundwater levels fall. Oxidised acid sulfate soils generate acid drainage upon rehydration which can pose a water quality risk to SA Water offtakes at Mannum, Murray Bridge and Tailem Bend once this water finds its way back to the river through subsurface drains.

For information on environmental land management issues in the LMRIA and how ELMA assists in managing them, see Section 2.5.2.

2.4.3.5 Wetland Purposes

The hydrology of many wetlands along the River Murray was permanently changed in the 1920s and 1930s with the installation of weirs along the river. As a result of the weirs, water levels are no longer as variable and wetlands have gone from being seasonally to permanently inundated. This altered hydrology has changed the dynamics and the ecology of the affected wetlands.

As set out in Section 2.3.7.3, the annual evaporative losses from existing permanent wetlands along the River Murray between the South Australian border and Wellington has been estimated at 200 GL. Two consumptive pools are in place, allowing water access entitlements to be granted for wetlands that can be managed via regulating infrastructure. This Plan provides for 46.1 GL to be allocated to managed wetlands, or wetlands where infrastructure has been installed. This volume is a portion of the 200 GL estimated to be taken by wetlands through evaporative losses. The licensed share may increase over time as more wetlands are fitted with flow control regulators.

The volume attributable to evaporative losses from wetlands with no management infrastructure are not subject to a water allocation or included in a consumptive pool, but are accounted for from the Dilution and Loss Entitlement. Water remains in-river and 'assigned' to those unmanaged sites as it is used each year. This way, the unmanaged use of water by wetlands is still accounted for even though it is not formally allocated on a licence.

2.4.3.6 Environmental Purposes

More water is being provided for the environment through initiatives such as buying back water and projects to achieve water savings, and this water is being allocated through a range of allocation types for environmental purposes. Environmental water is used to enhance river flows and improve the health of wetland and floodplains. This water is in addition to the 200 GL identified for wetlands in Section 2.3.7.3.

The approach taken for allocating water from the River Murray PWC is different to other prescribed water resources, where water is set aside for the environment first and then the remainder is allocated to consumptive uses. In the case of the River Murray, existing users were already heavily reliant on the watercourse when environmental water requirements were quantified. As a result, water is held on licence for the environment, and the unallocated portion of the Entitlement also benefits the environment by remaining in the river. This is in acknowledgement that environmental water requirements cannot be met at the current level of consumptive use.

Water is held on licence for the management of icon sites along the River Murray through The Living Murray program (TLM). TLM arose in recognition that to achieve a healthy, functioning river system, some of the water that was previously taken out for consumptive purposes would need to be returned to the environment. TLM was set up by the Commonwealth and Basin states in 2002 as a long-term river restoration program. The South Australian icon sites are the Chowilla Floodplain; the Lower Lakes, Coorong and Murray Mouth; and the River Murray Channel (Murray-Darling Basin Authority 2011).

Water for TLM was sourced through buybacks from willing sellers, and works and measures have been undertaken to ensure the maximum benefit is achieved from the use of this water. Watering occurs at a number of sites along the River Murray to improve their health, specifically at the Chowilla, and the Lower Lakes, and Coorong and Murray Mouth icon sites. A total of 45 GL⁹ of the Entitlement is held for the environment through TLM.

Allocations are also held by the Commonwealth of Australia and the South Australian Minister for Environment and Water for environmental watering purposes. The delivery of water arising from these allocations is coordinated through state and Basin-wide environmental watering plans. For information about environmental water, see Chapter 3.

2.4.4 Water Use for Non-Licensed Purposes

2.4.4.1 Aboriginal Water Needs

To support a component of Aboriginal water needs, a notice has been published pursuant to section 105 of the Landscape Act, authorising native title holders to take water from a prescribed water resource that is situated on the native title holders land or waters for the purpose of:

personal, domestic, cultural, spiritual or non-commercial communal needs where they are doing so in the exercise or enjoyment of their native title rights and interests, providing that the taking does not involve stopping, impeding or diverting the flow of water for the purpose of collecting the water or diverting the flow of water from a watercourse.

⁹ Of the 45 GL held for TLM, 38.36 GL is held as water access entitlements in Class 7, with the remainder being entitlements held in Class 1 and Class 3a.

Access to and use of water from the River Murray PWC by native title holders does not require a water licence (this also includes native title claimants). This water use has been estimated and forms part of the 6.1 GL included as a volume in the All Purpose Consumptive Pool (Class 1) (see Section 2.3.7.2). The authorisation is limited to native title holders (including native title claimants) accessing water in the exercise or enjoyment of their native title rights and interests (see Section 2 and Figure 2).

Water needs based on Aboriginal values and uses are not restricted to the water authorised to be taken in exercise of native title rights. The provisions in this Plan that aim to maintain water quantity and quality may help to support some other Aboriginal values and uses, particularly in relation to supporting flora, fauna and the landscape (see Table 2). Aboriginal values and uses have not been considered as part of the water licensing process in the River Murray to date, but future demand for Aboriginal water needs are discussed in Section 2.4.7.3.

2.4.4.2 Stock and Domestic Use

Water is taken from the River Murray for non-licensed purposes, including stock and domestic use in limited circumstances. Section 100(5) of the Landscape Act excludes the requirement for a water allocation to take water from a prescribed watercourse where water:

- is taken by the occupier of land from a watercourse that adjoins or runs through the land, and
- is used by the occupier for domestic purposes or for watering stock (other than stock subject to intensive farming).

It is estimated that 6.1 GL is used for non-licensed purposes, and in dry periods this is accounted for in South Australia's CHWN. In a year where the Entitlement is 1,850 GL, this use comes out of the unallocated portion. To account for this volume of water, it has been included as a volume in the All Purpose Consumptive Pool (Class 1) (see Section 2.3.7.2). As a water allocation is not required for this use, a water access entitlement and unit shares are not applicable.

2.4.4.3 Other Non-Licensed Water Needs

Other non-licensed water needs include purposes such as public road making, firefighting, applying chemicals to non-irrigated crops or to control pests, and for artificial water bodies equal to or less than 190 m². These purposes are authorised pursuant to a notice published under section 105 of the Landscape Act and accordingly a water allocation is not required. The volume of water used for these purposes is likely to be small and in some cases variable from year to year. This water use has been estimated to be 0.1 GL per annum and is included as a volume in the All Purpose Consumptive Pool (Class 3 (High Security)) (see Section 2.3.7.2).

2.4.5 Historic Demand

Historic demand within this section is referred to as the use of water for consumptive purposes. Prior to WRPs being developed through the Basin Plan process, consideration of Aboriginal water interests, management and governance in water planning was limited. Aboriginal use of water has historically been recognised through section 105 of the Landscape Act (see Section 2.4.4.1) for non-licensed purposes. Future water needs of South Australian Aboriginal river nations may include licences to take water for commercial purposes and are discussed in Section 2.4.7.3.

Historically, primary production has been the main economy along the length of the river. The nature of crops grown (primarily grapevines, citrus, stone fruit, almonds and vegetables) has led to a high dependence on irrigation. The ability to diversify into dryland farming is difficult in the region due to low rainfall. Value adding industries, such as packing sheds and processing plants, also rely heavily on the regular supply of produce from irrigated sources. Water is therefore a critical factor to maintaining the economies along the river, and this was evidenced during the drought between 2001 and 2010. Re-structuring of irrigation was seen during this period to ensure that production could still occur. Low levels of water flow lead to restrictions on allocations, and the already efficient irrigators in South Australia had to operate with less water. Data shows that as diversions reduced during the drought period, the area of land irrigated also reduced (Adamson, Quiggin & Quiggin 2011). Industries that rely on high security water, such as perennial horticulture and dairy systems, were required to either resort to alternative management options (such as purchasing feed) or changing crops or area irrigated. The return of flows and the easing of restrictions on allocations saw a return to annual cropping.

Across the Basin, water trading facilitated the shift of water towards highest value use such as horticulture and viticulture, allowing these industries to remain in production. Reductions in water use was seen in rice, cotton, pasture and dairy commodities, which resulted in water moving from NSW (primarily the rice growing region) into Victoria and South Australia (CSIRO 2012). While the ability to purchase water allowed production to be maintained, this also increased costs – resulting in higher levels of debt for many growers (MDBA 2010).

Australian Government programs have also had an impact on irrigation in the region, with funding provided to purchase water entitlements from irrigators for the environment. The *Sustainable Rural Water Use and Infrastructure Program* purchased water saved through irrigation infrastructure and efficiency improvements. The *Small Block Irrigators Exit Grant Package* purchased water entitlements from willing sellers, allowing them to leave the irrigation industry. The water buybacks aimed to provide additional lasting water returns for the environment while helping to improve irrigation productivity and efficiency, and to secure a sustainable agricultural industry.

South Australians dependent on the public water supply were also impacted by the dry period. Permanent water conservation measures were introduced in 2003. As drought conditions deteriorated, the level of water restrictions increased with Level 2 restrictions commencing on 23 October 2006 and escalating to Level 3 enhanced water restrictions on 1 January 2007. Level 3 restrictions were not lifted until 1 December 2010 at which time permanent water wise measures became the normal basis for water use from the public water supply. In response to the drought, South Australia invested in many programs to improve water security such as leakage reduction from pipelines and construction of the Adelaide desalination plant. SA Water customer consumption fell during the drought, and has remained at a lower level since 2009-10 (ABS 2011).

At the time of adoption of the first Water Allocation Plan for the River Murray Prescribed Watercourse on 1 July 2002, allocations endorsed on water licences granted under the *Water Resources Act 1997* were in excess of actual demand for water. Table 5 summarises allocations and actual average demands from the River Murray PWC between 1996-97 and 2000-01. The data represents use from prior to the drought and pre the 2002 Plan.

Table 5: Allocations and actual average demands for River Murray PWC water, 1996-97 to 2000-01

Consumptive Pool	Allocation of water endorsed on licences as at October 2001 (expressed as GL available for take and use in a water-use year)	Actual average demand 1996-97 – 2000-01 (expressed as GL taken and used in a water-use year)
Irrigation	503.8	383.5
Lower Murray Reclaimed Areas Irrigation	99.6	99.6
Industrial	3.4	2.4
Stock and Domestic	1.7	2.1
Recreation and Environmental	5.6	3.8
Metropolitan Water Supplies	130.0 (650.0 over a rolling 5-year period)	123.0
Country Town Water Supplies	50.0	36.0
Total	794.1	650.4

On 1 July 2008, 805 GL of water was authorised to be taken as allocations from the River Murray PWC (up from 794.1 GL in 2001). Table 6 indicates allocations and actual demand for water between 2003-04 and 2007-08. Volumes allocated in 2008 differ from 2001 volumes for a number of reasons. New allocations were granted on application for stock, domestic and industrial purposes as there was available water within these classes. Prior to 2009 and the unbundling of water licences, allocations were able to be moved or transferred between classes. Allocations within classes therefore increased or decreased due to legitimate transfers between classes of water. Water entitlements for TLM or entitlements sold to the Commonwealth of Australia are counted as allocations from the original purpose.

Table 6: Allocations and actual average demands for River Murray PWC water, 2003-04 to 2007-08

Purpose	Allocation of water endorsed on licences as at July 2008 (expressed as GL available for take and use in a water-use year)	Actual average demand 2003-04 – 2007-08 (expressed as GL taken and used in a water-use year)
Irrigation	554.0	381.8
Industrial	4.2	2.8
Stock and Domestic	6.8	5.1
Recreation and Environmental	22.9	16.8
Metropolitan Water Supplies	130.0 (650.0 over a rolling 5-year period)	97.0
Country Town Water Supplies	50.0	31.3
Wetlands	15.8	13.3
Environmental Land Management	21.3	21.3
Total	805.0	569.4

* To remove the distortion associated with restrictions on the use of irrigation allocations since 2003-04, figures have been derived by assigning a percentage share of use in 2005-06 (the last year in which 100 percent allocations were issued) to the average demand over the 5-year period.

Table 7 demonstrates five years of actual water use from 2010-11 to 2014-15, compared to the allowable diversions under the Cap, which was in place at the time. Data from prior to 2010-11 is not included, as previous years were impacted by drought and restricted allocations due to continuing low water availability. Data represents use after the drought and unbundling of water licences.

Table 7: The Long-Term Diversion Cap and actual average use of River Murray PWC water, 2010-11 to 2014-15¹⁰

	2010-11		2011-12		2012-13		2013-14		2014-15	
Cap Valley	Cap Target (GL) ¹¹	Actual Use (GL)	Cap Target (GL)	Actual Use (GL)	Cap Target (GL)	Actual Use (GL)	Cap Target (GL)	Actual Use (GL)	Cap Target (GL)	Actual Use (GL)
Metro Adelaide and Associated Country Areas¹²	151.1	56.4	297.7	59.0	328.1	81.7	396.0	42.1	410.7	73.2
Country Town Water Supplies	35.6	34.2	36.0	35.7	39.4	37.4	36.5	35.4	37.0	35.8
Lower Murray Swamps	43.4	13.6	38.7	14.0	45.8	18.0	33.6	15.6	31.4	15.7
All Other Purposes	326.6	257.0	353.5	314.7	402.8	385.0	357.7	349.8	381.2	376.2

Consumptive water use in 2012-13 was higher than previous years due to climatic conditions – several heatwaves were experienced during summer and autumn of that year. As a result, the climate adjusted annual Cap target was higher, and South Australian diversions remained within the Cap target.

Environmental water was provided for the above five years in accordance with Annual Environmental Watering Plans for the South Australian River Murray, through water allocated for TLM, wetlands and to the Commonwealth of Australia.

2.4.6 Present Demand

There is currently 823.9 GL of water held on licence for consumptive purposes associated with irrigation, industrial, commercial, recreational, stock and domestic, and urban and country town water supplies.

A further 45 GL was allocated for environmental purposes through TLM (from several consumptive pools), and 46.1 GL was allocated for wetland water use from Class 9 (now the Wetland Consumptive Pool and Environmental Consumptive Pool). At 28 February 2018, the Commonwealth of Australia held 155 GL of water on licence in South Australia.

Table 8 sets out the actual water use in 2015-16 to 2017-18, compared to the allowable diversions under the Cap, which gives a measure of present demand.

¹⁰ Data is from Cap Register maintained by the MDBA. Data to 2013-14 is available at: <http://www.mdba.gov.au/sites/default/files/attachments/Cap-register-2012-13-and-2013-14.pdf>. Data for 2014-15 is currently in publication.

¹¹ In accordance with the Agreement, an Annual Cap Target is determined each year based on the observed climate conditions, and is adjusted for permanent and temporary trade and for the use of held environmental water. The adjustment for permanent and temporary trade includes trade from interstate and between the Lower Murray Swamps and All Other Purposes Cap valleys.

¹² Annual Cap Target for metropolitan Adelaide is the maximum permitted use of 650 GL minus the total diversion over the previous 4 years.

Table 8: The Long-Term Diversion Cap and actual average use of River Murray PWC water, 2015-16 to 2017-18

	2015-16		2016-17		2017-18	
Cap Valley	Cap Target (GL) ¹³	Actual Use (GL)	Cap Target (GL)	Actual Use (GL)	Cap Target (GL)	Actual Use (GL)
Metro Adelaide and Associated Country Areas¹⁴	409.4	153.3	385.0	34.7	374.4	71.1
Country Town Water Supplies	38.0	36.1	33.0	33.0	38.5	38.4
Lower Murray Swamps	31.7	17.2	26.6	12.8	29.3	15.2
All Other Purposes	421.7	390.8	286.0	345.0	404.4	410.2

Table 7 demonstrates that in the past few years, South Australia's consumptive use has been less than the Cap on diversions.

Table 8 show in 2016-17 and 2017-18 the All Other Purposes Cap Valley actual use exceeded the Cap target however, the available Cap credits were sufficient to balance the exceedance in this Cap valley. Additionally, the total take at a state level is less than that permitted under the Cap.

Water use has increased in recent years and is now tracking very close to, and sometimes has exceeded, the annual Cap target for the relevant Cap valley. Whilst the large volume of Cap credits has been able to balance any overuse, the ability to use credits from underuse in previous years has changed for compliance with the new SDLs (refer to sections 2.3.3 and 2.3.3.1 for further details).

SDL compliance commenced on 1 July 2019 with a cumulative SDL balance equal to zero. From the end of the 2019-20 water year, the cumulative balance will be updated annually. As long as the cumulative balance does not reach a debit of more than 20 per cent of the SDL (around 105 GL), South Australia will be assessed as being compliant with the SDL.

If increased water use leads to the SDL cumulative balance reaching a debit of 20 per cent of the SDL, or there is a high risk that this will occur, then the Minister for Environment and Water will consult with stakeholders and take action, if necessary, to address potential noncompliance (see section 5.3.3 principles 25 and 26 of the this plan). Any actions will seek to minimise adverse impacts for entitlement holders.

Given that water use is tracking closer to that permitted under Cap, it will also be close to that permitted under the new SDLs. Water use from 2019-20 onwards will be measured against SDLs, which will replace the Cap on diversions.

¹³ In accordance with the Agreement, an Annual Cap Target is determined each year based on the observed climate conditions, and is adjusted for permanent and temporary trade and for the use of held environmental water. The adjustment for permanent and temporary trade includes trade from interstate and between the Lower Murray Swamps and All Other Purposes Cap valleys.

¹⁴ Annual Cap Target for metropolitan Adelaide is the maximum permitted use of 650 GL minus the total diversion over the previous 4 years.

2.4.7 Future Demand

The principal factors that are likely to affect future demand for water from the River Murray PWC are:

- changes in crop type and area irrigated
- improvements in water use efficiency
- Aboriginal water needs
- Maturation of water markets and increasing trade of unused allocation
- environmental demands for water, and
- climate change (see Section 2.6).

It is anticipated that over the next five years demand from public water supply customers will be at a growth rate of 1.2 percent per annum. Due to improved water use efficiency, this should equate to a volume of 4.5 GL between 2016 and 2020.

2.4.7.1 Changes in Crop Type and Area Irrigated

It is likely that irrigated areas using water from the River Murray PWC will expand in the future, as global demand for major crop types including vines, citrus, tree crops and vegetables increases. However, as no more water will be granted for consumptive purposes (see Section 2.4.8), any expansion in irrigation area will have to be accommodated through existing allocations, improved water use efficiency, or water transfers.

Demand for high value crops (for example, almonds) has resulted in an increase in plantings. The total area planted to almonds across the southern connected Murray-Darling Basin region was 3,555 hectares in 2000, and is expected to reach around 50,000 hectares. Water demand will increase as these crops reach maturity. Crop types such as cotton, rice and tree nuts are expected to remain in high demand (Marsden Jacob 2018).

2.4.7.2 Improvements in Water Use Efficiency

This Plan requires water use for irrigation to be applied to the land efficiently. While it is recognised that South Australian irrigators are already highly efficient, the policies in Chapter 6 aim to facilitate improvements in current irrigation practices, resulting in more efficient use of water into the future.

Australian Government programs, such as the *On-Farm Irrigation Efficiency Programme*, are funding improvements in irrigation efficiency with water saved through efficiency gains being purchased for return to the environment. The purchase of water entitlements in exchange for funding allows for on-farm improvements such as increased crop water use efficiencies, improved soil management and improved efficiency in irrigation systems.

The Australian Government has committed \$265 million to the *South Australian River Murray Sustainability Program*. This program will result in the purchase of significant water for the environment, and will provide funding for irrigation industry assistance and regional economic development. The purchased water entitlements will come from water saved through business re-structuring and efficiency improvements.

2.4.7.3 Aboriginal Water Needs

First Peoples of the River Murray and Mallee, Peramangk and Ngarrindjeri want a future that maintains the continuation of their culture upon their traditional country, and that continues to give life to their people who live and work in and outside of the region. Water is an important part of this.

Section 2.4.2 outlines values and uses associated with Aboriginal water needs. If these needs (or components of them) are not being met through existing arrangements, then these unmet needs should be given consideration when future amendments are contemplated or required.

The aspirations of Aboriginal nations to re-establish the economic benefits that flow from their traditional country into their communities and institutions have been articulated at workshop discussions in-hand with referencing key documents such as the Ngarrindjeri Yarluwar-Ruwe Plan (2006). Aboriginal nations recognise new industries are here to stay and seek to share the economic benefits from Country.

Opportunities relating to re-establishing economic benefits from Country include:

- Cultural education
- Protected area management
- Ecological restoration
- Natural resources management, including monitoring and research
- Nature-based tourism
- Aquaculture, agriculture and wild produce.

These things arise from the cultural flow of interconnected benefit between the lands, waters, people, spirit and all living things.

2.4.7.4 Maturation of Water Markets and Increasing Trade of Unused Allocation

Water markets have developed across the Murray-Darling Basin system, allowing water to move to its most economically productive uses. The ability to trade water provides flexibility to businesses to respond to factors such as the price of water or commodities. The southern connected Murray-Darling Basin system is the most highly developed water market in Australia.

Historically, South Australian water users used less than their water allocation, with the remainder being left in river, as indicated by water use data set out in Section 2.4.5 and Section 2.4.6. As water markets mature and businesses respond to changing conditions (climate and policy), unused allocations are increasingly likely to be traded.

Water is traded for a variety of reasons, with climatic conditions being the primary driver. Climatic conditions impact on a) the water available for allocation in a particular season; and b) demand for irrigation water. Accordingly, the demand for water (indicated by the price of water) varies depending on whether it is a wet or dry season (Aither 2016).

2.4.7.5 Environmental Demands for Water

Environmental water demands have been a key focus of the Basin Plan, with SDLs proposed that reflect an environmentally sustainable level of water use for consumptive purposes. Meeting the proposed SDLs has required the recovery of water for the environment. The provision of water to meet environmental water demands will contribute to maintaining the quality of water in the River Murray, and the productive capacity of land on which River Murray water is used.

2.4.8 Capacity to Meet Demand

The assessment of the capacity of the River Murray PWC to meet existing and foreseeable future demands for water must take into account the South Australian Entitlement (see Section 2.3.4), the Murray-Darling Basin arrangements (see Section 2.3.1), and SDLs under the Basin Plan (see Section 2.3.3), which place limits on the quantity of water that South Australia can divert from the River Murray for consumptive purposes.

Current use within the River Murray PWC is below that permitted under the SDL:

- The average use rate across entitlements now included in the All Purpose Consumptive Pool between 2011-12 and 2016-17 was 85%, which is 5% below the approximately 90% permitted under the SDL.

A portion of the Entitlement is provided for environmental purposes through the Wetland Consumptive Pool and Environmental Consumptive Pool, TLM and Commonwealth of Australia entitlements. As indicated in Chapter 3, additional water is required to meet many of the environmental water requirements in South Australia, especially those relating to the floodplain and to flow, water levels and water quality in the Coorong, Lower Lakes and Murray Mouth region.

The requirement to operate within SDLs (see Section 2.3.3), means that no additional water will be granted for consumptive purposes. Any future demands for water for consumptive purposes will need to be met by intrastate or interstate transfers.

Schedule D to the Agreement and the Basin Plan Water Trading Rules provide for water rights holders to trade water entitlement and water allocation across state boundaries and among trading zones. This means that South Australian businesses who rely on water from the River Murray can generally secure additional water allocation from other water users in South Australia, New South Wales and Victoria. In future, it is likely that interstate transfers will provide opportunities for new irrigation development in South Australia.

There is a broad range of interstate water products available to South Australian water users, each with different characteristics such as their long-term average reliability. Overall, the estimated annual turnover of this 'southern-connected system' water market was approximately \$1 billion in the 2014-15 water year (ABARES, 2016). This comprised \$300 million in water allocation trade and \$640 million in water entitlement trade. Water transfers into South Australia increase the Entitlement under the Agreement, and increase South Australia's right to divert water for consumptive uses under the former Cap on diversions (being replaced by SDLs).

2.4.8.1 Capacity to Meet Demand in Low Flow Conditions

Extreme dry events that effect the volume of water in the River Murray have the potential to have wide-ranging adverse consequences for the people, ecosystems and economies that rely on the river.

Examples of this were seen during the Millennium drought.

During the period of drought from 2001 to 2010, South Australia experienced nearly a decade of lower than average flows with a number of years providing less than the Entitlement across the border. Under these conditions, the environment suffered with some areas, such as Lake Alexandrina and Lake Albert, at risk of catastrophic harm.

Consumptive use was restricted, which impacted on primary producers and the economy. Irrigation areas were restructured, and some irrigators chose to exit the industry, as facilitated through Australian Government funding. The South Australian Government introduced a *River Murray Water Allocation Framework* on an annual basis, and decisions were made about how to manage the limited flows coming over the border.

These dry conditions also coincided with a period of dry conditions in the Mount Lofty Ranges. Metropolitan Adelaide demand was reduced through a series of water restrictions that had significant implications for commercial, industrial, residential and local government sectors.

This period demonstrated that during low flow periods, the River Murray is unable to meet demand in South Australia. The impact of the drought on the environment, the economy, communities and individuals was extreme.

Since the drought, a number of arrangements have been put in place to assist South Australia in future dry periods. These arrangements include large volumes of water held for the environment by the CEWH and environmental management frameworks; legislated provisions for CHWN; a drought emergency framework for Lakes Alexandrina and Albert; and principles in this Plan for allocating water including during dry conditions, and private carryover allocations (see Sections 5.3.2, 5.3.3, 5.5 and 5.5.2).

In a dry period, water held on licence for both consumptive and environmental purposes is impacted by decisions for managing allocations. As seen during the drought, there was very little water available to deliver for environmental purposes.

Principles guiding the allocation of water, including during dry periods, are detailed in this Plan to provide transparency to water users and to satisfy obligations under the Landscape Act, in particular section 53(1) which states that:

a water allocation plan must, among other things, (d) set out principles associated with the determination of water access entitlements and for the taking and use of water so that – (i) an equitable balance is achieved between environmental, social and economic needs for the water; and (ii) the rate of the taking and use of the water is sustainable.

The framework also considers national commitments through the Water Act and the Agreement.

2.4.9 Impacts of Changing Water Security

The Basin Plan requires the implementation of new SDLs that limit the amount of surface and ground water that can be taken from the Basin for consumptive use. Implementation of the new SDLs for the River Murray requires South Australia to recover 183.8 GL (long-term average annual yield) for the environment by 2019 (Government of South Australia 2013). Over half of this water recovery target has already been met. To recover the remaining water, the Australian Government has committed to purchasing from willing sellers and investing in water efficient infrastructure, as well as environmental works and measures that result in equivalent environmental outcomes with less water.

Research, undertaken during the preparation of the Basin Plan, investigated the socio-economic impacts of introducing SDLs and the reduction of water available for irrigation diversions. The impacts of variable water security were also explored. It was noted that during times of low water security, producers responded by reducing areas of perennial horticulture. The supply of water can also be directly related to the area of land under irrigation – during the drought, the area of land irrigated across the Murray-Darling Basin halved (Adamson, Quiggin & Quiggin 2011). Flexible operations are required for many producers to remain viable.

Impacts of the introduction of SDLs on Aboriginal values requires further exploration. While environmental flows will improve as a result of Basin Plan implementation, the link to Aboriginal water requirements is not well known. There is an opportunity to build on existing knowledge in this area, including ensuring that Aboriginal values are considered in planning for environmental watering, and exploring other ways to meet Aboriginal water needs. For information about how this may be facilitated, see Section 2.2.3.

In addition to SDLs, the policies within this Plan that impact on consumptive users and water security include allocation decisions in periods of low water availability (see Sections 5.3.2, 5.3.3 and 5.5), water trading rules (see Section 7.2), private carryover (see Section 5.5.2) and salinity zoning (see Section 6.3.1). These policies have been reviewed in the preparation of the South Australian River Murray WRP. Some have also been reviewed at a national level, through the implementation of the Basin Plan and national arrangements. For example, the Murray-Darling Basin Ministerial Council requested the development of a new Basin Salinity Management Strategy (the *Basin Salinity Management Strategy 2030* was published by the Murray-Darling Basin Ministerial Council in November 2015). At a broader level, the desalination plant is an asset to South Australia's water security. The Plan reflects how the desalination plant will be used to supplement River Murray water use during dry periods.

2.5 Health and Condition of the System

Freshwater flows down the Murray-Darling system are regarded as the life blood of the living body of the Murray River, Lower Lakes and Coorong to the South Australian Aboriginal river nations. Sufficient water flows into water dependent systems is crucial to bringing life to Country and the wellbeing of Aboriginal people. Aboriginal nations have observed the consequences of river regulation on the breeding cycle, habitat and movements of species such as, kungari (black swan), pondi (Murray cod) and mullowi (mulloway) (DEWNR, 2017). The health of the river system and freshwater flows down the Murray-Darling is also important to the non-Aboriginal community and many stakeholders and organisations. The River Murray has become a highly modified system and there are a number of factors that affect river health.

Those factors that that require careful management are discussed below.

2.5.1 Salinity

Salt is a natural part of the Murray-Darling Basin with more than 100 billion tonnes held within groundwater systems. The River Murray is the natural drainage point for these groundwater systems.

Some salinity in the River Murray is due to natural causes. However, clearing of native vegetation and development of agriculture across the Basin has increased saline groundwater discharge to the River Murray. River regulation and increased water extraction has also changed river flow patterns. This combination of factors has caused salinity levels to increase.

High salinity levels can reduce crop yields, corrode and damage infrastructure, reduce the suitability and palatability of water for human use and intensive livestock production, degrade floodplain and wetland systems and affect recreational, tourism and cultural heritage values.

It is not feasible to completely revegetate the catchment and irrigated agriculture is vitally important to the State's economy, so ongoing management is needed to keep salinity in the River Murray at acceptable levels.

South Australia works with the other Basin jurisdictions to manage salinity under the Basin Salinity Management 2030 Strategy and the Murray-Darling Basin Agreement.

All Basin states must ensure that their overall impact on the river is neutral or positive. Actions which increase salt in the River Murray must be offset with actions that decrease salt.

The need to achieve this balance is reflected in South Australian Government policies and programs that support irrigated agriculture while also minimising and offsetting additional salt entering the River Murray.

Within parts of the Murray-Darling Basin, saline groundwater naturally flows into rivers. Water flowing through the river system and out to sea through the Murray Mouth is the only natural means by which salt can leave the Murray-Darling Basin. This is reflected in the salt export target in the Basin Plan. An open Murray Mouth and adequate flows downstream are vital to ensuring management of salt within the River Murray system.

The River Murray salinity zoning policy helps manage salinity impacts from irrigation development and is a key element of South Australia's salinity management program. The salinity zoning policy is implemented through site use approvals that specify the maximum volume of water that can be applied for irrigation on defined land parcels.

The River Murray salinity zoning principles are detailed in Chapter 6 of this Plan, with an overview map showing the location of the zones (see Figure 7).

2.5.2 Lower Murray Reclaimed Irrigation Areas (LMRIA)

Historically there was approximately 5,200 ha of productive irrigated farm land on the former floodplain of the River Murray in South Australia, between the townships of Mannum and Wellington – this area is known collectively as the Lower Murray Reclaimed Irrigation Area (LMRIA) (see Figure 8, Figure 9 and Figure 10). Most of this land was drained and developed for agriculture between 1880 and 1940, with levee banks constructed along the river's edge to control flooding. Since completion of barrages to prevent seawater ingress at the mouth of the river in 1940, the reclaimed areas have been 1.0–1.5 m below the river level, enabling gravity fed flood irrigation (EPA 2013).

Due to the LMRIA's low lying nature, the area is a natural discharge point for saline groundwater. Drainage and regular irrigation is needed to keep the local watertable below the surface and alleviate salinity issues.

During the drought, low river levels and restricted water allocations resulted in a large portion of the LMRIA not being irrigated for substantial periods of time, causing a drop in the shallow water table of 1.5 m to 3.0 m from pre-drought levels. As a result, the heavy clay soils salinised, dried and cracked, causing significant damage to levees, irrigation bays and associated infrastructure.

When irrigation resumed in 2010-11, acid water was also found within the drainage channels of 13 of the 27 irrigation areas. Investigations by the EPA found sulfidic material in subsoils over approximately 3,300ha of the LMRIA. Upon rehydration of the soils, this stored acidity enters the groundwater and is eventually flushed through drainage channels into the River Murray where it can pose a risk to water quality and environmental values.

To manage the effects of high saline groundwater levels and cracking on irrigated and non-irrigated land within the LMRIA, this Plan establishes a consumptive pool for Environmental Land Management Allocations (ELMA) – the All Purpose Consumptive Pool (Class 8). ELMA is also supported under Schedule E of the Agreement, which provides South Australia with the right to divert 22.2 GL for environmental land management purposes in the LMRIA. This water can also reduce risks associated with acid sulfate soils.

Water entitlements and allocations granted from the All Purpose Consumptive Pool (Class 8) are only available to owners and occupiers of land within the LMRIA, as this water is specifically provided to reduce the risk of oxidising underlying acid sulfate soils and to manage rising saline groundwater and soil movement and cracking. ELMA provides maximum benefit when taken in full each year. Principles and guidelines relating to the management of the LMRIA through ELMA are included at Sections 5.4, 5.5.1 and 6.3.3 of this Plan.

2.5.3 Upper Pike River Anabranh

The Pike River anabranh and floodplain is located within the Riverland region of South Australia and includes the floodplain from Paringa (near Lock 5) downstream to Lyrup village near Berri. It consists of a large anabranh system of approximately 6,700 ha with creeks, islands, billabongs, and other ephemeral floodplain water bodies. The Pike floodplain has been identified as a High Conservation Value Aquatic Ecosystem on a national level due to its unique ecological and hydraulic character and has four species of national significance: the southern bell frog, Murray cod, Malleefowl, and the regent parrot. It also contains an additional 18 species with state conservation significance. While it is highly modified and currently dominated by agricultural land use, irrigated horticulture and cropping and grazing land, the Pike floodplain has been identified as a key priority site for floodplain rehabilitation and protection (SAMDB 2014).

Irrigation development in the upper Pike River was enabled through the construction of Lock 5 in 1927 and the modification of Col Col embankment, which was originally built to provide a watering hole for stock but later expanded to provide water for irrigation extraction. There have been ongoing issues associated with ownership and management of the regulating structures on the upper Pike, water quality in Pike River, and low flows, which became inevitable with increasing irrigation development. In the past these were temporarily resolved with engineering and other measures such as de-snagging, dredging, and changing flow paths to increase flow. Irrigation development has continued to expand in the region, and problems associated with irrigation extraction have recurred.

The Pike River Land Management Group was formed to address concerns over the issues facing the Pike River area, and in partnership with Renmark to the Border Local Action Planning Association (RBLAP) a *Land and Water Management Plan* (LWMP) was developed (Australian Water Environments & Renmark to the Border LAP 2006). The LWMP documented the recurrent problems of the Pike River anabranh and floodplain, and requested assistance from the government to address them. The initial LWMP was developed in the 1990s and updated in 2006.

The three primary issues identified by the local irrigation community in the LWMP were:

- high salt loads in the Pike River anabranh
- poor flow regime through the anabranh, and
- a degraded floodplain.

The Pike Implementation Plan (PIP) was developed in 2010. It outlines the ecological assets of the area and identifies a number of management objectives to improve the health of the Pike River anabranh and floodplain (Department for Water 2010b).

South Australian and Australian Government programs (such as the Riverine Recovery Project) are undertaking significant infrastructure upgrades to introduce additional water into the anabranh complex to reinstate a more natural flow regime, with the aim to maintain or improve the health of sites. While flows will increase into the upper Pike River as a result of these works, it is recognised that the extraction of water for consumptive use has the potential to decrease the intended environmental and water quality benefits associated with the additional water.

Investigations into a sustainable extraction limit in the upper Pike system have indicated that unconstrained extraction is likely to have negative impacts on the ecological assets of the anabranh. As such, to ensure the health of the site is improved and existing users have a secure water supply, an Upper Pike River Extraction Management Zone (UPREMZ), (see Figure 11) has been established. Sections 6.2.2 and 9.2.2 of this Plan contain principles that apply to this management zone. The principles have the effect of limiting extraction from the resource but providing some flexibility for access to new Water Resource Works Approvals in the UPREMZ in recognition of the unique characteristics of the upper Pike River anabranh.

2.5.4 River Level Management

River regulation through the construction of dams and weirs has caused a significant change to the natural hydrology and water level patterns of the River Murray system. South Australian Aboriginal river nations view river regulation as having a detrimental impact on the function, connectivity and life of the River Murray as a living body. An example of this is where some wetlands have become disconnected from the river due to regulation. Aboriginal nations value the wetlands as lungs of the river that cleans the body.

Since regulation, River Murray water levels have been managed to remain at fixed weir pool water levels to ensure navigation, reliability of human water supplies, and access for all water users. Government water reform processes and strategies, including the Basin Plan and *South Australian River Murray Annual Operating Plan*, recognise that continuing to manage for relatively constant levels has detrimental impacts on the ecology of the River Murray system. A range of strategies such as the *SA Weir Pool Manipulation Project* sets environmental objectives which require the introduction of wetting and drying cycles of connected wetlands to improve ecosystem function.

The *2018-19 South Australian Annual Environmental Watering Plan* identifies the value of weir pool water level manipulation and recommends the implementation of small scale weir pool water level raising and lowering events in future. The strategy is implemented through the *South Australian River Murray Annual Operating Plan* which is a high-level document covering River Murray operations, including the delivery of environmental water.

Weir pool water level manipulation events are considered to be beneficial to the ecology of the River Murray. These events will become an important technique to improve floodplain and wetland health and connectivity. Trials will be undertaken through incremental weir pool raising and lowering events to monitor impacts on the riverine environment, and learnings will be incorporated into decisions about the water level operating range in the future. As water level variability trials progress, the impacts on water quality and access will be considered. All water users will be informed of proposed actions prior to implementation.

Chapter 6 of this Plan includes principles that reflect the approach of incremental changes in water levels by maintaining the existing policies that prevent the installation of new pumping infrastructure of any kind on backwaters or anabranches (any branch or body of water extending off of the main river channel), except for the area defined as the UPRMZ. The principles in Chapter 6 will protect existing water users from increasing extractions from a vulnerable source of water (i.e. backwaters), limit the impacts of water level manipulation events, and allow environmental water to be of benefit to floodplain and wetland health. Figure 12 to Figure 18 detail the anabranches and backwaters along the River Murray PWC where these principles apply.

2.6 Climate Change Impacts

The climate of the Murray-Darling Basin is highly variable and is strongly influenced by El Niño and La Niña events. Historically this has produced hot droughts and cooler wet periods.

The policies in this Plan are based on the best available meteorological, hydrological and hydrogeological information. Much of the work to set allocation limits and associated principles in this Plan has been based on historical data on resource availability. The future effects of climate, and hence water availability, may not reflect historical patterns.

Climate change projections developed by the CSIRO and Bureau of Meteorology (Timbal et al., 2015) for the Murray-Darling Basin indicate that:

- average temperatures will continue to increase in all seasons
- more hot days and warm spells are projected
- by late this century, less rainfall is projected during the cool season and rainfall will remain unchanged in the warm season, and
- although mean annual rainfall is projected to decline, heavy rainfall intensity is projected to increase.

The impacts of climate change and the resulting impact on water availability were modelled through a collaboration between the CSIRO and MDBA, as an update to the CSIRO sustainable yields project¹⁵ (Podger et al., 2010). The median projection (i.e. 50% of projections are drier and 50% are wetter) resulted in approximately a 10% reduction in average annual runoff across the basin under the projected 2030 climate, compared to the historical climate. An extreme dry scenario (2nd driest of 45 climate scenarios modelled) resulted in a 30% reduction in average annual runoff across the basin in the projected 2030 climate, compared to the historical climate. Uncertainty about the quantum and timing of climate change and its impact on water availability and demand remains.

Principles have been included (see Sections 5.3.2, 5.3.3 and 5.5) that guide allocation decisions across all water availability scenarios. These principles will assist in responding to changes in climate in a transparent and flexible manner.

Adequate monitoring and evaluation is of primary importance to support an adaptive management approach in the face of climatic uncertainty. Chapter 9 of this Plan sets out the minimum monitoring framework required to assess water demand, trends in water resource behaviour, environmental responses and the capacity of the resource to meet demands. Regular reviews of this Plan will allow for the measurement of the effectiveness of principles and policies so that changes can be incorporated as required.

The Board has published a *Regional Adaptation Plan: A Climate Change Adaptation Plan for the South Australian Murray-Darling Basin (2014)* (the Regional Adaptation Plan). The Regional Adaptation Plan aims to show how the region can limit the negative impacts of climate change and make sure the region adapts sustainably, and continues to be a place where people want to live, visit, invest, and conduct business. The Regional Adaptation Plan identifies areas of decision making that need to consider climate change and priority adaptation options, including options for irrigated horticulture. Periodic review should allow for adaptive management and consideration of new climate information.

2.6.1 South Australian Aboriginal River Nations Position on Climate Change

The Ngarrindjeri Yarluwar-Ruwe Plan (2006) describes how Aboriginal people have long experience with climate change. Their Creation stories tell them of the flooding of their lands and changes to rivers and coast lines. Their Old People have watched the impacts of the degradation of their lands and waters since European occupation. They recognise the impacts of climate change on their lands and waters and all living things. In recent years, Ngarrindjeri have observed changes in their local environment that tells them that climate change is a reality. They see irregular breeding behaviour of birds, turtles and fish, they see the colour of the fish and their behaviour are changing, and the fruiting and flowering of their bush foods are changing. They have also noticed that some of their animal and plant species have declined in size and abundance, and some species have disappeared altogether. Ngarrindjeri have also witnessed coastal camping places and middens being washed away by rising sea levels. When Aboriginal people lose these places, they lose not only part of their cultural heritage, but they also lose an irreplaceable record of their adaptation to climate change in the past.

¹⁵ Climate projections for the year 2030 were derived from 15 Global Circulation Models and three global warming scenarios (0.7, 1.0 and 1.3 °C relative to 1990) which resulted in 45 projections.

Recorded through a climate change workshop at Barmera in 2014 with the First Peoples of the River Murray and Mallee, many of the climate change issues of cultural and community concern are linked to wellbeing. Aboriginal people see their culture as a whole and it is not easy to separate out one topic or consider risks such as climate change in an individual way. Aboriginal people see the connectedness of the system and how impacts arising from one change can affect everything. For example, the impacts of reduced rainfall and river flow affects the type, timing and availability of resources for food collection, while hotter weather restricts cultural practices such as camping and fires, and extreme events such as heat waves may put Aboriginal members of the community more at risk. Collectively these changes impact on cultural wellbeing and ability to maintain kinship with Country.

Aboriginal nations support action to address climate change and are willing to work with all levels of government to reverse damage done by industrialisation and unsustainable practices.

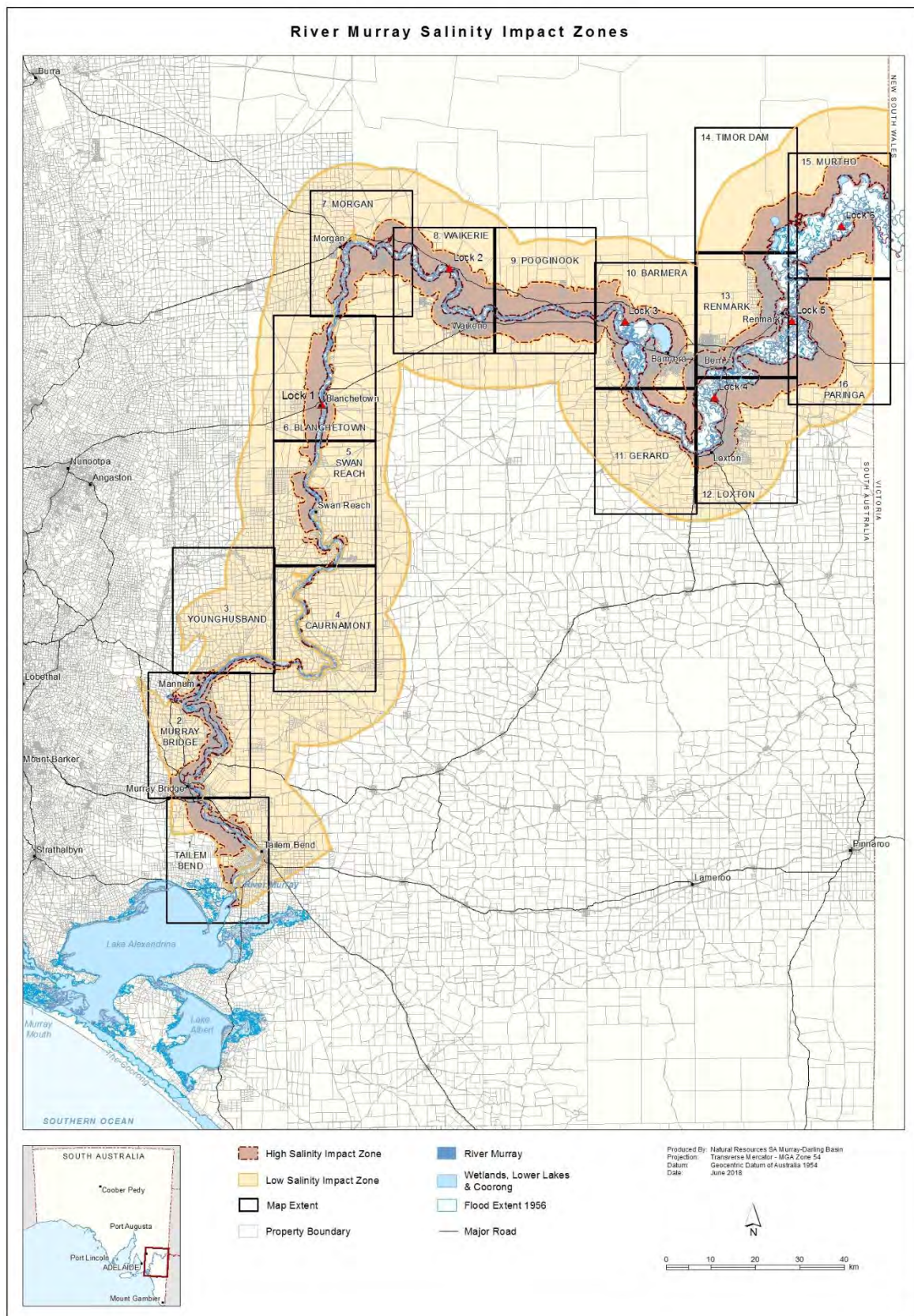


Figure 7: Overview of Salinity Impact Zones

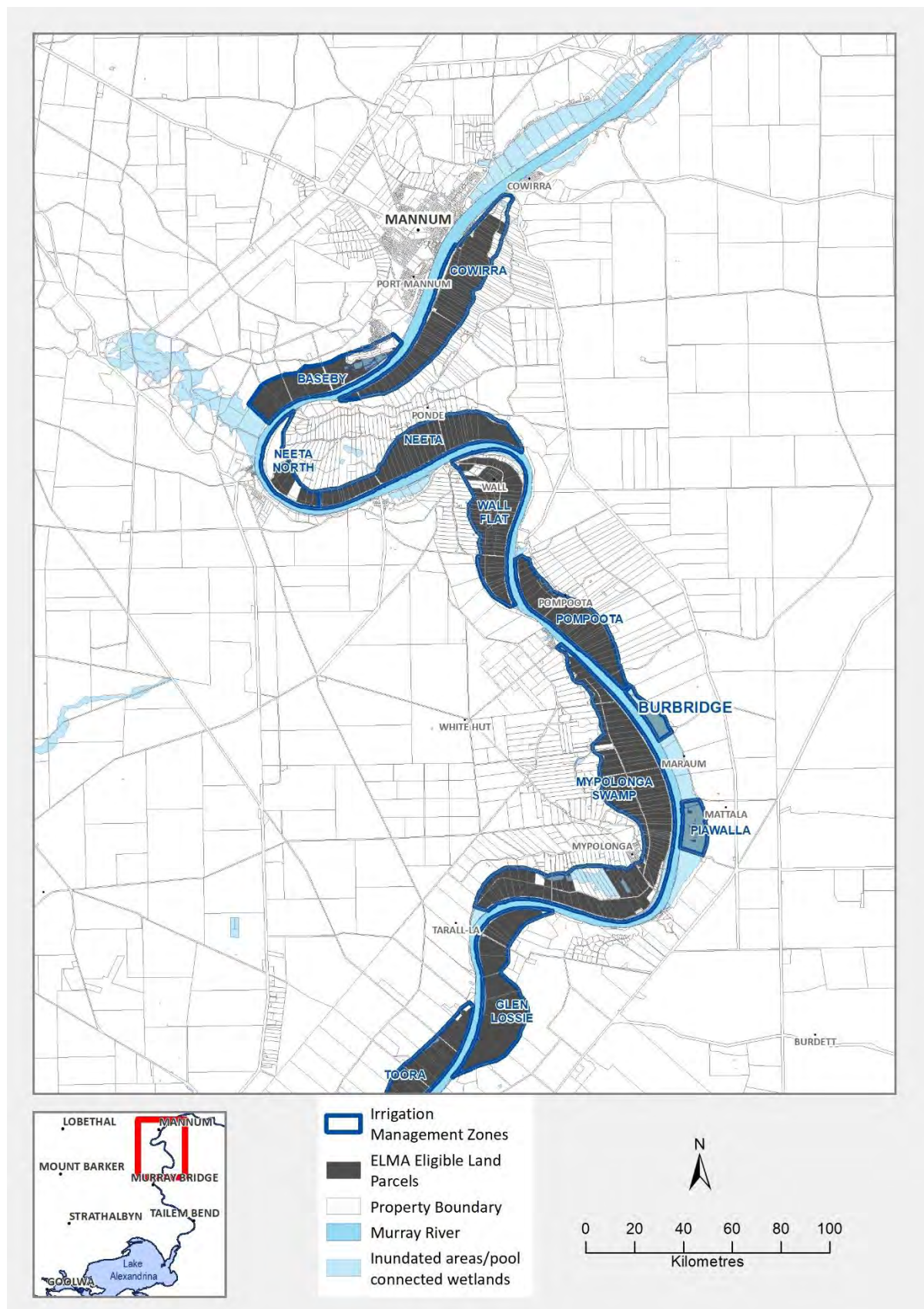


Figure 8: Lower Murray Reclaimed Irrigation Areas Management Zone (i)

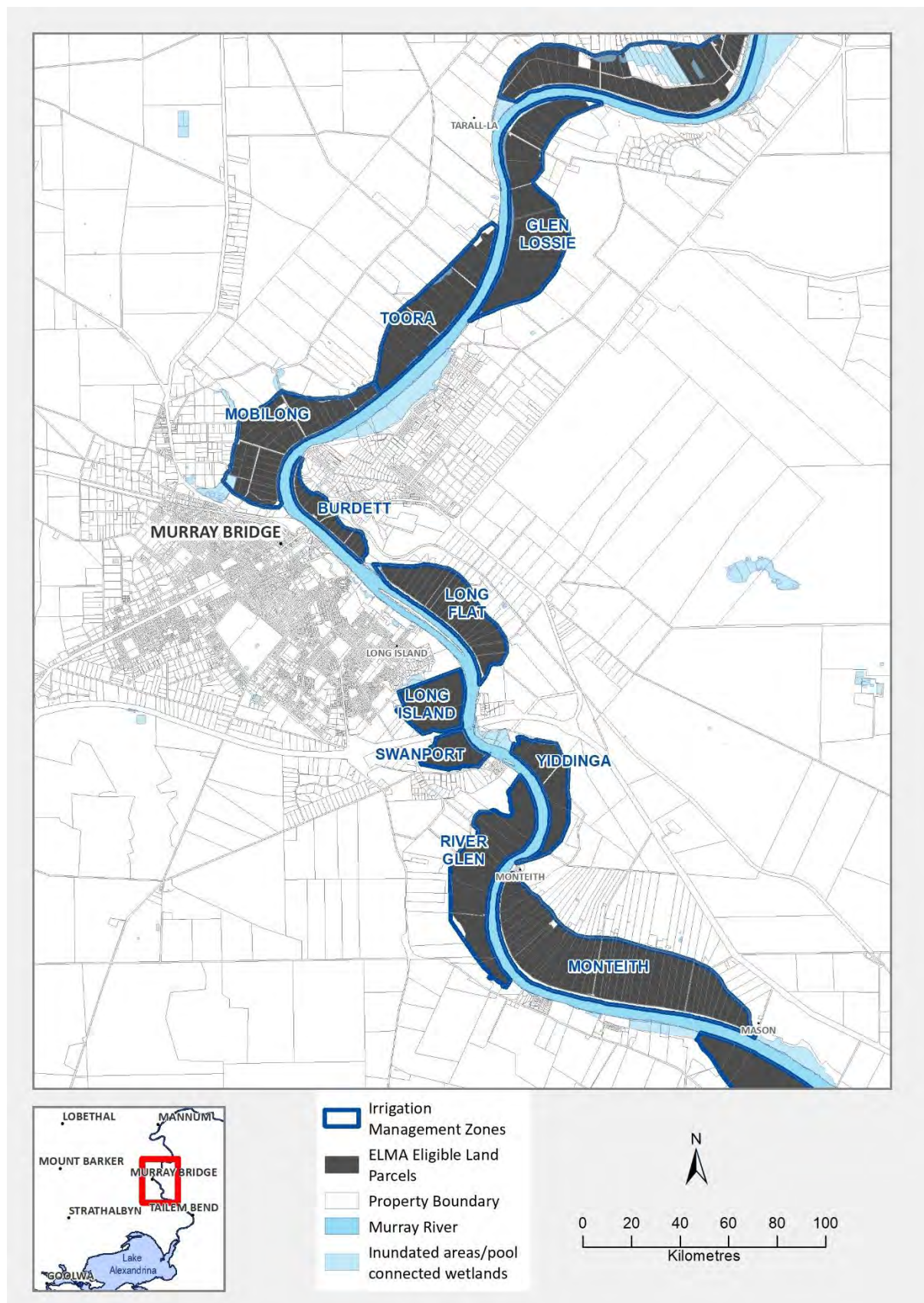


Figure 9: Lower Murray Reclaimed Irrigation Areas Management Zone (ii)

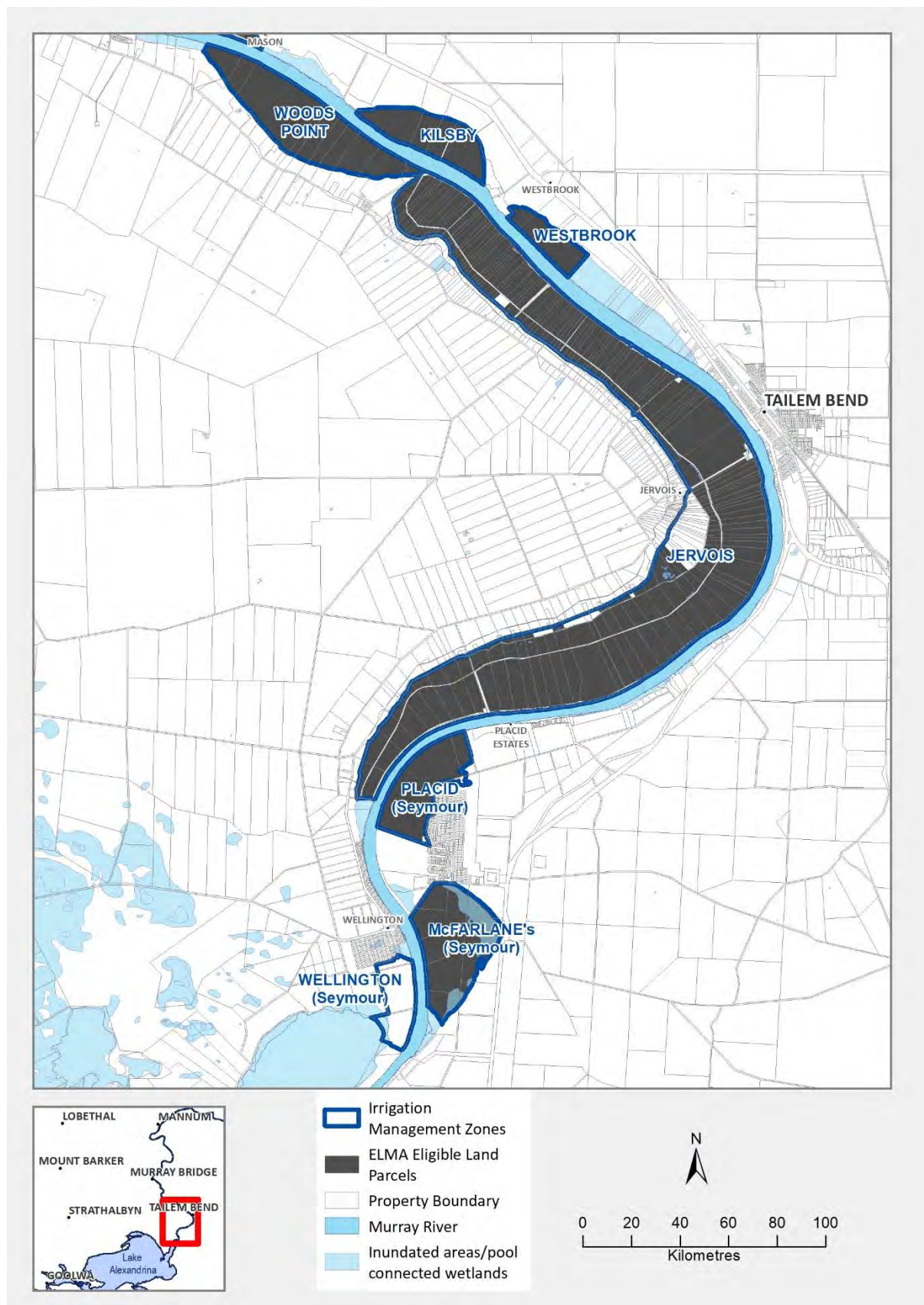


Figure 10: Lower Murray Reclaimed Irrigation Areas Management Zone (iii)

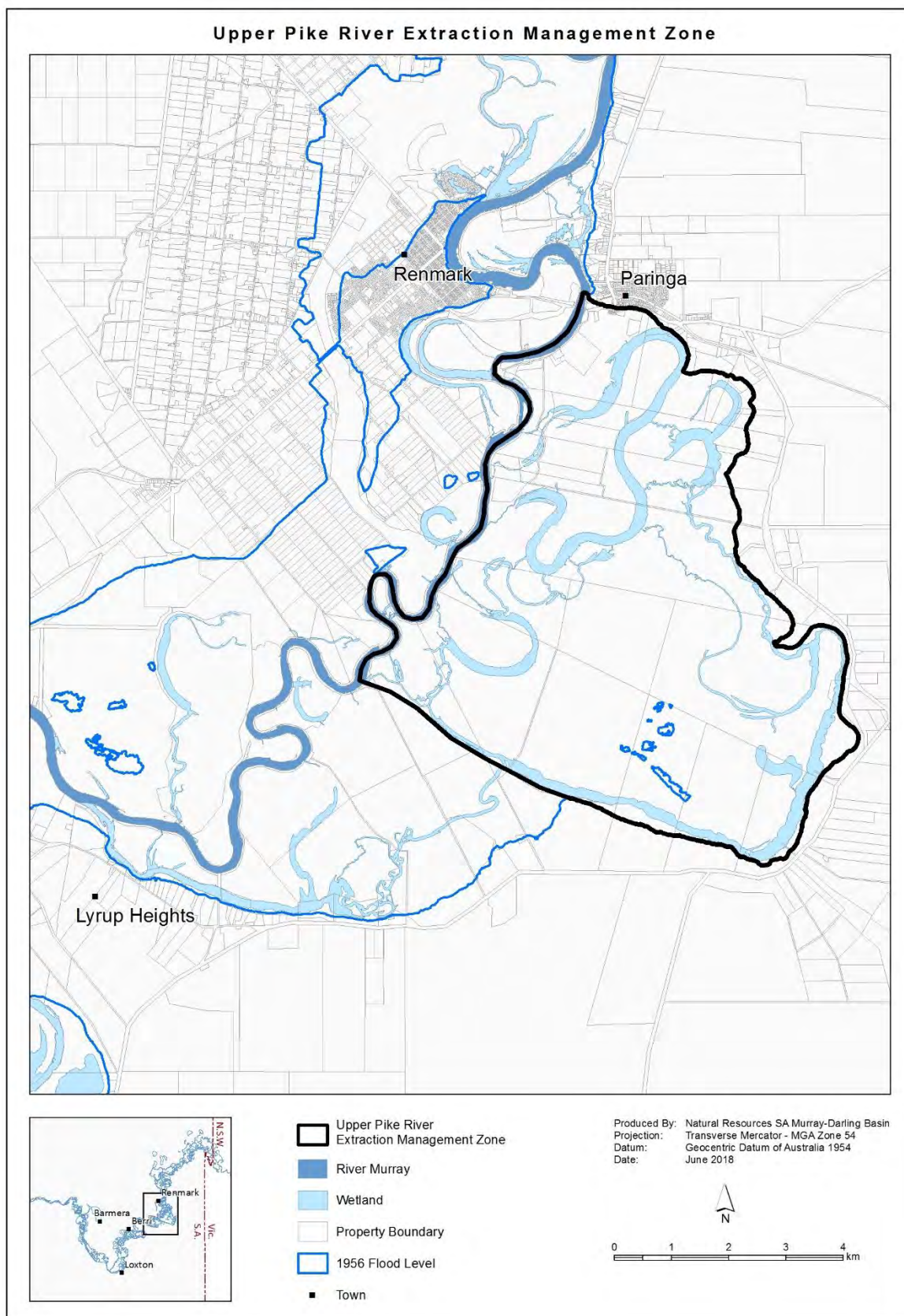


Figure 11: Upper Pike River Extraction Management Zone

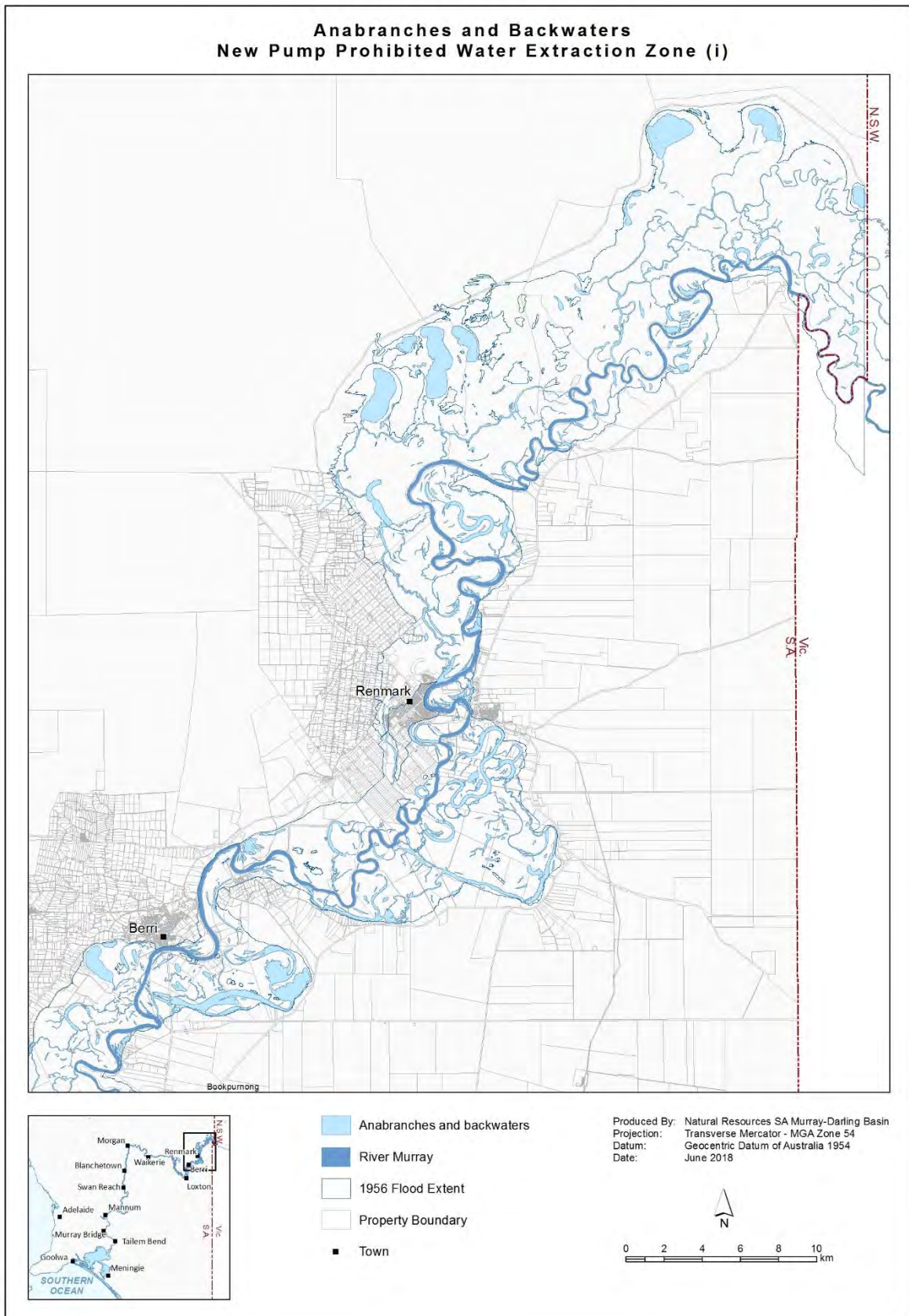


Figure 12: Anabranches and Backwaters – New Pump Prohibited Water Extraction Zone (i)

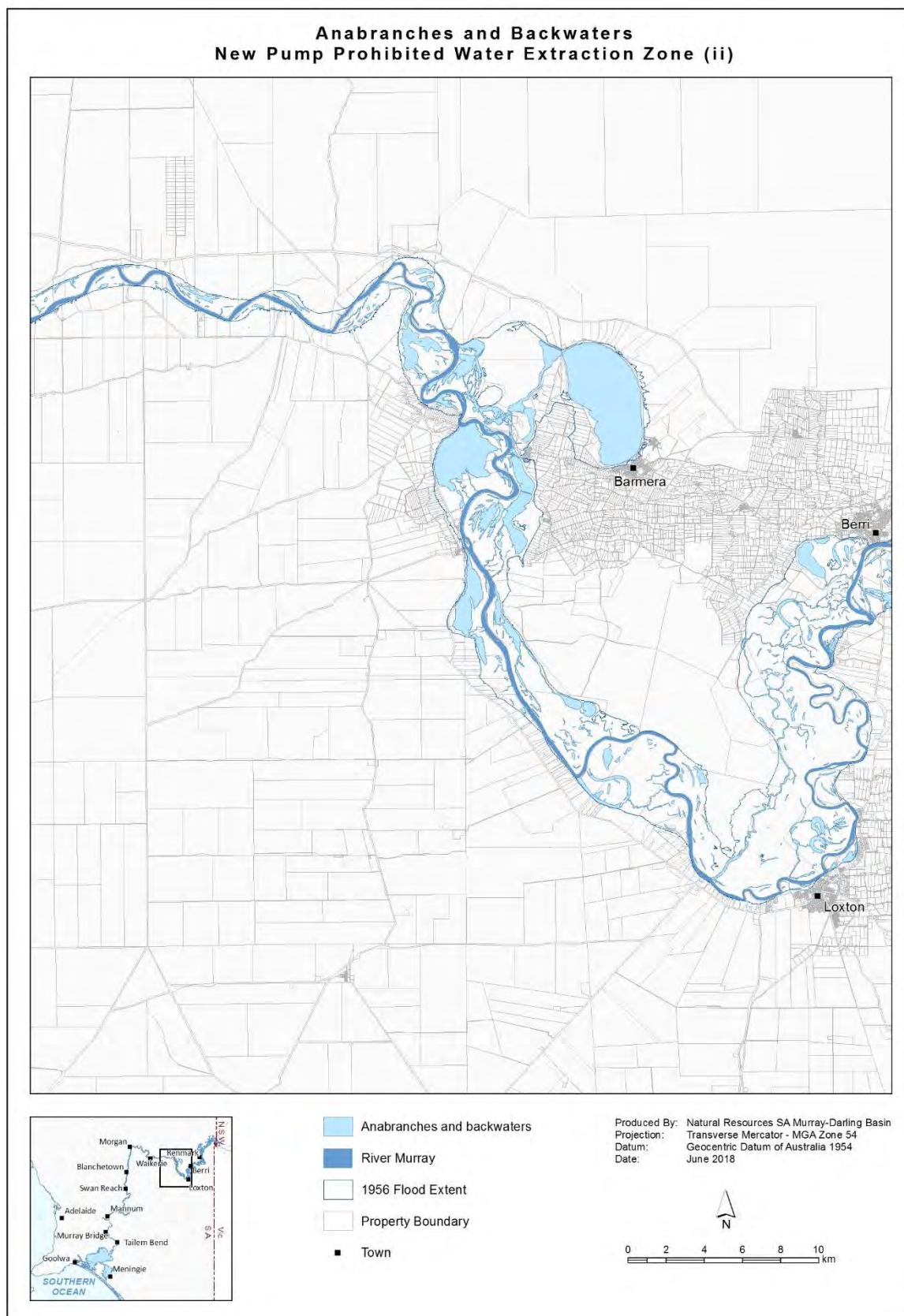
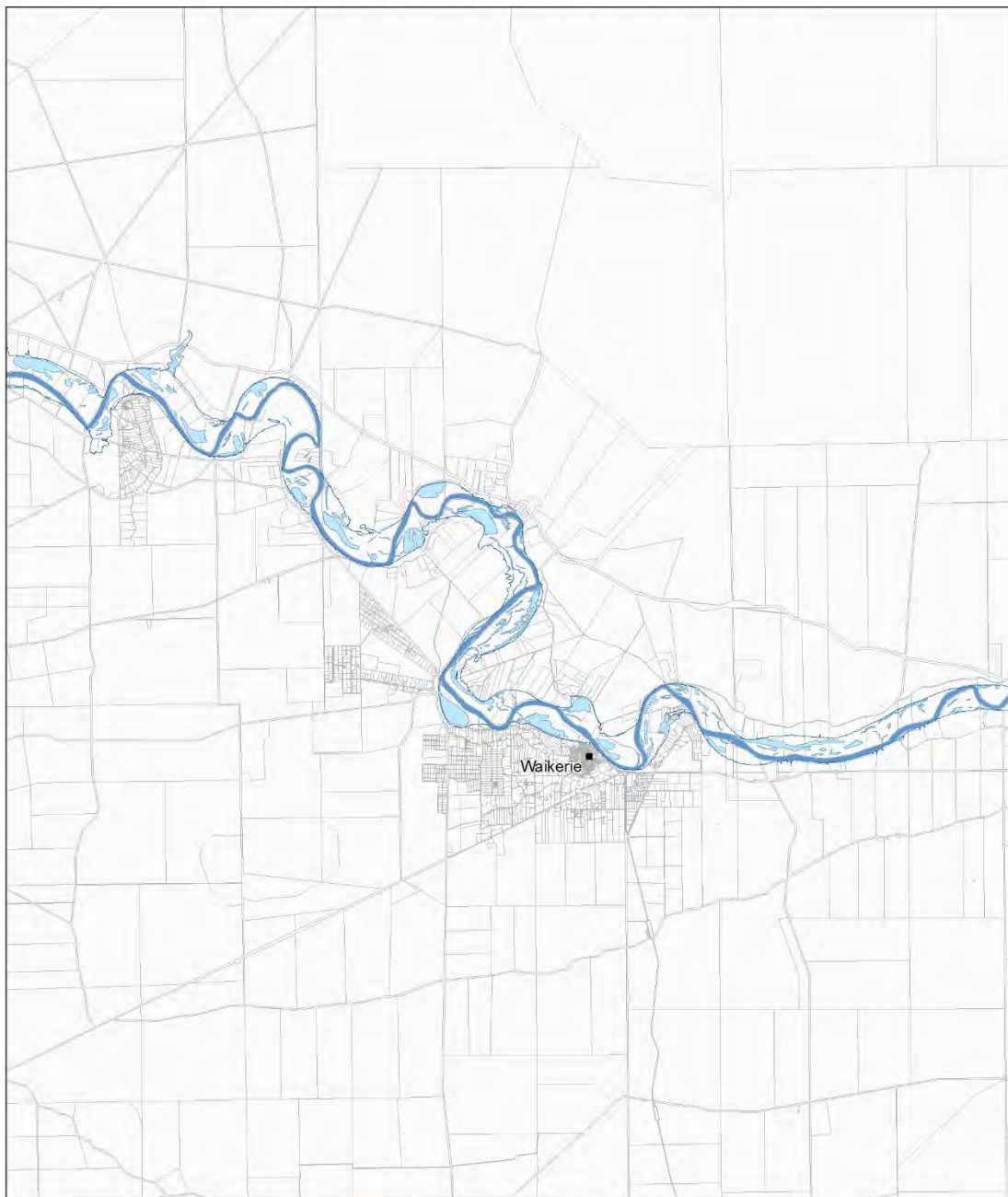


Figure 13: Anabranches and Backwaters – New Pump Prohibited Water Extraction Zone (ii)

**Anabranches and Backwaters
New Pump Prohibited Water Extraction Zone (iii)**



- Anabranches and backwaters
- River Murray
- 1956 Flood Extent
- Property Boundary
- Town

Produced By: Natural Resources SA Murray-Darling Basin
 Projection: Transverse Mercator - MGA Zone 54
 Datum: Geocentric Datum of Australia 1954
 Date: June 2018

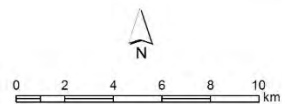


Figure 14: Anabranches and Backwaters – New Pump Prohibited Water Extraction Zone (iii)

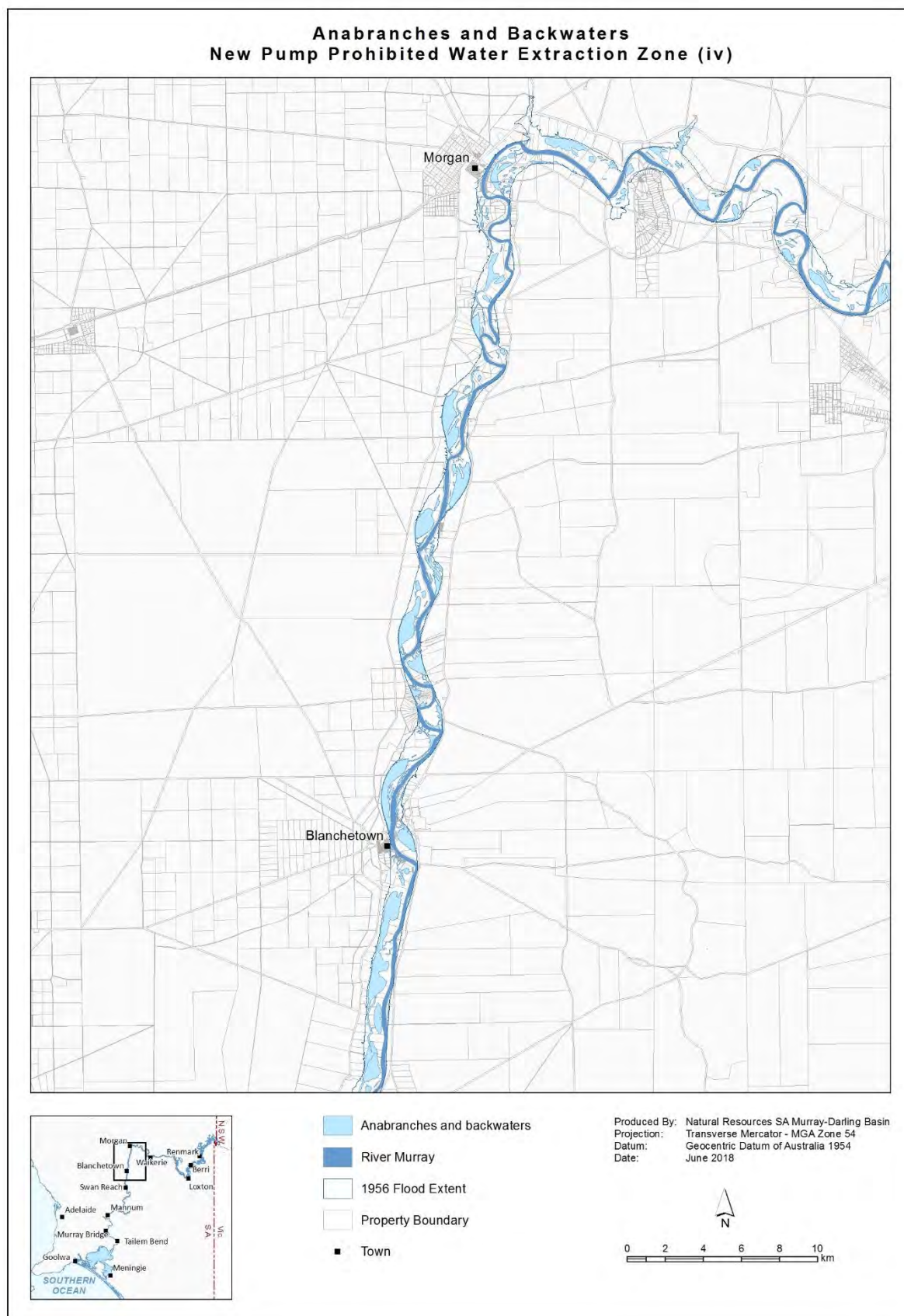


Figure 15: Anabranches and Backwaters – New Pump Prohibited Water Extraction Zone (iv)

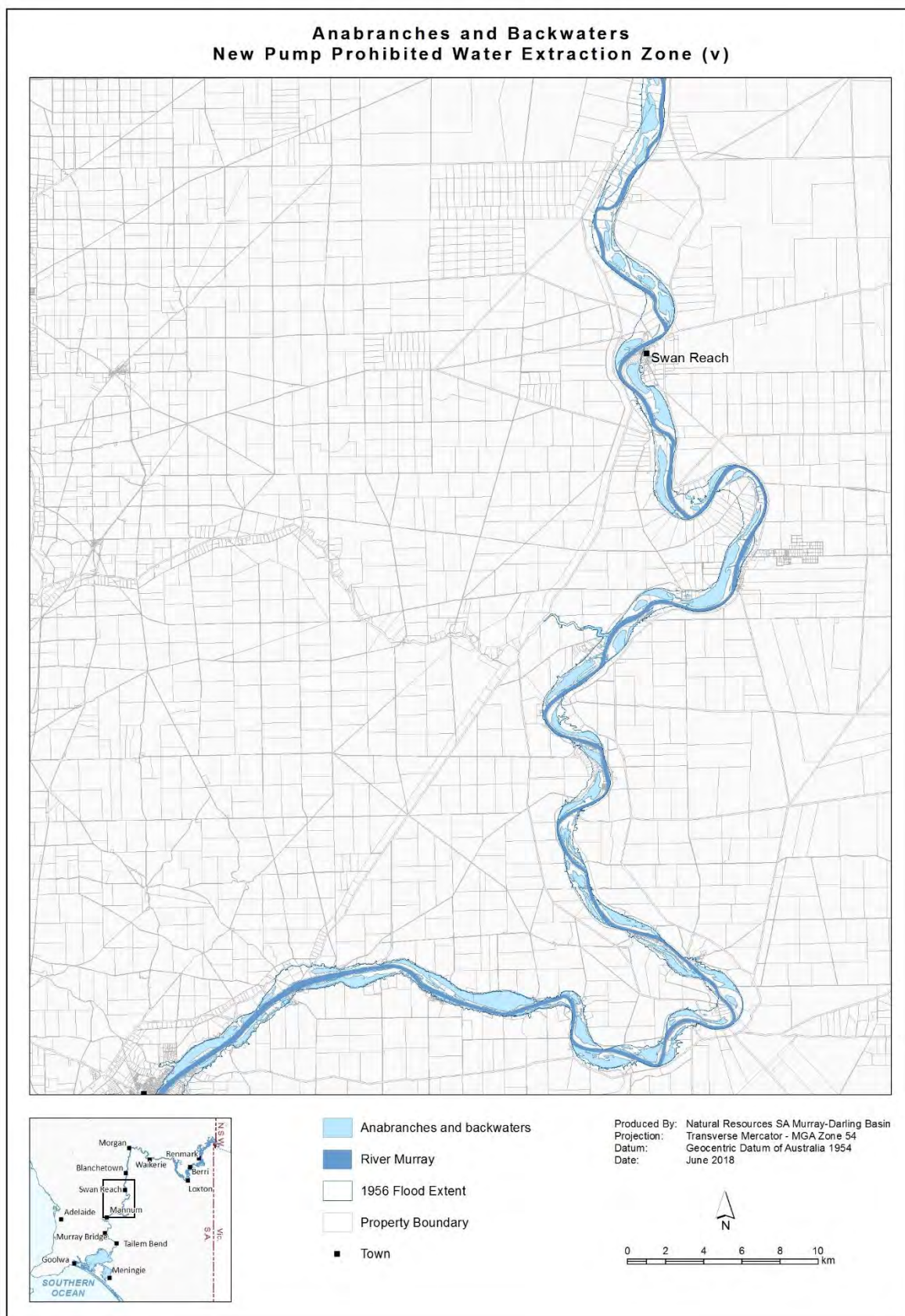
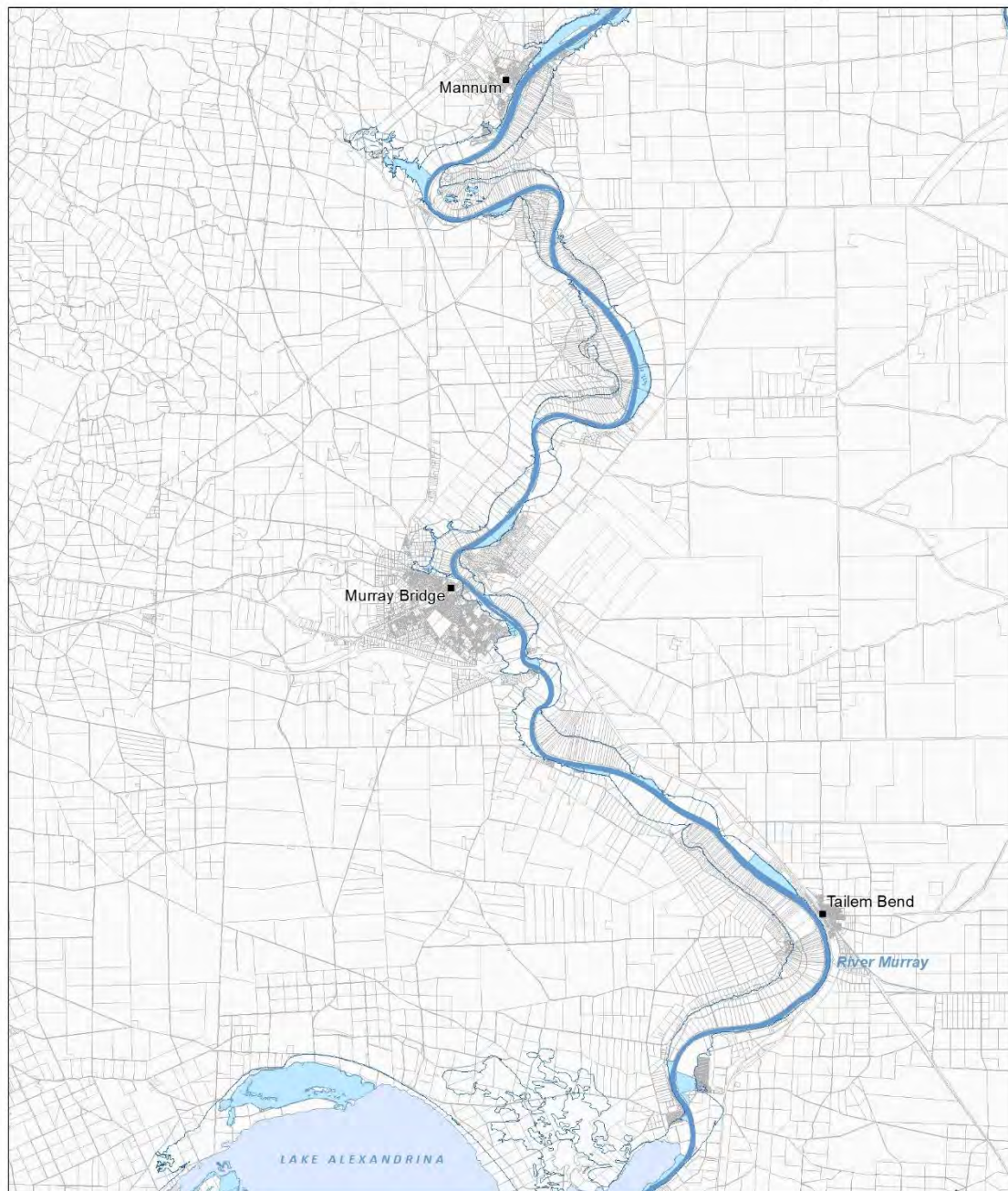


Figure 16: Anabranches and Backwaters – New Pump Prohibited Water Extraction Zone (v)

**Anabranches and Backwaters
New Pump Prohibited Water Extraction Zone (vi)**



- Anabranches and backwaters
- River Murray
- 1956 Flood Extent
- Property Boundary
- Town

Produced By: Natural Resources SA Murray-Darling Basin
 Projection: Transverse Mercator - MGA Zone 54
 Datum: Geocentric Datum of Australia 1954
 Date: June 2018

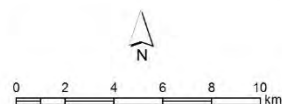


Figure 17: Anabranches and Backwaters – New Pump Prohibited Water Extraction Zone (vi)



Figure 18: Tributary Wetlands of Lake Alexandrina – New Pump Prohibited Water Extraction Zone (vii)

3 NEEDS OF WATER-DEPENDENT ECOSYSTEMS

3.1 Introduction

The Landscape Act requires that a water allocation plan undertakes a range of assessments, including the needs of ecosystems dependent on water from the prescribed resource.

Specifically, section 53 (1)(a)(i) of the Landscape Act states that a water allocation plan must include:

an assessment of the quantity and quality of water needed by the ecosystems that depend on the water resource and the times at which, or the periods during which, those ecosystems will need that water.

Section 53 (1)(b) also requires that a water allocation plan must include:

- i. *an assessment of the capacity of the water resources to meet environmental water requirements;*
- ii. *information about the water that is to be set aside for the environment including, insofar as is reasonable practicable, information about the quantity and quality of that water, the time when that water is expected to be made available, and the type and extent of the ecosystems to which it is to be provided; and*
- iii. *a statement of the environmental outcomes expected to be delivered on account of the provision of environmental water under the plan.*

Chapter 3 addresses the requirements of the Landscape Act by summarising the environmental water requirements (EWRs) for representative water-dependent ecosystems of the River Murray PWC, based on the current level of scientific knowledge and understanding. The chapter will then broadly discuss the capacity of the resource to meet environmental water requirements – the water available to be set aside for environmental outcomes (environmental water provisions (EWPs)) and the extent to which that water is expected to achieve desired outcomes. In addition, the chapter will discuss other water that may be available that is not an environmental water provision, and actions that can be undertaken and supported through principles in the Plan to assist in achieving environmental outcomes.

3.2 Background

The Murray-Darling Basin is one of Australia's most significant cultural, environmental and economic areas. While the Basin has supported regional economic growth through river regulation and irrigated agricultural industry development, this has come at a considerable cost to the environment. The recent extreme drought highlighted the impacts that past water management decisions have had on ecosystem health.

High levels of water allocation and extraction from the rivers, wetlands, and backwaters of the Basin have resulted in widespread environmental decline. Regulation of the system, including maintaining static pool levels and mitigating flow peaks into storages, has also played a significant part in altering the ecology of the Basin. The impact of extractions and regulation are evident across the Basin in the form of salinisation, reduction in tree health and tree death, localised native species decline and loss, acidification of soils, and increased algal blooms. It has also altered ecosystem functions that are important to the Basin and the River Murray, such as fish breeding, bird and bee pollination, riverbank stability, the flushing of salt, and natural filtration by wetlands. In addition, there is a general loss of resistance and resilience of the ecosystem, which can lead to infestations of pest plants and animals and a reduced capacity of the ecosystem to cope with flow variability. All of these ecological components and functions are important to the health of the system and ultimately the long-term viability of the Basin's communities and economy.

The Murray-Darling Basin Cap was introduced to cap surface water diversions by each of the states. The Cap is being replaced by SDLs under the Basin Plan (see Section 2.3.3). However, even with consumptive extractions capped, extraction was at a level that saw the ecological condition continue to decline. The Basin Plan has been introduced to standardise rules between the states and to improve the balance between social, economic and environmental water uses (see Section 2.3.2). Water recovered for the environment, together with operational regimes that promote water level variability, will provide the ability to take a Basin-wide approach to achieving ecological outcomes and improving the health of the system, which will ultimately support communities and productive activity along the river.

The South Australian River Murray WRP area has surface water connection with the Victorian and New South Wales WRP areas. Coordination of environmental watering across the southern connected basin occurs via cross-jurisdictional planning and operational groups convened by the Murray-Darling Basin Authority. All of the environmental water for the South Australian River Murray is delivered via the River Murray channel. This presents a risk for South Australia as flow to the state may be restricted at certain times of the year due to physical and policy constraints. These constraints are identified in Section 4.3 of the *Long Term Environmental Watering Plan for the South Australian River Murray Water Resource Plan Area* (DEWNR, 2015).

The South Australian River Murray WRP area also has surface water connection with the Coorong and Murray Mouth, which is geographically located within the South Australian Murray Region WRP area. As outlined in Section 2.3.2, the Coorong is recognised as a priority environmental asset of both the South Australian River Murray and the South Australian Murray Region WRPs. Due to its intrinsic connection to the River Murray and the Lower Lakes, for the purposes of environmental water planning the environmental water requirements for the Coorong are set out in this Plan as part of the Coorong, Lower Lakes and Murray Mouth asset, defined at Section 3.4.1.3.

The Agreement sets out the flow that must be delivered to South Australia. The Agreement protects the state's Entitlement flow and all water traded to South Australia. It also protects additional water delivered to South Australia including Additional Dilution Flow, the Lindsay River Allowance and access to unregulated flow. This additional water is essential for the achievement of environmental outcomes under the Basin Plan.

The Plan provides the mechanism for the state to put in place policy provisions to protect water-dependent ecosystems by ensuring the security of environmental water and supporting flexible approaches to the use of that water. This will complement the operation of the Basin Plan.

The Aboriginal river nations of South Australia have deep knowledge of the connectivity of water sources on their lands and waters, and the relationship between flow, water dependent ecosystems and sustainable livelihoods that would be a valuable addition to scientific knowledge. Through respectful partnership, Aboriginal cultural knowledge is assisting in addressing knowledge gaps and assessment of the needs of water dependent ecosystems in the region.

Each of the nations, First Peoples of the River Murray and Mallee, Peramangk and Ngarrindjeri, are having input and influence into the development and management of wetlands along the river. A decline in the ecological condition of the water dependent ecosystems of the River Murray is understood as a threat to Aboriginal people's health and wellbeing. In this way, Aboriginal nations support the intent of the Plan to sustainably manage this part of Country.

3.3 South Australia's Environmental Water Planning Framework

The Plan's policies facilitate the provision and use of environmental water by specifying that any water that South Australia receives above that which can be allocated, used or deferred for consumptive purposes under the Agreement is preserved for the purposes of achieving environmental outcomes unless required in emergency circumstances consistent with Part 1 s6 of the Water Act. With the exception of the Commonwealth of Australia, which may use its environmental water holdings in accordance with the Water Act, return flow from environmental water use cannot be used or allocated for other purposes.

A sophisticated planning framework is in place alongside the Plan that identifies environmental watering priorities for the ecosystems of the River Murray. The planning framework guides the delivery of environmental water to water-dependent ecosystems and sets out the expected outcomes from the delivery of the water.

Under the Basin Plan, a *Long-Term Environmental Watering Plan* (LTWP) has been prepared for the South Australian River Murray Water Resource Plan Area (DEWNR 2015; DEW in prep). The LTWP specifies the priority environmental assets and functions and the environmental objectives, targets and EWRs needed for a healthy, functioning ecosystem for those assets over the longer term. It provides direction for the effective and efficient use of environmental water, and will guide decision making and coordination of environmental watering in the future.

Annual environmental watering priorities are also prepared for the South Australian River Murray as a requirement of the Basin Plan. The Department prepares annual environmental watering plans, which consider the priorities for that particular year and how to effectively deliver and use the environmental water available. The priorities are guided by the over-arching objectives, targets and EWRs in the LTWP and take into account previous environmental watering and conditions for the year ahead. All parties who hold South Australian water access entitlements for environmental use are involved in this annual planning process, and consultation occurs prior to finalising the annual plans.

The MDBA coordinates a process to align environmental watering actions each year to maximise outcomes at individual sites and throughout the Basin. South Australia contributes to the coordination of environmental watering with the upstream states by having regard for the following rules:

- Supporting consensus decision making for the coordination of environmental watering planning and delivery within the Murray-Darling Basin
- Facilitating environmental water trade, and
- Cooperating with environmental water holders and managers to maximise the benefit of environmental water delivery.

The information included in this chapter, specifically in Sections 3.8 and 3.9, indicates that at the Entitlement of 1,850 GL, the EWRs in the LTWP cannot be met. The Entitlement does however provide important baseflow to build upon. The sources of water set aside for the environment are set out at Section 3.6 – annual environmental watering plans guide how this water can most effectively be used. This chapter of the Plan details the importance of unregulated flows (see Section 3.6.3) and a coordinated approach to environmental water delivery (see Section 3.9) to supporting healthy ecosystems.

3.4 Environmental Water Requirements Assessment

Water-dependent ecosystems are *those parts of the environment, the species composition and natural ecological processes of which are determined by the permanent or temporary presence of flowing or standing water* (ARMCANZ & ANZECC 1996). Although the various parts of the environment are intrinsically linked, for planning purposes, and as set out in Section 3.4.1, the water-dependent ecosystems of the River Murray are divided into three sections – the floodplain, channel, and the Coorong, Lower Lakes and Murray Mouth.

Water-dependent plants and animals have evolved in response to the water regime that they have been exposed to under natural conditions, and have become dependent on this to support important processes. Changes to environmentally important parts of the flow regime have led to changes in the condition and composition of the dependent ecosystems (Kingsford et al. 2011, Walker et al. 1994).

Prior to extraction and regulation of the Murray-Darling Basin, the water regime of the River Murray was highly variable. The diverse mosaic of habitats, variety of species, and functions of the River Murray are adapted to and require a highly variable water regime. For example, in-channel flow events stimulate large-bodied fish such as golden perch (*Macquaria ambigua ambigua*) to spawn (Zampatti & Leigh 2013), while overbank flows stimulate the germination, growth and survival of long-lived vegetation such as river red gums (*Eucalyptus camaldulensis ssp. camaldulensis*) and black box (*E. largiflorens*) (Roberts & Marsten 2011).

While the river still experiences flooding and drought, under a regulated regime water level variability is highly reduced as weirs and river management create more stable conditions. The lack of river variability has had significant impacts on water-dependent ecosystems (Wallace et al 2014).

EWRs are defined under the Landscape Act as *those water requirements that must be met in order to sustain the ecological values of ecosystems that depend on the water resource, including their processes and biodiversity, at a low level of risk*. The water regime required to meet EWRs includes a range of flow components, from cease to flow events to bank full flows to overbank flows, as well as groundwater inputs (Australian Government 2012).

EWRs can be expressed in terms of magnitude (size), frequency (how often), duration (length required), seasonality (when needed) and maximum time between events. Flow and water levels determine the extent of inundation of communities and habitats and the hydrological connectivity between them. Flow rates (expressed as volume/day) are commonly included in descriptions of the magnitude (e.g. Bloss et al. 2012), generally specified for the purposes of determining how much water is needed to meet the requirements of a portion of water-dependent ecosystems, or for determining what portion of a water-dependent ecosystem's EWRs may be met for a given flow. Flow rates are not included in the description of EWRs unless they are a specific part of the requirements of a component or process (e.g. channel EWRs), or if they represent a suite of inundation and/or water quality outcomes required by the ecosystem components and processes (e.g. Coorong, Lower Lakes and Murray Mouth).

Frequency is expressed as an average recurrence of an event. The actual time between flow events may be longer or shorter than the average frequency. There are maximum times between events that should not be exceeded in order for the component or process to be maintained (e.g. recruitment for species with short life-cycles).

Seasonality is an important part of the flow regime, as many species and processes are responsive to seasonal effects such as temperature and day/night length and will not respond to flow events if they do not occur at the right time of year.

EWRs also include flows that maintain water quality within the requirements of species or communities (e.g. flushing flows that prevent salinisation through evaporation and acidification as a result of acid sulfate soil conditions developing).

3.4.1 Water-Dependent Ecosystems of the South Australian River Murray

For the purposes of determining EWRs of ecosystems that rely on water from the River Murray in South Australia, three priority environmental assets have been identified in the LTWP:

- The South Australian River Murray Floodplain
- The South Australian River Murray Channel, and
- The Coorong, Lower Lakes and Murray Mouth.

A description of each is provided below.

3.4.1.1 The South Australian River Murray Floodplain

The South Australian River Murray Floodplain asset (River Murray floodplain) covers an area of approximately 54,300 hectares and includes the area that is inundated when flows are between 40,000 ML/day and 80,000 ML/day (the area beyond the channel asset that can be managed with environmental water). The floodplain does not contain any areas of permanent water.

The River Murray floodplain intersects two Ramsar-listed Wetlands of International Importance – the Riverland Ramsar Site and Banrock Station Wetland Complex.

The Riverland Ramsar Site extends from Renmark, South Australia, to the New South Wales/Victoria/South Australian border. It covers 30,615 hectares of floodplain area, with 13,250 hectares falling within the River Murray floodplain asset (Newall et al 2009).

The Banrock Station Wetland Complex is located at Kingston-on-Murray in the Riverland region. It covers a total area of 1,375 hectares, with approximately 190 hectares falling within the River Murray floodplain asset (Butcher et al 2009).

The River Murray floodplain comprises a mosaic of water-dependent and terrestrial habitats, including temporary wetlands, river red gum woodlands, black box woodlands, lignum shrublands, terrestrial shrublands and samphire woodlands. The River Murray floodplain supports many water-dependent species including native fish, frogs, waterbirds and macroinvertebrates, including species of conservation significance (Kilsby & Steggles 2015).

The definition of the River Murray floodplain asset is in accordance with the Basin Plan definition, and is based on the feasibility of delivering environmental water. Modelling indicates that 80,000 ML/day QSA (flow at the South Australian border) is the maximum flow rate at which active management of environmental water can occur (DEWNR 2015). The objectives, targets and EWRs in this chapter for the River Murray floodplain relate only to this part of the floodplain.

The whole South Australian River Murray floodplain extends to the 1956 flood level and requires flows greater than 100,000 ML/day QSA to be fully inundated. While the area of floodplain requiring flows above 80,000 ML/day QSA is not recognised as part of the priority asset, it is still an area of high importance to South Australia and supports flora and fauna species with high conservation value. Unregulated flow events are important to inundate this part of the floodplain and maintain connectivity between habitats (DEWNR 2015).

3.4.1.2 The South Australian River Murray Channel

The South Australian River Murray Channel asset (River Murray channel) covers an area of approximately 28,800 ha from Wellington to the South Australian border. The River Murray channel includes the main river channel, permanently inundated wetlands and anabranches, and the area that is inundated at flows of 40,000 ML/day QSA. The River Murray channel is recognised as an icon site under TLM. The River Murray channel supports species of conservation significance, including endangered, vulnerable and rare plant species, and nationally threatened and protected fauna species.

The River Murray Channel asset intersects two Ramsar-listed Wetlands of International Importance – the Riverland Ramsar Site and Banrock Station Wetland Complex, described at Section 3.4.1.1. An area of 3,840 hectares and 190 hectares respectively fall within the River Murray Channel asset.

3.4.1.3 Coorong, Lower Lakes and Murray Mouth

The Coorong, Lower Lakes and Murray Mouth (CLLMM) covers a total approximate area of 142,530 hectares and consists of Lake Alexandrina and Lake Albert, the lower reaches of the Eastern Mount Lofty Ranges tributaries, the Murray Mouth estuary and the Coorong. The CLLMM is recognised as a site of high ecological and cultural value through TLM and as a Wetland of International Importance under the Ramsar Convention.

Flows from upstream pass into Lake Alexandrina and out to the ocean via the Murray Mouth estuary. Freshwater outflows are required to keep the Murray Mouth open. A small channel connects Lake Alexandrina to Lake Albert. Both lakes are large, shallow, permanent lakes surrounded by fringing ephemeral wetlands. The lakes are separated from the Murray Mouth and Coorong via a complex of islands, channels and five barrages. The barrages prevent the ingress of saline water into the lakes and regulate lakes levels.

The Coorong receives inflows at the northern end from Lake Alexandrina and the Southern Ocean, and to the southern end via Salt Creek. Salinities range from fresh to hyper-saline within the site.

The CLLMM is the only estuary of the Murray-Darling Basin and provides a significant habitat for waterbirds, including a number of threatened and endangered species, as well as native fish species and ecologically significant vegetation species and communities.

3.4.2 Overview of EWRs for the River Murray

The natural flow regime of the River Murray was, before regulation, highly variable but showed pronounced seasonal variation. Peak flows in South Australia were usually in spring and early summer, reflecting the travel time for winter/spring run-off and snow-melt in the headwaters of the catchment. In the lower River Murray, *the flow regime has experienced substantial reductions in magnitudes of mean and median annual flows and high-flows, substantial changes in variability and moderate changes in seasonality* (MDBC 2008).

The EWRs set out in this chapter are represented in the respective LTWP for the priority environmental asset. Any revised LTWP will reflect the most up to date knowledge on EWRs of the three River Murray assets and therefor the LTWP takes precedence over this WAP in respect of EWRs.

For the River Murray, priority environmental assets, objectives and targets have been determined and EWRs established as a basis for environmental water planning and delivery to achieve those objectives and targets. The ecological objectives, targets and EWRs are set out in the LTWP and represent what is needed to support each of the priority environmental assets in a healthy, functioning state. The EWRs will be refined over time through adaptive management.

- Ecological objectives – provide a clear statement of what the delivery of the EWRs are intended to achieve. There are a number of objectives for each asset, with each objective focused on a key biotic group or ecological process – interdependencies are also important.
- Ecological targets – are nested within an ecological objective, and there may be more than one target per objective. As much as possible the targets are 'SMART' – specific, measurable, achievable, realistic and time-bound. This provides a means of assessing the change in condition and progress towards achieving the objectives.

3.4.2.1 River Murray Floodplain

The South Australian River Murray floodplain includes the temporary channels, wetlands and shedding floodplain from the South Australian border to Wellington. For the purposes of the LTWP, the river channel and floodplain are distinguished by the area inundated at flow to South Australia of 40,000 ML/day under normal river operations. This is the approximate flow at which overbank flow occurs.

For floodplain habitats, river levels need to rise above normal pool level for the EWRs to be achieved. Flow regime is the critical driver of the floodplain ecosystem. The EWRs are based on best available knowledge, expert opinion and modelling outputs and/or new modelling tools to maximise the likelihood of achieving the ecological objectives and targets outlined in the LTWP.

The EWRs for the River Murray floodplain are described in Table 9.

Table 9: Environmental Water Requirements of the South Australian River Murray Floodplain showing the specified target values for individual metrics (DEW in prep)

	EWR metrics						
EWR #	Target discharge (ML/day QSA)	Duration (days)	Timing (months)	Frequency* (#flows-per-ARI; [% of years]; {#yr in 10-yr})	Critical Maximum Interval^ (years)	Rate of water level rise# (m/day or [ML/day])	Rate of water level fall (m/day or [ML/day])
FP1	≥50,000	≥40	Sep–Dec	1-in-1.67 [60%] {5–7 yr in 10}	4	0.05 [465]	0.025 [232.50]
FP2	≥60,000	≥20	Sep–Dec	1-in-2.25 [45%] {4–5 yr in 10}	5	0.05 [465]	0.025 [232.50]
FP3	≥70,000	≥20	Sep–Dec	1-in-2.86 [35%] {3–4 yr in 10}	5	0.05 [465]	0.025 [232.50]
FP4	≥80,000	≥10	Sep–Dec	1-in-4.0 [25%] {2–3 yr in 10}	5	0.05 [465]	0.025 [232.50]
FP5	≥80,000	≥30	Sep–Dec	1-in-6.67 [15%] {1–2 yr in 10}	8.5	0.05 [465]	0.025 [232.50]

* Frequency is expressed as: 1) number of flows per Average Return Interval (ARI), 2) percentage of years and 3) the number of years that the EWR should occur within a 10-yr period.

^represents the critical maximum interval (years) between EWRs before a significant decline in FP condition is likely to occur. This period should not be exceeded wherever possible.

#rate of rise and fall presented as m/day or ML/day.

3.4.2.2 River Murray Channel

The detailed ecological objectives and targets can be found in the LTWP. The EWRs describe the desired variable flow regime to meet the range of ecological objectives and targets for the River Murray Channel. These River Murray Channel objectives and targets focus on abiotic processes, water quality, biofilms, vegetation, wetlands, groundwater and fish.

The EWRs in Table 10 show the target values for the individual EWR metrics. These target values represent the hydrological conditions required to give the greatest certainty of achieving ecological outcomes along the SA River Murray channel.

Table 10: Environmental Water Requirements of the South Australian River Murray Channel (DEW in prep)

	EWR metrics						
EWR #	Target discharge (ML/day QSA)	Duration (days)	Timing (months)	Frequency* (#flows-per-ARI; [% of years]; {#yr in 10-yr})	Critical Maximum Interval^ (years)	Rate of water level rise# (m/day or [ML/day])	Rate of water level fall (m/day or [ML/day])
EF^^	≥3,000	365	All year	1-in-1 [100%] {10 yr in 10}	0	N/A	N/A
IC1	≥10,000	≥60	Sep–Mar	1-in-1.05 [95%] {9–10 yr in 10}	2	0.05 [465]	0.025 [232.50]
IC2	≥20,000	≥60	Oct–Dec	1-in-1.33 [75%] {6–7 yr in 10}	3	0.05 [465]	0.025 [232.50]
IC3	≥30,000	≥60	Oct–Dec	1-in-1.54 [65%] {5–6 yr in 10}	4	0.05 [465]	0.025 [232.50]
IC4	≥40,000	≥60	Oct–Dec	1-in-2.22 [45%] {4–5 yr in 10}	5	0.05 [465]	0.025 [232.50]

* Frequency is expressed as: 1) number of flows per Average Return Interval (ARI), 2) percentage of years and 3) the number of years that the EWR should occur within a 10-yr period.

^represents the critical maximum interval (years) between EWRs before a significant decline in IC condition is likely to occur. This period should not be exceeded wherever possible.

#rate of rise and fall presented as m/day or ML/day.

^^EF= Entitlement flow

3.4.2.3 Coorong, Lower Lakes and Murray Mouth

EWRs for the Coorong, Lower Lakes and Murray Mouth (CLLMM) region have been defined to maintain the system as a healthy, productive and resilient wetland of international importance (Lester et al. 2011).

Flow-related requirements were identified for a wide range of indicator plants, animals, assemblages and processes, each of which were linked to the ecological outcomes. Implicit within the eight objectives and flow requirements for these indicators is a requirement for the Murray Mouth to remain functionally open so that tidal variations in the Coorong can occur, diadromous fish can move through the Mouth, salt loads can be exported, and other critical processes are supported.

For the ecosystem to function as a whole all ecosystem objectives need to be met. The EWRs are not aligned to individual ecological outcomes but have been grouped to describe the optimal requirements to achieve all the ecological outcomes as described in the SA River Murray LTWP. The flows required to meet these requirements are sufficient to keep the Murray Mouth functionally open. The varying water level regime ensures inundation of the low lying wetlands and connectivity between these and the lakes.

Table 11: Environmental Water Requirements of the Coorong, Lower Lakes and Murray Mouth (CLLMM) showing the specified target values for individual metrics (DEW in prep)

	EWR metrics									
EWR #	Barrage flow (GL/yr)	Total barrage flow over rolling 3-yr period (GL)	Barrage outflow annual pattern^	Frequency [#] (# flows-per-Average Return Interval; [% of years]; {#yr in 10-yr})	Critical Max Interval ^{&} (years)	Lakes water level (m AHD)	Lakes water level peak and/or minimum timing (months)	Coorong South Lagoon peak water level (m AHD)#	Coorong South Lagoon peak water level timing (months)#	Coorong South Lagoon peak water level duration (days)#
CLLMM1	Average annual $\geq 2,000$ with no less than 650 GL in any year	$\geq 6,000^*$	Total volume released in Sep–Dec > Total volume released in Jan–Aug	1-in-1 [100%] {10 yr in 10}	0	0.4 to ≥ 0.75	Peak: Sep–Dec Min: Mar–May	0.0 to 0.2	Sep–Nov	≥ 90
CLLMM2	Total annual $\geq 4,000$	N/A	Total volume released in Sep–Dec > Total volume released in Jan–Aug	1-in-2 [50%] {5 yr in 10}	3	0.5 to ≥ 0.83		0.35 to 0.45	Sep–Dec	≥ 120
CLLMM3	Total Annual $\geq 6,000$	N/A	Total volume released in Sep–Jan > Total volume released in Feb–Aug	1-in-3 [33.3%] {3–4 yr in 10}	5	0.6 to ≥ 0.83		0.35 to 0.45	Sep–Jan	≥ 150
CLLMM4	Total Annual $\geq 10,000$	N/A	Total volume released in Sep–Jan > Total volume released in Feb–Aug	1-in-7 [14%] {1–2 yr in 10}	17	0.6 to ≥ 0.9		0.35 to 0.45	Sep–Feb	> 180

[&]represents the critical maximum interval (years) between EWRs before a significant decline in CLLMM condition is likely to occur. This period should not be exceeded wherever possible.

3.5 Capacity of the Resource to Meet Environmental Water Requirements

Providing water for the environment is a fundamental step in establishing a balance between social, economic and environmental outcomes. The volume of 1,850 GL available under the Entitlement is not adequate to meet any of the EWRs that are outlined in Section 3.4. Provisions for the environment are also limited based on historical allocation. However, the available provisions still play an important role in achieving desired ecological outcomes, especially within the River Murray main channel and pool-connected wetlands.

The Entitlement of 1,850 GL is delivered in a monthly pattern to best suit the peak extraction periods of October to March. Flows vary daily within this delivery pattern, with average flows in December and January being 7,000 ML/day, down to 3,000 ML/day in May and June. This delivery pattern coincides with some ecological timing requirements, but as outlined in Section 3.6, EWRs set aside for the environment are limited. This is due to the requirement to balance environmental, social and economic needs through water sharing arrangements under the Agreement. This highlights the importance of held environmental water (see Section 3.6.2), unregulated flow events (see Section 3.6.3), and achieving more through alternative solutions such as infrastructure, pumping and variable water delivery options (see Section 3.7) to benefit the environment and contribute towards EWRs.

Table 12 provides an example of the contribution that EWRs make towards ecological targets in comparison to the Entitlement (in this case the River Murray channel EWRs). Green shading in the table indicates a large positive contribution to the target is achieved by the specified EWR. Where a target is orange, the EWR is unlikely to provide a detectable contribution.

Under the Entitlement, and IC1 ($\geq 10,000$ ML/day) for the majority of ecological objectives and targets, the contribution is expected to be unlikely or undetectable, as demonstrated by the majority of targets being orange or red. Between 20,000 ML/day and 30,000 ML/day a low to moderate positive contribution towards ecological targets is expected from most EWRs.

The Entitlement by itself does not meet any EWRs other than for abundance of carp and distribution of generalist foraging fish. Entitlement flow does provide a baseflow on which held environmental water, gained from water recovery programs, can be added to achieve the discharge and duration for lower channel and CLLMM EWRs. A much greater volume is needed to meet the majority of EWRs, so environmental water will need to be delivered in conjunction with unregulated flows (DEWNR 2015, DEW in prep). This highlights the importance of unregulated flows and water held by the CEWH and through TLM to South Australia.

Coordination of environmental watering means that increasing the magnitude and/or extending the duration of higher flows can be achieved by 'topping up' unregulated flows (see Section 3.6.3). South Australia's annual environmental watering plans (see Section 3.3) set out how environmental water is proposed to be delivered to meet objectives and targets to ensure efficient and effective use of environmental water.

Table 12: Contributions of In-channel (IC) EWRs towards the ecological targets outlined for the channel in the SA LTWP. Red cells = **Unlikely** to contribute; Orange Cells = **Difficult** to detect contribution; Yellow cells = **Low** contribution; Light Green cells = **Moderate** contribution and Dark Green cells = **High** contribution; (Gehrig et al, 2020).

In-channel Ecological Targets (DEWNR 2015)	EF ≥3,000 ML/day	IC1 ≥ 10,000 ML/day	IC2 ≥20,000 ML/day	IC3 ≥30,000 ML/day	IC4 ≥40,000 ML/day
Open-water productivity shows a temporary shift from near zero or autotrophic dominance (positive Net Daily Metabolism) towards heterotrophy (negative Net Daily Metabolism) when QSA >30,000 ML/day.	U	U	L	M	H
Habitat across the range of velocity classes is present in the lower third of weir pools for at least 60 consecutive days in Sep–Mar, at a maximum interval of 2 years.	U	D	L	M	H
Thermal stratification does not persist for more than 5 days at any time.	L	M	H	H	H
Basin Plan Objective: Salt export, averaged over the preceding 3 years, is ≥2 million tonnes per year.	U	L	M	H	H
Inundation periods in temporary wetlands have unrestricted lateral connectivity between the river and wetlands in >90% of inundation events.	U	L	L	M	H
Biovolume <4 mm ³ /L for all Cyanobacteria, where a known toxin producer is dominant.	L	M	H	H	H
Biovolume <10 mm ³ /L for all Cyanobacteria, where toxins are not present.	L	M	H	H	H
Basin Plan Target: Maintain dissolved oxygen above 50% saturation throughout water column at all times.	L	M	M	H	H
Establish and maintain freshwater lenses in near-bank recharge zones.	U	U	L	M	H
Maintain soil water availability, measured as soil water potential > -1.5 MPa at soil depth 20–50 cm, to sustain recruitment of long-lived vegetation across the elevation gradient in the target zone.	U	U	L	M	H
Reduce soil salinity (measured as EC 1:5) to <5000 µS.cm ⁻¹ to prevent shifts in understorey plant communities to salt-tolerant functional groups across the elevation gradient in the target zone.	U	U	L	M	H
Annual median biofilm composition is not dominated (>80%) by filamentous algae.	U	D	M	M	H
Annual median biofilm C:N ratios are <10:1.	U	D	M	M	H
In standardized transects spanning the elevation gradient in the target zone, 70% of River Red Gums have a Tree Condition Index score ≥ 10.	U	U	L	M	H
A sustainable demographic is established to match the modelled profile for a viable River Red Gum population in existing communities spanning the elevation gradient in the target zone.	U	U	L	M	H
Species from the Plant Functional Group ‘flood-dependent/responsive’ occur in 70% of quadrats spanning the elevation gradient in the target zone at least once every 3 years.	U	U	L	M	H
Native macrophytes from the emergent, amphibious and flood- dependent functional groups occur in 70% of quadrats spanning the elevation gradient in the target zone at least once every 3 years.	U	U	L	M	H
Expected fish species occur in each mesohabitat (channel, anabranch, wetlands) in each weir pool/reach.	U	U	L	M	H

In-channel Ecological Targets (DEWNR 2015)	EF ≥3,000 ML/day	IC1 ≥10,000 ML/day	IC2 ≥20,000 ML/day	IC3 ≥30,000 ML/day	IC4 ≥40,000 ML/day
Population age structure of Murray Cod includes recent recruits, subadults and adults in 9 years in 10.	U	L	M	H	H
Population age structure of Murray Cod indicates a large recruitment event 1 year in 5, demonstrated by a cohort representing >50% of the population.	U	L	M	H	H
Abundance (measured as CPUE) of Murray Cod increases by ≥50% over a 10-year period.	U	L	M	H	H
Population age structure of Golden Perch and Silver Perch includes YOY with sub-adults and adults in 8 years in 10.	U	U	L	M	H
Population age structure of golden perch and Silver Perch indicates a large recruitment event 2 years in 5, demonstrated by separate cohorts representing >30% of the population.	U	U	L	L	M
Abundance (measured as CPUE) of Golden Perch and Silver Perch increases by ≥30% over a 5-year period.	U	U	L	L	M
Population age structure of freshwater catfish includes YOY, with sub-adults and adults in 9 years in 10.	U	U	L	M	H
Population age structure of freshwater catfish indicates a large recruitment event 2 years in 5, demonstrated by separate cohorts representing >30% of the population.	U	U	D	M	H
Abundance (measured as CPUE) of freshwater catfish increases by ≥30% over a 5-year period.	U	U	D	M	H
The length-frequency distributions for foraging generalists include size classes showing annual recruitment.	H	H	M	L	L
The relative abundance and biomass of common carp does not increase in the absence of increases in abundance and biomass of flow-dependent native fish.	H	H	L	H	H

3.6 Environmental Water Provisions

This section includes information about the water that is set aside for the environment by the Plan, and the environmental outcomes that are expected to be delivered by the provision of environmental water under this Plan.

The Landscape Act requires a water allocation plan to achieve an equitable balance between environmental, social and economic needs for the water, and that the rate of the taking and use of the water is sustainable (section 53 (1)(d)(i) and (ii)). For the purposes of this plan, EWPs have been defined as *those parts of environmental water requirements that can be met at any given time. This recognises that providing water to the environment is a part of water allocation and management, and that we must balance social, economic and environmental needs* (ARMCANZ & ANZECC 1996).

The objects of the Landscape Act seek to support and enhance ecologically sustainable development by establishing an integrated scheme to promote the use and management of the natural resources that make up or contribute to our State's landscape in an integrated manner that, among other things¹⁶:

- recognises and protects the intrinsic values of landscapes
- supports the State's primary production and other industries and a sustainable State economy, supports resilient communities and natural and built environments, and supports the interests of Aboriginal peoples promotes, protects and conserves biodiversity, and insofar as is reasonably practicable, supports and encourages the restoration or rehabilitation of ecological systems and processes that have been lost or degraded, and promotes the health of ecosystems so that they are resilient in the face of change.

3.6.1 Overview

The Dilution and Loss Entitlement (696 GL) is essential for meeting conveyance losses between the South Australian border and Wellington, and for providing salinity dilution throughout the River Murray in South Australia. The Consumptive Entitlement (1,154 GL) is divided into water to be taken for consumptive purposes, water specifically for allocation to the environment, and water that remains unallocated. Water for non-consumptive use (including the unallocated portion of the Entitlement) has both an in-channel benefit and benefit to wetlands connected at pool level. Water for the environment, as set out in consumptive pools in this Plan, provides more specific, localised benefits.

Available environmental water can also be defined as 'held' and 'planned' environmental water, where:

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

This Plan provides for both held and planned environmental water. Held environmental water includes the water available via licences in the Wetland Consumptive Pool and the Environmental Consumptive Pool, and a proportion of the water licences held in the All Purpose Consumptive Pool that are specifically used for the environment (see Section 3.6.2).

¹⁶ Paraphrased from section 7(1) of the Landscape Act.

Planned environmental water includes water set aside that is used in unmanaged wetlands. Unregulated flows may be left in the system to contribute to environmental outcomes and provide environmental benefit.

3.6.2 Held Environmental Water

Held environmental water is water that is allocated for the purposes of achieving environmental outcomes. The volume of water held for the environment has increased considerably with the establishment of TLM and the CEWH, and with the purchase or acquisition of water from irrigators as part of Australian Government funded programs. A small amount of environmental water is held by non-government organisations and the Minister.

As detailed in Section 2.4.3.6 of the Plan, TLM was established in 2002 to return water previously taken for consumptive purposes to the environment. Water was sourced through buybacks from willing sellers and is used at icon sites along the River Murray, including Chowilla and the Lower Lakes, Coorong and Murray Mouth. Approximately 45 GL¹⁷ of the Entitlement was held for the environment through TLM in 2013-14.

Pursuant to the Basin Plan, and as detailed in Section 2.3.9, water used for consumptive purposes is being recovered across the Basin for the environment and is managed by the CEWH. The functions of the CEWH are:

to be performed for the purpose of protecting or restoring the environmental assets of the Murray-Darling Basin; and other areas outside the Murray-Darling Basin where the Commonwealth holds water; so as to give effect to relevant international agreements. (Water Act 2007)

In accordance with the Basin Plan:

the CEWH must perform its functions and exercise its powers in a way that is consistent with: a) the environmental watering plan; and b) the Basin-wide environmental watering strategy. (Commonwealth of Australia 2012)

For the River Murray in South Australia, a total of 183.8 GL is required to be recovered for the environment by 2019 under the Basin Plan. A significant portion of this water has already been recovered. As set out in Section 2.3.9, the Commonwealth of Australia holds approximately 155 GL of South Australian water access entitlements (as at 30 April 2018).

Water recovered through TLM and through the Basin Plan can be used within or outside of South Australia, and planning processes by the water holders determine which sites are watered from year to year.

The Minister also holds a small environmental water portfolio for environmental water provision and related purposes. An agreement between the South Australian Government and the Australian Government, regarding the Adelaide desalination plant, establishes an environmental water reserve of 6 GL of permanent entitlement for use at priority sites along the River Murray in South Australia.

¹⁷ Of the 45 GL held for TLM, 38.36 GL arise from water access entitlements in the former Class 7. The remainder of entitlements are held in the former Class 1 and Class 3a.

Held environmental water provides opportunities for managing the River Murray to achieve environmental outcomes and support water-dependent ecosystems. Allocating water for environmental purposes ensures that the volume of water available each year can be managed to achieve desired environmental outcomes described earlier. The Plan will assist in achieving environmental outcomes through principles that facilitate the allocation and required transfer of water, and through ensuring that holders of water for managed wetlands participate in a specified environment improvement program (see Section 3.9). This ensures that a coordinated approach is in place where water is used to achieve ecological outcomes at these sites.

3.6.3 Planned Environmental Water

Planned environmental water is water preserved for environmental outcomes that cannot be used for any other purpose.

As specified in Section 2.3.4, South Australia typically receives volumes of flow each year above the Entitlement, including unregulated flows, water traded to South Australia (including environmental water deliveries), and other dilution flows as determined by the Agreement – such as Additional Dilution Flow (3 GL/day when storage triggers are met in the Menindee Lakes and Hume and Dartmouth Reservoirs) and Lindsay River Dilution Flow (~65 GL/year).

Apart from water traded to South Australia for consumptive purposes, this additional ‘required flow’ remains in the river system for environmental purposes. These flows are critical for meeting environmental watering priorities and objectives in South Australia, especially those relating to the floodplain and flow, water level and water quality in the CLLMM region.

A portion of the Entitlement remains unallocated, in recognition of being required to remain in the river to support dilution, loss and environmental purposes. This volume has environmental benefit to the Lower Lakes (including fringing wetlands) and the main river channel, for example to support ecological processes and provide habitat for aquatic biota, and maintaining suitable water quality.

The Dilution and Loss Entitlement (less the volume made available as water access entitlement shares in the Wetland and Environmental Consumptive Pools, which is considered held environmental water) is also considered to be planned environmental water. This volume includes the volume attributable to unmanaged wetlands. Water for wetlands and the environmental outcomes expected from wetland water is further explained in Section 3.6.4.

An unregulated flow event is defined on the Bureau of Meteorology website as *a river flow that does not result from a controlled release made to service an allocation, or flows declared to be unregulated by the appropriate authority*. Flow to South Australia that is in excess of the state’s monthly Entitlement and that cannot be captured in Lake Victoria is considered to be unregulated flow. It may occur when there is higher than average rainfall in the upper catchment of the Basin. Declaration of an unregulated flow in South Australia is undertaken by the Murray-Darling Basin Authority, according to rules set out in the Agreement. The Plan supports using unregulated flows to achieve a range of environmental objectives, particularly those outcomes that are described earlier in this section.

Flows into the River Murray are also received from the Eastern Mount Lofty Ranges tributaries, some of which flow into Lake Alexandrina. These flows are defined and protected as planned environmental water in the Eastern Mount Lofty Ranges WRP. The volumes of flow vary from year to year (average 78 GL to the Lower Lakes (Alcorn 2010)) and at this scale the contribution to the River Murray is small. These flows are, however, important to the unique range of water-dependent ecosystems and communities in the local area at the interface between the Eastern Mount Lofty Ranges catchments and Lake Alexandrina. Under this Plan, the flows are in addition to Entitlement and not a source of available water for allocation for consumptive purposes. As such, they are also considered planned environmental water for the SA River Murray WRP.

Principles in Chapter 5 ensure that planned environmental water is preserved for the environment, and is not allocated for other purposes (except in emergency circumstances).

3.6.4 Wetlands

The regulation of the River Murray in South Australia through the installation of the weirs in the 1920s and 1930s has resulted in permanent inundation of many wetlands between the South Australian border and Wellington. Since then, water has been used by these wetlands from the river each year. The annual evaporative losses from the wetlands permanently connected at normal pool level have been estimated to be 200 GL.

To improve the ecology of some pool-connected wetland sites, flow-control infrastructure has been installed within the channels that connect the wetlands to the river, to enable them to be temporarily disconnected, drawn-down or dried. Temporary drying allows for the consolidation of the bed and riparian plant establishment, and assists in controlling feral species such as carp. Management of each wetland varies significantly, but every site has a management plan with a proposed hydrograph. These wetlands are referred to as 'managed wetlands'. 'Unmanaged wetlands' are those that do not have flow-control infrastructure installed and remain permanently connected to the river.

As outlined in Section 2.3.7.3, this Plan sets out a consumptive pool for water required for managed wetlands (Wetland Consumptive Pool), and a consumptive pool for the volume of water savings arising from the installation of flow-control infrastructure (Environmental Consumptive Pool). The consumptive pools allow for allocations to be granted and the use to be licensed (defined as held environmental water). The volume attributable to unmanaged wetlands is left in-river and accounted for from the Dilution and Loss Entitlement (defined as planned environmental water).

Where wetland flow-control infrastructure is installed on a site to enable management through wetting and drying, an allocation is required to cover the refill and evaporative losses attributed to the site. The water access entitlements on licence for managed wetlands are provided for on a water licence held by the Minister, and an allocation is provided based on the water available for allocation on an annual basis.

A portion of the shares on licence for managed wetlands have been transferred to the Commonwealth of Australia, where water savings have been achieved via infrastructure works through the RRP. A separate consumptive pool has been established for these shares – the Environmental Consumptive Pool. As the project progresses, the Commonwealth of Australia shares that are held will increase.

The provision of water to managed wetlands through an allocation from the Wetland Consumptive Pool, and the reintroduction of a wetting and drying regime, will increase the distribution and abundance of aquatic plants and animals, and in doing so provide complex habitat for fauna, increasing the abundance of native fauna and promoting ecological processes such as breeding (DEWNR 2012a).

The volume for evaporative losses from unmanaged wetlands remains in-river but 'assigned' or 'planned' as an environmental provision to offset the evaporative losses. This volume is approximately 153.9 GL. The provision of water to unmanaged wetlands provides permanent habitat for fauna (refugia). This volume of water helps to maintain connectivity, support ecological processes and provide habitat for aquatic biota. Water is delivered to these areas through normal river operations.

The total volume of water for wetland management purposes is 200 GL, whether provided for from a consumptive pool or as part of dilution and loss.

3.7 Alternative Practices to Support Dependent Ecosystems

In acknowledgement of the continuing decline of the riverine environment in South Australia, alternate practices have been initiated to improve support for water-dependent ecosystems. Significant effort and funding have been invested into 'doing more with less' through:

- infrastructure, which may be used to inundate large areas of floodplains to the same level as high flow events but at much lower flows
- pumping, which can provide water to disconnected floodplains and wetland areas where a decline in health is evident, allowing the area to survive until the next natural high flow event occurs
- water level variability projects such as flexible management of the weirs to improve bank stability and sedimentation, increase hydraulic complexity and to support riparian vegetation, and
- environmental water deliveries, which can potentially be managed in a way that creates a higher flow peak, extends the duration of a peak, provides additional water level variability, and has benefits to multiple sites as it flows through the system.

The Plan supports these endeavours by providing principles which are flexible for the purpose of achieving environmental outcomes (see Chapters 5 and 6).

Aboriginal nations have been involved in projects and activities that aim to improve the health of the River Murray environment. This has supported environmental outcomes as well as built capacity and employment opportunities within Aboriginal communities.

3.8 Environmental Outcomes Expected from Plan Provisions

It is broadly acknowledged that EWP from the South Australian Entitlement of 1,850 GL cannot keep all of the ecosystems of the River Murray in South Australia in good health. The provisions can help to deliver targeted environmental outcomes at specific locations, and facilitate environmental projects such as TLM. Wetland provisions discussed in Section 3.6.4 provide for the replacement of evaporated water from unmanaged pool-connected wetlands, and allow for the implementation of wetting and drying regimes at those pool-connected wetlands with management infrastructure.

In managed wetlands, the water provided and the regime of water delivery contribute to the recruitment of native vegetation, provision of habitat for fauna, increased abundance of fauna, the promotion of ecological processes such as breeding, and control over populations of pest species. In unmanaged wetlands, the provision of water to wetlands provides permanent refuge for fauna.

The non-consumptive (unassigned) portion of the Entitlement also has in-channel benefits and supports the Lower Lakes, by maintaining water quality and managing salinity levels, thereby supporting native flora and fauna.

Managing sites using the EWPs can have significant localised benefits, including improved riparian vegetation health, consolidation of sediments, and improved site biodiversity.

The EWP set out by the Plan also provide a baseflow, which can be built upon when additional environmental water is available, for example unregulated flows or water delivered through Basin Plan implementation. To meet most EWRs, an unregulated flow event will have to occur, with environmental water used to boost the magnitude or duration of the event (DEWNR 2015; DEW in prep). The environmental water planning framework determines how best to use the available sources of environmental water.

3.9 Achieving Best Ecological Outcomes through Plan Implementation

To maximise the benefits from environmental water, it is important to have a coordinated approach to the delivery and use of the water. The LTWP and the annual prioritisation process required under the Basin Plan provide for this coordinated approach. The South Australian Environmental Water Planning Framework is described in Section 3.3. Sections 135 (4)(b)(ii) and 142 (3)(b)(ii) of the Landscape Act help to facilitate this coordinated approach through provisions that may require a person who has the benefit of a relevant approval (site use or water resource works approval) to participate in a *specified environment improvement program*.

The specified environment improvement program describes participation requirements for site use approval or water resource works approval holders to undertake environmental watering. This includes regular collaboration with DEW staff, participation in DEW annual environmental water planning, meeting legal requirements, and the provision of River Murray Action Request forms and annual summaries of environmental watering undertaken including sites, volumes and outcomes to DEW staff.

The Plan supports a coordinated approach by including linkages to the specified environment improvement program where water is used to achieve ecological outcomes in managed wetlands and specified disposal basins.

4 EFFECTS ON OTHER WATER RESOURCES

Section 53 (9) and (10) of the Landscape Act requires the Plan to include an assessment as to whether the taking or use of water from the River Murray PWC will have a detrimental effect on the quality or quantity of water that is available from any other water resource. This may include water resources in neighbouring prescribed and unprescribed areas. The neighbouring water resource areas are outlined in Figure 19. Water resources from the following areas are considered in this chapter:

- Eastern Mount Lofty Ranges
- Angas Bremer
- Western Mount Lofty Ranges
- Marne River and Saunders Creek
- McLaren Vale
- Tintinara Coonalpyn
- Tatiara
- Mallee
- Peake, Roby and Sherlock
- Clare Valley
- Barossa Valley, and
- Non-Prescribed Resources.

If a detrimental effect is occurring or is likely to occur, then the Plan must take account of the needs of those dependent on the affected resources. The Plan addresses the detrimental effect of taking water from the River Murray PWC on other water resources, users and the environment through principles in the Plan. Where a principle is included to address the detrimental impact on another water resource caused by the taking of water from the River Murray PWC, the detail is set out in this chapter.

South Australian Aboriginal river nations see surface water and groundwater flows as the life blood of the living body of the Country. Maintaining connectivity between parts of the living body is a cultural priority. Connection of surface water and groundwater with neighbouring areas also bring connection of other Aboriginal nations with the river nations across Country. It is the obligation of Aboriginal nations to continue to maintain kinship through the interconnectivity between lands, waters, spirit and all living things.

South Australian Aboriginal river nations are concerned that extraction of water is causing changes to flow paths into and across Country. Aboriginal nations acknowledge the continued importance of the prescribed water areas for the local and regional communities and seek for the underground and surface water sources to be managed respectfully so they continue to sustain Country and future generations.

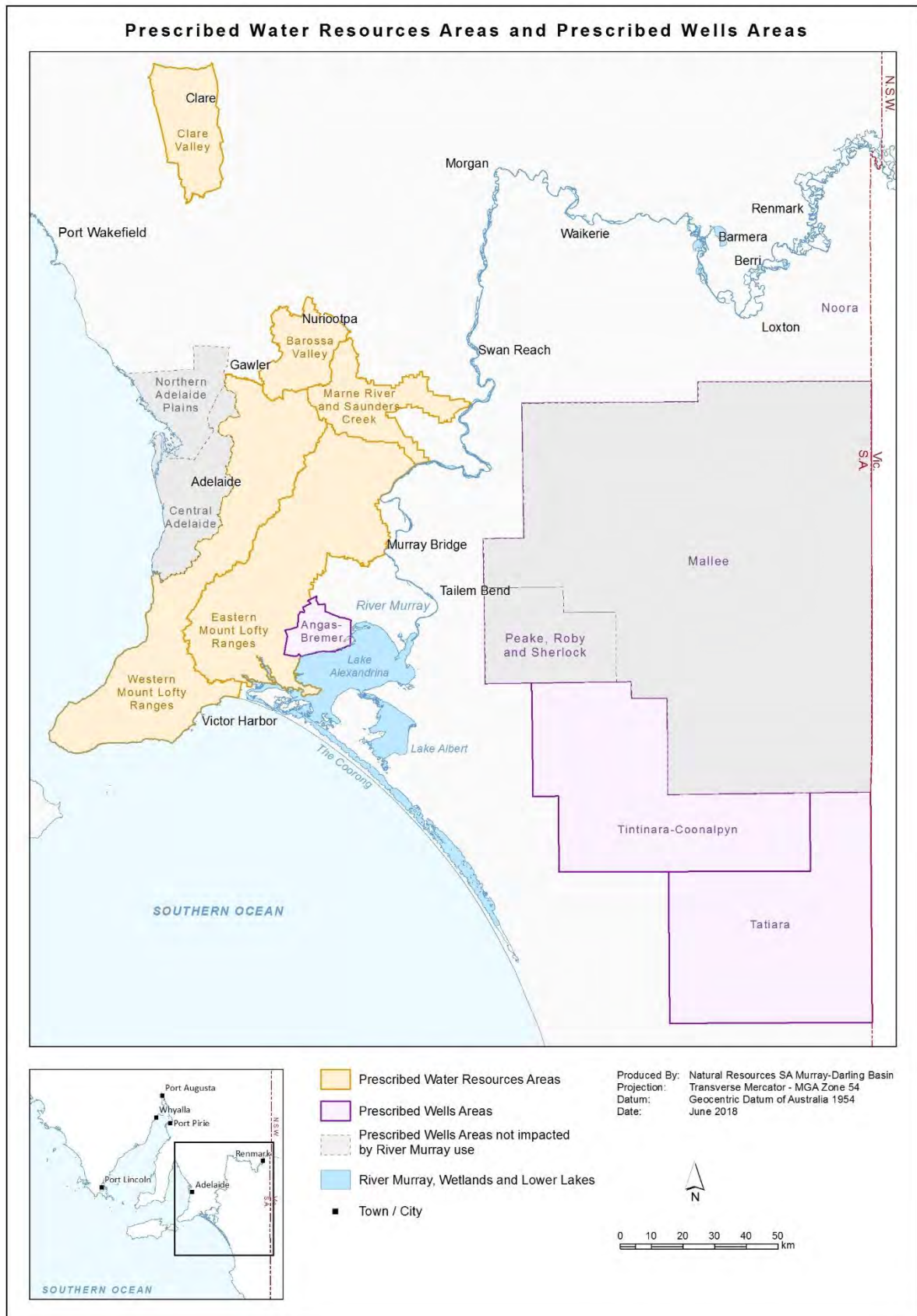


Figure 19: Prescribed water resource area and prescribed wells areas

4.1 Eastern Mount Lofty Ranges Prescribed Water Resources Area

The Eastern Mount Lofty Ranges (EMLR) Prescribed Water Resource Area (PWRA) occupies an area of 2,845 km² and incorporates the eastern slopes of the Mount Lofty Ranges and the Murray Plains, which lie within the Murray-Darling Basin.

The EMLR PWRA incorporates the Angas Bremer Prescribed Wells Area (PWA), which is located on the western side of Lake Alexandrina.

4.1.1 Interconnection with the River Murray PWC

The EMLR PWRA contains sixteen surface water catchments, from which numerous rivers and streams drain into Lake Alexandrina and the River Murray. Of these, the River Murray PWC boundary incorporates the lower reaches of Currency Creek, Tookayerta Creek, and the Rivers Finniss, Angas and Bremer.

Conditions in the River Murray and Lake Alexandrina directly affect water quality, unique habitats, and licensee access to water in the lower reaches of the streams within the EMLR PWRA. Any increased extraction from the lower River Murray could have local impacts on water quality, ecosystems and water access.

The Water Allocation Plan for the Eastern Mount Lofty Ranges (EMLR Plan) includes principles that protect low flows (at or below the threshold flow rate) to provide part of the environmental water requirements in the EMLR. Threshold flow rate principles apply to watercourses in the EMLR catchments, including Finniss and Tookayerta catchments, setting out that flows below the local threshold flow rate cannot be extracted. Extraction limits also apply to catchments, and allocations are not to be granted beyond these limits. These principles aim to protect the environmental assets in this region (South Australian Murray-Darling Basin NRM Board 2013).

River Murray licensees have not been subject to these requirements, and extraction of low flows by River Murray licensees where the prescribed areas adjoin may affect environmental water requirements, and existing water users.

It is important that this Plan includes principles that align with the principles in the EMLR Plan, to address the local issues in the lower River Murray that impact on the EMLR PWRA.

Principle 82 provides that water cannot be extracted from a new extraction point within 100 metres of a tributary wetland of Lake Alexandrina (as delineated in Figure 18). This principle also provides that the capacity of existing pumping infrastructure within this area cannot be modified to increase the maximum flow rate of that infrastructure. This principle aims to limit increased levels of extraction from this location.

Principle 86 is included to ensure that the taking of new or additional water allocations that apply to new or existing River Murray water resource works approvals, where an extraction point is located within the Finniss River or Tookayerta Creek upstream of where Winery Road crosses these watercourses, is aligned with the principles in the EMLR Plan.

It is proposed to review this situation more closely in the next review of the Plan, to ensure that consistent policies are in place for water users on either side of the boundary, with the aim of protecting ecosystems from the impacts of low flows.

4.1.2 Angas Bremer Prescribed Wells Area

There are two aquifers within the Angas Bremer PWA – a shallow, generally saline unconfined aquifer, and a deeper confined limestone aquifer, which is primarily used for irrigation, but also supplies water for stock and domestic use. The taking or use of water from the River Murray PWC can affect both aquifers in two ways.

- Direct application for irrigation – drainage water resulting from such irrigation may enter the shallow unconfined aquifer and potentially result in rising water tables. Water level monitoring has shown no evidence of any widespread or consistent rises in the water table due to irrigation, which is most likely due to the dominant use of highly efficient drip irrigation.
- Managed aquifer recharge (MAR) – River Murray water can be directly recharged into the confined limestone aquifer for later extraction during the irrigation season. The injection of River Murray water will locally increase water levels in the confined aquifer, and computer modelling has shown that in the long-term, groundwater salinities will locally decrease because the salinity of the River Murray water is lower than the native groundwater salinity.

Principles are included in the EMLR Plan (which incorporates the Angas Bremer PWA) to manage issues arising from the use of imported water, including where the use could have a detrimental impact on the productive capacity of the land, or on the condition, biodiversity or extent of water-dependent ecosystems.

Principles 105 to 112 are included in this Plan to address the issue of rising water tables and soil salinisation associated with irrigation in the Angas Bremer Irrigation Management Zone.

4.2 Western Mount Lofty Ranges Prescribed Water Resources Area

The Western Mount Lofty Ranges (WMLR) PWRA covers a total area of approximately 2,750 km², from Gawler in the north, to Middleton, and across to Cape Jervis on the south coast.

4.2.1 Interconnection with the River Murray PWC

There is no direct hydrological connection between the water resources in the WMLR PWRA and the River Murray PWC, therefore there will be no impacts from the taking or use of water from the River Murray PWC. However, water from the River Murray is used to provide water supplies for metropolitan Adelaide – pipelines discharge River Murray water directly into the rivers of the WMLR PWRA (SA Water 2012).

On average over the last four years up to 2016-17, the reservoir catchments in the WMLR PWRA provided 32 percent of metropolitan Adelaide's mains water supply. Depending on storage levels in SA Water reservoirs in the WMLR PWRA, the proportion of water taken each year from the River Murray varies from 10 percent to 90 percent. Accordingly, any reduction of inflows to reservoirs in the WMLR PWRA could increase reliance on the River Murray (noting that SA Water operates under Cap arrangements, which limits the volume of water that can be taken from the river. See Section 2.3.3).

In 2009, the South Australian Government released *Water for Good: A plan to ensure our water future to 2050*, which encourages the diversification of water supplies to reduce reliance on the River Murray and other rain-dependent water sources. To address the potential reduction of inflows to these reservoirs, and to limit demand on the River Murray, no new surface water or watercourse water will be made available for allocation, dam development or commercial forestry upstream of the reservoirs (Adelaide and Mount Lofty Ranges Natural Resources Management Board 2010).

4.3 Marne Saunders Prescribed Water Resources Area

The Marne Saunders PWRA is located approximately 70 km north-east of Adelaide, in the Eastern Mount Lofty Ranges. The Marne Saunders PWRA includes the townships of Springton, Eden Valley, Keyneton and Cambrai.

The Marne Saunders PWRA encompasses the catchments of the Marne River, including the North Rhine and Saunders Creek, and includes the underground water within these catchments. These water resources are used for a range of purposes including stock and domestic, irrigation, industrial, and recreational uses.

4.3.1 Interconnection with the River Murray PWC

The Marne River and Saunders Creek discharge to the River Murray. However, much of the flow generated in the hills zone is naturally lost from the watercourse on the plains zone as recharge to the underlying aquifers. Significant floods are required for flow to traverse the plains zones.

The primary direction of flow of underground water in the Murray Group Limestone aquifer is toward the east, where discharge occurs to the River Murray. Underground water extractions have minimal or no impact on the River Murray, as most of these are located more than 15 km west of the river (South Australian Murray-Darling Basin NRM Board 2010).

Due to the direction of surface water flow from the Marne Saunders PWRA towards the River Murray, it is not expected that the taking of water from the River Murray PWC will impact on water users in this area.

4.4 McLaren Vale Prescribed Wells Area

The McLaren Vale PWA covers an area of approximately 320 km². It is bound to the north by the Onkaparinga River, to the west by St Vincent Gulf and to the south-east by the Mount Lofty Ranges (Adelaide and Mount Lofty Ranges NRM Board 2007, Department for Water 2012).

4.4.1 Interconnection with the River Murray PWC

There is no direct hydrological connection between the water resources in the McLaren Vale PWA and the River Murray PWC. There will be no detrimental impacts on water users in the McLaren Vale PWA as a result of the taking or use of water from the River Murray PWC.

4.5 Tintinara Coonalpyn Prescribed Wells Area

The Tintinara-Coonalpyn PWA is located in the Upper South East of South Australia and covers an area of 3,423 km². Groundwater is used for irrigation as well as stock and domestic purposes (South East Natural Resources Management Board 2011).

4.5.1 Interconnection with the River Murray PWC

There is no direct hydrological connection between the water resources in the Tintinara-Coonalpyn PWA and the River Murray PWC. There will be no detrimental impacts on water users in this PWA as a result of the taking or use of water from the River Murray PWC. The River Murray provides water for the Taillem Bend to Keith pipeline, which provides reticulated supplies for the townships of Tintinara and Coonalpyn and also stock and domestic supplies for a large number of rural properties.

4.6 Tatiara Prescribed Wells Area

The Tatiara PWA is located in the Upper South East of South Australia and covers an area of 3,500 km². Groundwater is used for irrigation, stock and domestic purposes and the water supply for the township of Bordertown (South East Natural Resources Management Board 2012).

4.6.1 Interconnection with the River Murray PWC

There is no direct hydrological connection between the water resources in the Tatiara PWA and the River Murray PWC. There will be no detrimental impacts on water users in this PWA as a result of the taking or use of water from the River Murray PWC. The River Murray provides water for the Taillem Bend to Keith pipeline which provides reticulated supplies for the township of Keith and also stock and domestic supplies for a large number of rural properties.

4.7 Mallee Prescribed Wells Area

The Mallee PWA is located south and east of the River Murray PWC, within the South Australian Murray-Darling Basin. It encompasses the townships of Alawoona, Wanbi, Mindarie, Karoonda, Geranium, Parrakie, Lamerloo, Parilla, Pinnaroo, Peebinga and Paruna. Underground water is extracted from the Mallee PWA for the purposes of irrigation, stock and domestic, mining, intensive farming and industry.

4.7.1 Interconnection with the River Murray PWC

The Mallee PWA includes the Pliocene Sands aquifer (Parilla Sands), overlying a Tertiary Limestone aquifer (Murray Group Limestone), in turn overlying a Tertiary Confined Sand aquifer (Renmark Group). These aquifers extend to the River Murray PWC. Water within these aquifers follows the very gradual watertable gradient of the Murray Basin toward the River Murray, where it discharges. The rate of movement of the underground water is very slow, approximately half a metre per year (SA Murray-Darling Basin NRM Board 2012).

Underground water extractions have minimal or no impact on the River Murray, as most of these are located more than 30 km south of the river.

The taking of water from the River Murray PWC will not impact on water users or water resources in this area.

4.8 Peake, Roby and Sherlock Prescribed Wells Area

The Peake, Roby and Sherlock PWA is located approximately 140 km south-east of Adelaide and covers an area of approximately 1,120 km² within the South Australian Murray-Darling Basin. It encompasses the townships of Peake, Sherlock, Coomandook and Netherton. Underground water is extracted from the Peake, Roby and Sherlock PWA for the purposes of irrigation, stock and domestic (including Peake town water supply) and intensive farming.

4.8.1 Interconnection with the River Murray PWC

The Peake, Roby and Sherlock PWA is underlain by two main aquifer systems, a shallow unconfined aquifer (Unconfined Murray Group Limestone) and the underlying confined aquifer (Buccleuch and Renmark Group). The unconfined and confined aquifers are separated by a low permeability aquitard (Ettrick formation). The lateral flow of water from these aquifers is in a westerly direction toward the River Murray PWC. The rate of movement is slow, taking thousands of years (SA Murray-Darling Basin NRM Board 2011).

The taking of water from the River Murray PWC will not impact on water users or the water resources within in this area.

The River Murray provides water for the Taillem Bend to Keith pipeline, which crosses the Hundred of Roby and provides reticulated supplies for a number of rural properties in the south-east area of the Peake, Roby and Sherlock PWA.

4.9 Clare Valley Prescribed Water Resources Area

The Clare Valley PWRA covers an area of approximately 700 km², and is located approximately 130 km north of Adelaide. The population of the Clare Valley region is approximately 5,000, with Clare providing the majority of commercial and business services in the region.

The major watercourses of the Clare Valley PWRA are the Hill River and Hutt River, which drain to the north into the Broughton River, and the Eyre Creek and Wakefield River which drain to the south (Northern and Yorke Natural Resources Management Board 2009).

4.9.1 Interconnection with the River Murray PWC

There is no direct hydrological connection between the water resources in the Clare PWRA and the River Murray PWC. There will be no detrimental impacts on water users in this PWRA as a result of the taking and use of water from the River Murray PWC.

The primary source of town water supplies in the region is the reticulated supply from the River Murray through the Clare Valley Water Supply Scheme, which is also used for irrigation of high value crops, including wine grapes.

The application of imported water within the Clare PWRA carries a risk of groundwater salinisation, but there does not appear to be any correlation between any observed rising salinity trends and application of this water (Department for Water 2010).

4.10 Barossa Prescribed Water Resources Area

The Barossa PWRA encompasses both the highland areas of the Mount Lofty Ranges and the Barossa Valley, and is located approximately 60 km north-east of Adelaide. The surface and watercourse water resources in the Barossa PWRA are characterised by high annual variability of flow. The North Para River is the major watercourse, which serves as a significant water supply for existing users and supports a range of ecosystems. There are a significant number of farm dams that are used for vineyard irrigation, and stock and domestic use. Groundwater is primarily used for irrigation, and is also used for commercial, industrial, and stock and domestic purposes (Department for Water 2010, Department for Water 2011).

4.10.1 Interconnection with the River Murray PWC

There is no direct hydrological connection between the water resources in the Barossa PWRA and the River Murray PWC. There will be no detrimental impacts on water users in this PWRA as a result of the taking and use of water from the River Murray PWC.

SA Water provides water from the River Murray for reticulated water supplies. In addition, Barossa Infrastructure Ltd (BIL) is increasing its capacity to supply up to 11,000 ML of supplementary irrigation water per annum from the River Murray through SA Water infrastructure (Barossa Infrastructure Limited 2017).

As this River Murray water is approximately one third of the average salinity of the groundwater resources used for irrigation, there will be a reduction in salt accessions to the shallow aquifers if there is a significant replacement of groundwater irrigation sources by water supplied through BIL. However, it is likely that any salt in irrigation water (whatever the source), will eventually reach the regional water table as a result of natural processes, and that this recharge will eventually discharge as base flows into catchment streams.

4.11 Non-Prescribed Resources

Non-prescribed groundwater resources lie adjacent to and beneath the River Murray PWC, which is the focus of regional groundwater discharge from the aquifer systems of the Murray Basin. These aquifers are generally saline and hence can contribute salt directly to the river or cause significant degradation of the floodplain.

The proclamation of the Noora Prescribed Wells Area was revoked in 2017 and this area is now a part of the non-prescribed resources. The area is managed as the Noora Groundwater Management Area through water affecting activity policies under the Board's Water Affecting Activities Control Policy. There is minimal use of underground water for stock and domestic use due to the relatively high water salinity. A larger volume of extraction occurs for the Salt Interception Scheme (SIS) near Murtho, to divert saline water from the aquifer entering the River Murray PWC. Parts of the Noora Groundwater Management Area are supplied with reticulated River Murray water.

4.11.1 Interconnection with the River Murray PWC

Prior to irrigation development along the River Murray, the regional groundwater flow gradients toward the river were low, and saline discharges to the river or floodplain would have also been relatively low. Irrigation development has increased recharge to groundwater and established water table mounds which significantly enhanced the discharge of saline groundwater. However, the management of saline inflows to the river have been greatly improved through improved irrigation practices, infrastructure upgrades, and the establishment of salt interception schemes.

The lateral flow of the water within aquifers underlying the Noora Groundwater Management Area is directly to the River Murray PWC. Irrigation using River Murray water on the highlands may result in drainage which could exacerbate natural groundwater flows to the floodplain. The Murtho SIS will mitigate these impacts.

5 CONSUMPTIVE POOLS, WATER ACCESS ENTITLEMENTS AND WATER ALLOCATIONS

This chapter determines the consumptive pools for the River Murray PWC, and sets out the objectives and principles associated with the determination of water access entitlements and water allocations in the River Murray PWC.

For the purposes of Chapters 5-8 of the Plan:

- Any terms used in the Plan that are defined in the Landscape Act carry the meanings given by the Landscape Act.
- Any terms used in the Plan that are defined in the glossary carry the meanings given in the glossary unless otherwise specified.

5.1 Objectives

The following objectives apply to the determination of the consumptive pools for the River Murray PWC, and the determination of water access entitlements and water allocations from the River Murray PWC.

- a. Provide allocations that contribute to the water needs of water-dependent ecosystems (WDEs).
- b. Allocate water in a sustainable and equitable manner between the different users.
- c. Contribute to fulfilling South Australia's obligations under Basin-wide plans, agreements and legislation, including ensuring take from the River Murray PWC is compliant with the SDL for the South Australian Murray SDL Resource Unit.

In addition to objectives a to c, and the principles set out in Chapter 5 of this Plan, when South Australia receives less than full Entitlement the following objectives apply.

- d. Ensure that CHWN are the highest priority water use in the current water-use year.
- e. Establish as early as possible a reserve for CHWN in the following water-use year, having regard to the requirements of all water users in the current water-use year.
- f. Minimise social and economic impacts of allocation decisions on industries, business and communities that are reliant on River Murray water.
- g. Maintain allocations arising from water access entitlements as high as reasonably practical, whilst also considering the volume of water available as carryover (see Section 5.5.2).
- h. Minimise the likelihood of long-term damage to the resource from hazards such as acidification, cracking of soils, salinisation, deterioration in water quality, species loss and riverbank collapse.

5.2 Available Water from the River Murray

The River Murray and its tributaries originate upstream of South Australia. Water available to South Australia and the flow of the River Murray into South Australia is governed by the Agreement. Water provided to South Australia by the Agreement includes an annual Entitlement volume up to 1,850 GL.

The South Australian Entitlement is determined annually by the MDBA, based on water availability and the water sharing rules under the Agreement. This is the water available to South Australia for sharing between consumptive and non-consumptive purposes. Entitlement previously deferred under the Agreement may also be made available (see Section 2.3.5 and 2.3.6).

General Principles

1. The available water is made up of the following components:
 - a. Entitlement under clause 88 of the Agreement, as follows:
 - i. Clause 88(a) – Consumptive Entitlement up to 1,154 GL per year
 - ii. Clause 88(b) – Dilution and Loss Entitlement of 58 GL per month (696 GL per year), and
 - iii. Clause 88(c) – additional quantities for dilution as determined by the Ministerial Council.
 - b. Volumes deferred and held by South Australia under the Agreement.
2. The sharing of available water shall be undertaken in accordance with the requirements of the Landscape Act, the Water Act, the Agreement, and any inter-governmental agreements.
3. The sharing of available water shall aim to be consistent with the provisions of the Basin Plan.

Dilution and Loss

4. In accordance with the Agreement, the Dilution and Loss Entitlement under clause 88(b) shall be provided for this purpose only, except as provided for under clause 88A of the Agreement.
5. In accordance with the Agreement, any additional quantities provided under clause 88(c) shall not be allocated or used for consumptive purposes.

Above Entitlement Flows

6. Any water South Australia receives in addition to that under Principle 1 that cannot be allocated or used for consumptive purposes under the Agreement¹⁸ is preserved for the purposes of achieving environmental outcomes unless required in emergency circumstances¹⁹.

¹⁸ This may include, but is not limited to, unregulated flow, Additional Dilution Flow and the Lindsay River Allowance.

¹⁹ Consistent with Part 1 s6 of the Water Act on planned environmental water.

5.3 Consumptive Pools

The Landscape Act includes the following provisions in relation to consumptive pools:

- Section 53(1)(c)– provides that a water allocation plan must determine, or provide a mechanism for determining, from time to time, a consumptive pool or consumptive pools for the water resource.
- Section 121(4) – the Minister must determine, from time to time, the volume of water that is to be made available for allocation from a consumptive pool.

This section:

1. determines the consumptive pools in the River Murray PWC
2. provides how the volume within each consumptive pool will be calculated, based primarily on water availability, and
3. provides principles for guiding the Minister in determining the volume of water available for allocation from each consumptive pool.

Section 5.5 then determines how water made available for allocation by the Minister will be allocated.

5.3.1 Determining the Consumptive Pools

In determining a consumptive pool or pools for a water resource, a water allocation plan may provide for the constitution of two or more consumptive pools, and assign a particular purpose to each consumptive pool.

A consumptive pool, as defined in the Landscape Act, is *the water that will from time to time be taken to constitute the resource within a particular part of a prescribed water resource for the purposes of Part 8* (of the Landscape Act). In other words, a consumptive pool is the water for consumptive use within a physically or geographically defined part of a water resource.

The water available to be taken from a consumptive pool consists of water that may be taken pursuant to Part 8 of the Landscape Act, includes but is not limited to:

- water that may be taken on account of existing water access entitlements under a water licence
- water that may be taken for domestic purposes or for watering stock (other than stock subject to intensive farming) pursuant to section 100 of the Landscape Act, and
- water that may be taken subject to an authorisation issued by the Minister pursuant to section 105 of the Landscape Act.

The River Murray PWC comprises four consumptive pools, as detailed in Table 13. There are multiple consumptive pools for the River Murray PWC to recognise the need to have different management criteria, characteristics and purposes for each consumptive pool.

The consumptive pools are each made up of water in the River Murray from the Victorian border down to and including Lakes Alexandrina and Albert to the barrages – the geographic area is detailed in Figure 1.

General Principles

7. The River Murray Murray PWC comprises the four consumptive pools as set out in Table 13.
8. Each of the consumptive pools listed in Principle 7 (Table 13) relate to the area delineated on the plans deposited in the general registry office as GRO Plan 926/78 sheets 1 to 13. This area is defined in the notice published in the *Gazette* on 10 August 1978 as the *River Murray Proclaimed Watercourse*.
9. Pursuant to the Water Act, the Commonwealth of Australia may use its environmental water holdings in accordance with that Act.

Table 13: Consumptive pools, purposes, and classes of unit share

Consumptive Pool	Purpose and Definition	Classes ²⁰
Metropolitan Adelaide	Water supply purposes delivered to metropolitan Adelaide and associated country areas through the Swan Reach – Stockwell, Mannum – Adelaide and Murray-Bridge – Onkaparinga pipelines	Class 6
All Purpose	<p>All purposes, including but not limited to:</p> <ul style="list-style-type: none"> the following licensed purposes: CHWN, stock and domestic, urban supply, country towns, industrial, dairy, irrigation, recreational, environmental and environmental land management in the Lower Murray Reclaimed Irrigation Area (LMRIA) Unlicensed stock and domestic use Purposes permitted under section 105 authorisations such as Native Title rights and interests, road making, firefighting and application of chemicals 	<p>Class 1</p> <p>Class 2</p> <p>Class 3 (High Security)</p> <p>Class 5</p> <p>Class 8</p>
Wetlands²¹	Management of wetlands within the 1956 flood boundary that are permanently connected at or below the flow associated with South Australia's Entitlement, and can be managed through a wetting and drying regime	Class 9
Environmental²²	Environmental purposes as specified by the <i>Water Act 2007</i> (Cth)	Class 9

²⁰ For information purposes, the classes in this table align to the previous classes of water access entitlements in the previous Plan, and prior to that, the previous purposes, as follows:

- Class 1 (Stock, domestic, stock and domestic)
- Class 2 (Urban water use – country towns)
- Class 3 (High Security) – Class 3a (Irrigation other than Qualco Sunlands), Class 3b (Irrigation in Qualco Sunlands), Class 4 (Recreation) and Class 7 (Environment)
- Class 5 (Industrial and industrial dairy)
- Class 6 (Urban water use – metropolitan Adelaide)
- Class 8 (Environmental Land Management)
- Class 9 (Wetlands and Wetland water savings achieved through the Riverine Recovery Program)

²¹ Sourced from Dilution and Loss

²² Sourced from Dilution and Loss when the state receives below full Entitlement and from the unallocated portion of Entitlement at all other times.

5.3.2 Determining the volume of water within each consumptive pool

The volume of water within each consumptive pool for each water use year in the River Murray PWC will be calculated based on:

- South Australia's Entitlement in the current water-use year (available water under Principle 1.a.).
- South Australia's Entitlement that has previously been deferred under the Agreement and made available for the current water-use year (available water under Principle 1.b.).
- Determination of the requirements for CHWN for the current water-use year and the following water-use year.

Critical Human Water Needs

The volume of water required for CHWN is the minimum amount of water required to meet core human consumption requirements in urban and rural areas and those non-human consumption requirements that a failure to meet would cause prohibitively high social, economic or national security costs (s86A(2) Water Act).

10. In accordance with the Basin Plan, CHWN from the River Murray is equal to 204 GL per year. This provides maximum volumes for CHWN of:
 - a. 54 GL from the All Purpose Consumptive Pool²³; and
 - b. 150 GL from the Metropolitan Adelaide Consumptive Pool²⁴.
11. After accounting for the 696 GL available under 88(b) of the Agreement, the Minister should ensure, in so far as it is possible, that CHWN in the current water-use year are provided next from the water available to South Australia.
12. In determining a volume that should be made available for CHWN, at or around the start of the water-use year, and with each improvement in water availability, the Minister should endeavour, in so far as it is possible, to:
 - a. Consider the volume required for the current water-use year and the following water-use year
 - b. Consider all sources of water available for CHWN (including the Adelaide Desalination Plant, Mount Lofty Ranges storages and upstream deferred water) and the net economic, social and environmental benefits and costs associated with each source, and
 - c. Make any reduction in requirements for CHWN in either the current water-use year or for a reserve in the following water-use year available for non-CHWN purposes.
13. In accordance with Principle 10.b., when determining the volume of water available for CHWN from the Metropolitan Adelaide Consumptive Pool, the Minister should ensure that this does not exceed 150,000,000 kL.

²³ Comprising 20 GL for Class 1 (including non-licensed stock and domestic use) and Class 5; and 34 GL for Class 2.

²⁴ 150 GL for Class 6.

14. When determining the volume of water available for CHWN from the Metropolitan Adelaide Consumptive Pool, if the water available under Principles 1.a.i. and 1.a.ii. is greater than 1,496.1 GL, then the Minister should ensure that the volume determined from Principles 1.a.i. and 1.a.ii. meets metropolitan Adelaide's reasonable requirements, up to 150,000,000 kL.
15. When determining the volume of water available for CHWN from the Metropolitan Adelaide Consumptive Pool, if the water available under Principles 1.a.i. and 1.a.ii. is less than 1,496.1 GL, then the Minister should ensure that the volume determined from Principles 1.a.i. and 1.a.ii. does not exceed metropolitan Adelaide's reasonable annual requirements, as follows:
 - a. For the purpose of this principle, Adelaide's reasonable annual requirements are determined to be 100,000,000 kL as of 3 October 2017.
 - b. The determination of Adelaide's reasonable annual requirements may be increased to reflect actual growth in metropolitan Adelaide's average annual demand since 3 October 2017, at the determination of the Minister, but not more frequently than once every four years.

Consumptive use

16. Consistent with clause 88A of the Agreement, a volume of up to 13.92 GL (two percent of 696 GL) may be provided for purposes other than dilution and loss.
17. The water available for consumptive use for purposes other than CHWN is the greater of:
 - a. The water available to South Australia under Principle 1.a.i. as determined by the Murray-Darling Basin Authority
Less
Any part of the water available to South Australia under Principle 1.a.i. that is considered to be required for CHWN for the current water-use year or the following water-use year under Principle 12
Less
Two percent of the value of shares held for Classes 3 (High Security) and 8; and
 - b. Zero kL.

Metropolitan Adelaide Consumptive Pool

18. If the water available under Principles 1.a.i. and 1.a.ii. is less than or equal to 1,546.1 GL, then the volume of water within the Metropolitan Adelaide Consumptive Pool is equal to the CHWN determination for Class 6 under Principle 12 for the current water-use year.
19. If the water available under Principles 1.a.i. and 1.a.ii. is greater than 1,546.1 GL then the volume of water within the Metropolitan Adelaide Consumptive Pool may be greater than the volume of CHWN under Principle 10.b. to enable management of variability in both supply and demand for metropolitan Adelaide.

All Purpose Consumptive Pool

20. The volume of water within the All Purpose Consumptive Pool is determined to be the lesser of:
- a. The volume determined for CHWN for classes 1, 2 and 5 for the current water-use year under Principle 12.
- Plus
- Two percent of the value of shares held for Classes 3 (High Security) and 8
- Plus
- Water available under Principle 17; and
- The total volume of shares held for Classes 1, 2, 3 (High Security), 5 and 8
- Plus
- The total volume for Class 1 and Class 3 (High Security) non-licensed consumptive use, at the time of determination.

Wetland Consumptive Pool

21. The volume of water within the Wetland Consumptive Pool is determined to be the lesser of:
- a. Total volume of Class 9 shares held in the Wetland Consumptive Pool, at the time of determination, and
 - b. 200,000,000 kL
- Minus
- Total volume of Class 9 shares held in the Environmental Consumptive Pool, at the time of determination.

Environmental Consumptive Pool

22. The volume of water within the Environmental Consumptive Pool is determined to be total volume of Class 9 shares held in the Environmental Consumptive Pool, at the time of determination.

5.3.3 Water available for allocation from a consumptive pool

Section 121(4) of the Landscape Act requires the Minister to determine, from time to time, the volume of water that is to be made available for allocation from a consumptive pool.

The volume made available for allocation in a water-use year from within each consumptive pool is dependent on water availability under Principle 1, the volume of water within each consumptive pool and the volume of water required from the consumptive pool for non-licensed purposes. The volume in each pool will vary from time to time. The principles guiding the Minister in determining the volume of water available for allocation from each consumptive pool apply in both normal and dry periods.

General Principles

23. In a year when South Australia receives its full Entitlement of 1,850 GL, the Minister should endeavour to determine a volume of water available for allocation from each consumptive pool equivalent to the unit shares displayed in column three Water Access Entitlements (in unit shares) of Table 14, where 1 unit share equals 1 kL.
24. An exemption to Principle 23 may apply to the Metropolitan Adelaide Consumptive Pool in some years to enable management of variability in both supply and demand for metropolitan Adelaide.
25. The long-term average annual take from the River Murray Prescribed Watercourse must be compliant with the long-term average SDL under Schedule 2 of the Basin Plan for the South Australian Murray SDL Resource Unit²⁵.
26. If an assessment of compliance with the SDL shows that a cumulative debit equal to or greater than 20% of the SDL has been reached, or there is a high risk of it being reached, then the Minister's determination under section 121(4) of the Landscape Act should:
 - a. take into consideration the need to reduce the cumulative balance to minimise, as far as practicable, the likelihood of future non-compliance;
 - b. take into consideration the views of affected stakeholders; and
 - c. seek to minimise adverse impacts for entitlement holders.

Metropolitan Adelaide Consumptive Pool

27. When determining the volume of water available for allocation for CHWN from the Metropolitan Adelaide Consumptive Pool, the Minister may consider a lesser volume than the CHWN volume determined under Principle 12 for the Metropolitan Adelaide Consumptive Pool for the current water-use year.
28. When determining the volume of water available for allocation from the Metropolitan Adelaide Consumptive Pool if the water available under Principles 1.a.i. and 1.a.ii. is greater than 1,546.2 GL, the Minister may make more than 150,000,000 kL available for allocation.

²⁵ Key stakeholders will be consulted to identify actions that may be implemented, if action is required, to ensure that SDL compliance requirements will be met.

All Purpose Consumptive Pool

29. The Minister should endeavour, in so far as it is possible, to determine a volume of water available for allocation from the All Purpose Consumptive Pool that:
- a. Is at least equal to:
 - The volume required for CHWN for Classes 1, 2 and 5 under Principle 10.a.
 - Plus
 - Two percent of the value of shares held for Classes 3 (High Security) and 8
 - Minus
 - The total volume for Class 1 non-licensed consumptive use, at the time of determination; and
 - b. Does not exceed:
 - The total volume determined under Principle 20
 - Minus
 - The total volume for Class 1 and Class 3 (High Security) non-licensed consumptive use, at the time of determination.

Wetland Consumptive Pool

30. The Minister should endeavour, in so far as it is possible, to determine a volume of water available for allocation from the Wetland Consumptive Pool equivalent to the unit shares displayed in Column three Water Access Entitlements (in unit shares) of Table 14.

Environmental Consumptive Pool

31. When determining the volume of water made available for allocation from the Environmental Consumptive Pool, the Minister should endeavour, in so far as it is possible, to determine a volume equivalent to the unit shares displayed in Column three Water Access Entitlements (in unit shares) of Table 14, and consistent with the Water Management Partnership Agreement (WMPA) between South Australia and the Commonwealth (including the RRP Schedule).

5.4 Water Access Entitlements

Water access entitlements in each of the four consumptive pools will be expressed as number of units of a total number of unit shares. The total number of unit shares in each consumptive pool is detailed in Table 14.

General Principles

32. The following principles relate to the water access entitlements that arise from the consumptive pools in Table 14.

Table 14: Water Access Entitlements in each consumptive pool and water for non-licensed consumptive use

Consumptive Pools and Purposes	Classes	Water Access Entitlements (unit shares)	Non-licensed consumptive use ²⁶ (kL)
Metropolitan Adelaide	Class 6	130,000,000	
All Purpose	Class 1	8,368,662	6,062,497 ²⁷
	Class 2	50,000,000 ²⁸	
	Class 3 (High Security)	607,798,212	100,000 ²⁹
	Class 5	5,568,841	
	Class 8	22,200,000	
	Subtotal	693,935,715	6,162,497
Wetland	Class 9	38,953,915	
Environmental	Class 9	7,244,800	
	Total	870,134,430	6,162,497

33. A water access entitlement cannot be converted (on application of the holder) to become an entitlement of any other consumptive pool.
34. A water access entitlement cannot be converted (on application of the holder) to become an entitlement of any other class.
35. No new water access entitlements will be made available in respect of the Metropolitan Adelaide Consumptive Pool and the All Purpose Consumptive Pool.

Class 8 in the All Purpose Consumptive Pool

Water access entitlements issued for the purpose of environmental land management in the Lower Murray Reclaimed Irrigation Area (Class 8) are a specified class of water access entitlements.

36. When considering granting water access entitlements that relate to Class 8 within the All Purpose Consumptive Pool, the Minister must take into account;
 - a. the purpose of the water use and whether that use is likely to contribute to the objectives for the LMRIA set out in Section 5.5.1 and
 - b. the history of Class 8 water use as relevant to whether or not the applicant is likely to contribute to the objectives for the LMRIA being met; and
 - c. whether or not the applicant holds or is eligible to hold Class 8 management authorisations specifically, site use and works approvals for the use of ELMA.

²⁶ Includes water used for non-licensed stock and domestic supply, and Ministerial authorisations under section 105 of the Landscape Act, such as water for firefighting and road making.

²⁷ Stock and domestic – where the prescribed watercourse adjoins or runs through the land; and a section 105 authorisation for exercising native title rights and interests.

²⁸ As outlined in Schedule E of the Agreement.

²⁹ Section 105 authorisations e.g. road making, firefighting, application of chemicals.

37. For the purpose of this plan, ELMA eligible land is land that was identified as being eligible for ELMA during 1993-94 application process and is listed in Table 21.
38. For the purposes of this Plan, the optimised rates and the originating rates are the rates displayed in Column 2 and Column 3 of Table 15 respectively for each irrigation area.
39. Commencing 1 July 2022, the Minister shall endeavour to grant water access entitlement shares at a rate equivalent to the optimised rates where 1 unit share is equivalent to 1 kL for the relevant irrigation management zone and ELMA eligible land area (in hectares), except where:
 - a. The originating rate is greater than the optimised rate and Class 8 water has been applied to the land at a rate equivalent to 90 – 100 % of the corresponding allocation in at least one water use year between, and including, 2015-16 and 2018-19, in which case, the Minister shall endeavour to grant water access entitlement shares equivalent to the originating rate for the relevant irrigation management zone and ELMA eligible land area (in hectares); or
 - b. Class 8 water has not been applied to the land in any of the water use years between, and including 2015-16 and 2018-19, in which case water access entitlement shares will not be granted unless proof of significant financial or legal commitment to the application of Class 8 water on the land can be demonstrated.
40. In the event the sum of Class 8 water access entitlement shares applied for exceeds the sum of Class 8 shares available, being 22,200,000 unit shares, a proportional adjustment will be made to the number of shares granted in respect of each application so that the sum of the water access entitlements are equal to or less than 22,200,000 unit shares.

Expiry of a water access entitlement / water licence (under a term on a licence)

41. A water access entitlement that relates to Class 8 within the All Purpose Consumptive Pool will only be granted for periods up to five years (which periods will commence on 1 July 2022 and end at five year intervals thereafter) on the basis that it will expire;
 - a. Upon a change in the owner or occupier of the land on which the water allocation (that is obtained under the terms of a water licence) is used; or
 - b. At the end of the relevant five year period in which the water access entitlement was granted (e.g. on 30 June 2027 or 30 June 2032 etc.

Whichever occurs first.

Subsequent granting of water access entitlements

42. Where a water licence has expired in accordance with Principle 41.a, the Minister shall endeavour to grant water access entitlements at a rate equivalent to the optimised rates where 1 unit share is equivalent to 1 kL for the relevant irrigation management zone and ELMA eligible land area (in hectares).

43. An exemption to Principle 42 may apply where the ELMA eligible land has transferred to an immediate family member, and the preceding water access entitlement shares were granted in accordance with 39.a, then upon receipt of a licence application, the Minister may consider granting water access entitlement shares equivalent to the originating rate for the relevant irrigation management zone and ELMA eligible land area (in hectares) up to the 30 June 2032.
44. For the purpose of this Plan, an immediate family member is defined as a spouse or former spouse, de facto partner or former de facto partner, child, parent, grandparent, grandchild or sibling of the land owner/occupier, or a child, parent, grandparent, grandchild or sibling of a landowner's spouse or de facto partner. It includes step-relations (e.g. step-parents and step-children) as well as adoptive relationships.
45. If a proportional reduction in the number of shares granted has occurred in accordance with Principle 40 and at any subsequent five year interval the Minister holds any Class 8 water access entitlement shares by virtue of the expiry of the relevant water access entitlements, the Minister may consider granting water access entitlement shares to applicants who would otherwise have been granted shares in accordance with Principles 39, 39.a or 47, whichever is relevant at the time.
46. As of 1 July 2027, the Minister will endeavour to grant water access entitlements shares consistent with the shares previously granted, in accordance with Principle 39 and 39.a up to 30 June 2032.
47. As of 1 July 2032, the Minister shall endeavour to grant water access entitlement shares at a rate equivalent to the optimised rates where 1 unit share is equivalent to 1 kL for the relevant irrigation management zone and ELMA eligible land area (in hectares).

Table 15: Irrigation areas in the LMRIA and the corresponding ELMA optimised and originating applications rates (in ML/ha).

Column 1	Column 2	Column 3
Irrigation Area	Optimised rates (ML/ha)	Originating rates (ML/ha)
Cowirra	4.489	6.35
Baseby	4.489	6.30
Neeta	4.489	6.10
Wall Flat	4.489	5.93
Neeta North	4.436	6.01
Pompoota	4.420	5.74
Burbridge	4.420	5.37
Mypolonga	4.354	5.38
Paiwalla	4.354	5.04
Glen Lossie	4.192	4.99
Toora	4.140	4.77
Mobilong	4.140	4.58
Burdett	4.140	4.46
Long Flat	4.097	4.37
Long Island	4.097	4.13
Swanport	4.097	4.06
Yiddinga	4.097	4.04
River Glen	4.097	3.90
Monteith	4.048	3.79
Kilsby	4.173	3.53
Woods Point	4.049	3.50
Westbrook	4.037	3.39
Jervois	4.042	2.90
Seymour	3.969	2.28

Wetland and Environmental Consumptive Pools

Water access entitlements in the Wetland Consumptive Pool are based on the volume that is required for managed wetlands as a result of the installation of regulating infrastructure. As more wetlands become managed through the installation of regulating infrastructure, the volume required to manage these wetlands will increase. This means additional water access entitlements in the Wetland Consumptive Pool may become available.

Additional water access entitlements may be granted where water savings have resulted from regulation of wetlands on the basis that 1 unit share will be granted for each 1 kL of water saved.

Notice of any additional water access entitlements to be included in the Wetland Consumptive Pool and the Environmental Consumptive Pool as a result of the installation of regulating infrastructure will be published by the Minister in the *Gazette*.

48. The total number of unit shares of water access entitlements in the Wetland Consumptive Pool and the Environmental Consumptive Pool set out in Table 14 reflect the total Managed Wetland Volume and the total Water Savings Volume as at the date of adoption of the 2019 Plan (which came into effect on the 28 February), where 1 unit share is equivalent to 1 kL.
49. The Minister shall, by publication in the *Gazette*, give notice of additional water access entitlements to be included in the Wetland Consumptive Pool and the Environmental Consumptive Pool as a result of the installation of wetland infrastructure, pursuant to the calculation set out in Principle 50.
50. The number of additional water access entitlements in the Wetland Consumptive Pool and the Environmental Consumptive Pool will be calculated based on fit for purpose modelling undertaken by the Department for all regulated wetlands within the 1956 flood boundary, as follows:

$$\text{Water Savings Volume} = \text{Unmanaged Wetland Volume} - \text{Managed Wetland Volume}$$

Where:

Unmanaged Wetland Volume = the volume that evaporates from the wetland through permanent connection to the river channel

Managed Wetland Volume = the volume required, based on modelling, to manage the wetland over a five-year management period, through the installation of regulating infrastructure. This includes periods of variable water levels and/or drying. As the use by the wetland is variable over the five-year period, this is expressed as an annual average.

Water Savings Volume = the difference between the volume evaporating from the wetland in an unmanaged state, and the modelled annual average volume required by the wetland in a managed state.

Example for wetland X:

Unmanaged Wetland Volume = 5 GL

Managed Wetland Volume = 4 GL

Water Savings Volume = 5 GL – 4 GL = 1 GL

51. Any additional water access entitlements that may become available as a Managed Wetland Volume in accordance with Principle 50 will relate to the Wetland Consumptive Pool.
52. Any additional water access entitlements that may become available as a Water Savings Volume in accordance with Principle 50 will relate to the Environmental Consumptive Pool.
53. Additional water access entitlements that relate to the Wetland Consumptive Pool may only be granted by the Minister where regulating infrastructure is installed on a wetland within the 1956 flood boundary that is permanently connected at or below the flow associated with South Australia's Entitlement, and where water savings as a result of the regulating infrastructure have been calculated in accordance with Principle 50.
54. In addition to Principle 53, the granting of additional water access entitlements from the Wetland Consumptive Pool shall only occur for wetland management where it will have, or will be likely to have, environmental benefits including:
 - a. The reintroduction of a wetting and drying regime that reflects a more natural pattern of connectivity
 - b. An increase in the recruitment and survival of native flora and fauna in the wetland or wetlands

- c. An improvement in the quality of water in the wetland or wetlands, and/or the River Murray
 - d. An increase or improvement in habitat for native fauna
 - e. The mitigation of any threatening processes
 - f. An improvement in the connectivity between the river and the floodplain
 - g. The promotion of nutrient exchange
 - h. Extending the duration or increasing the frequency of wetland inundation, and/or
 - i. Providing critical refugia during extended dry periods.
55. Additional water access entitlements that relate to the Environmental Wetland Consumptive Pool may only be granted by the Minister where water savings arise as a result of the installation of regulating infrastructure on wetlands within the 1956 flood boundary through the Riverine Recovery Project.

5.5 Basis for Water Allocation

The Landscape Act provides that a person must not take water from a prescribed watercourse unless authorised to do so under section 105, or if they are entitled to take water for domestic purposes or for watering stock, or as part of a water allocation that relates to the relevant water resource.

A water allocation may be obtained on account of a water access entitlement under a water licence, as a carryover or under an Interstate Water Entitlements Transfer Scheme (IWETS). A water allocation will relate to a specified water resource and is obtained on account of a water access entitlement. The water allocation must be taken from the consumptive pool specified on the relevant water licence.

A water allocation issued by the Minister must be consistent with the relevant water access entitlement (or IWETS) in relation to the volume of water granted.

Water allocations will be issued for a period of no more than twelve months, and assigned to the water access entitlement shares based on the volume of water that has been determined to be available.

Water allocations are issued to holders of Interstate Water Entitlements Transfer Scheme (IWETS) entitlements in accordance with the terms and conditions relevant to the state of origin.

Water allocations will be issued on account of a water access entitlement in accordance with the provisions of the Landscape Act and the following principles.

General Principles

56. Except for water access entitlements that relate to the Metropolitan Adelaide Consumptive Pool, the maximum volume of water that can be allocated in respect of a unit share is 1 kL.

All Purpose Consumptive Pool

57. The purpose of CHWN will be assigned to:

- a. Class 1
 - b. Class 2 – for the first 34,000,000 kL, and
 - c. Class 5.
58. An allocation arising from Classes 3 (High Security) and 8 water access entitlements of up to 0.02 kL per unit share will be provided from water made available.
59. Allocations arising from water access entitlements in the All Purpose Consumptive Pool will be distributed between classes of shares in the following priority order:
- a. Class 1 and Class 5 water access entitlements up to 1 kL per unit share, and
 - b. Class 2 water access entitlements up to 0.68 kL per unit share, then
 - c. Pro-rata increase to Class 3 (High Security) and Class 8 water access entitlements up to 0.68 kL per unit share, then
 - d. Pro-rata increase to Class 2, Class 3 (High Security) and Class 8 water access entitlements up to 1 kL per unit share.

Environmental Consumptive Pool

60. Allocations made against Class 9 water access entitlements that arise from the Environmental Consumptive Pool must be used within South Australia when the Entitlement available under Principle 1.a is less than 1,850 GL.

5.5.1 Environmental Land Management Allocations

Water allocations that relate to Class 8 water access entitlements within the All Purpose Consumptive Pool are specifically for the purpose of environmental land management within the LMRIA. Objectives and the principle outlined below are in addition to those set out in Section 5.1.

Objectives

The following objectives relate to water allocations obtained on account of water access entitlements from Class 8 within the All Purpose Consumptive Pool. ELMA is to be used to:

- a. Contribute to the protection of environmental land and infrastructure of the LMRIA, including by:
 - i. Reducing soil salinisation as a result of saline groundwater discharge
 - ii. minimising oxidation of acid sulfate soils, and
 - iii. minimising cracking and movement of soils.

General Principles

61. A water allocation derived from water access entitlements obtained from Class 8 within the All Purpose Consumptive Pool is considered the first water taken, prior to any other water allocation.

5.5.2 Private Carryover

South Australia's storage rights are defined under clause 91 and Schedule G of the Agreement. The Agreement provides South Australia with the right to store (defer) a portion of its Entitlement in the upstream River Murray storages and subsequently deliver this water for CHWN and private carryover in a future dry year(s).

The volume of Entitlement that has been deferred and stored by the state in a given year may become available for delivery in a subsequent year, in addition to the South Australian Entitlement for that year.

The volume that may be made available by the Minister for the purpose of private carryover pursuant to section 127(8) of the Landscape Act will depend on the total volume of deferred private carryover remaining in storage from the previous water-use year. The volume of water in storage for the purpose of private carryover will depend upon storage spills and evaporation, and the amount of stored water required for the purpose of CHWN. There is no guarantee that private carryover will be available to those who do not use their full allocation in a given year.

Decisions by South Australia to defer the delivery of, and to store Entitlement, take into account a number of factors including but not limited to:

- available space in upstream storages
- risks of spill or pre-release for flood mitigation
- potential effects on other water users (including the environment)
- potential water availability the following year
- volume of underuse in the previous water-use year, and
- the opening water allocation in the current water-use year.

Eligible Water Access Entitlement Holders

62. Carryover may only be granted in the current water-use year to those who held a South Australian water access entitlement on 30 June of the previous water-use year, subject to Principles 63 to 66.
63. Carryover is not available in respect of water allocations that relate to any of the following:
 - a. Metropolitan Adelaide Consumptive Pool, or
 - b. All Purpose Consumptive Pool (Class 1, Class 2 and Class 5).
64. Carryover is not available in respect of water allocations that relate to Class 8 within the All Purpose Consumptive Pool, as the water allocated may only be taken in the year of allocation for environmental land management purposes within the LMRIA.
65. Carryover is not available in respect of water allocations that relate to the Wetland Consumptive Pool or the Environmental Consumptive Pool.
66. Carryover may only be granted in respect of an individual water access entitlement if:
 - a. water has been taken through a fully operational flow recording meter for the whole of the water-use year for which carryover is determined, unless the quantity of water taken can be determined on another basis to the satisfaction of the Minister, and

- b. final water meter reading(s) for the quantity of water taken during the previous water-use year have been provided to the Department by no later than 31 July of the current water-use year, or
- c. holders of water access entitlements for environmental purposes who cannot meter their water use have provided to the Department their final estimate(s) of water use for the previous water-use year by no later than 31 July of the current water-use year.

Carryover Entitlement

- 67. In making a determination on whether carryover is to be granted, the Minister shall have regard to information provided by the Murray-Darling Basin Authority, and consider only allocating private carryover when forecast minimum opening allocations are equal to or less than 0.5 kL per unit share³⁰.
- 68. The Minister may make available a volume of water for private carryover purposes from:
 - a. any volume deferred and stored for the purpose of private carryover, that is in storage at the beginning of the water use year, after making an allowance for storage loss, and
 - b. the sum of allocations that were traded into South Australia between 1 April and 30 June in the previous water use year, which remained unused on 30 June.

Storage loss = a volume equivalent to five percent of the volume in storage, that may otherwise have been made available by the Minister for the purpose of private carryover

- 69. The total volume of an allocation that may be obtained by a water access entitlement holder from allocations arising in the current water use year plus any carryover volume from the previous water-use year shall not exceed an amount that is equal to 1 kL per unit share of the shares held in that current water-use year.
- 70. Should carryover be granted in accordance with Principle 67, and allocations increase to 1 kL per unit share (from allocations plus carryover) during the current water use year, the carryover volume from the previous water use year will be quarantined and available in the next water use year if carryover is subsequently announced as available.
- 71. The quarantined carryover volume can be rolled over until a minimum opening allocation announcement made in accordance with Principle 67 is greater than 0.5 kL per unit share.
- 72. Available carryover volume is the volume of carryover allocation to be granted to an eligible water access entitlement holder. The maximum volume of carryover that may be granted to a water access entitlement holder will be determined on the following basis:

Carryover volume (up to a maximum of 0.2 kL per unit share) = unused allocation + quarantined carryover volume

Where:

Unused allocation = a water access entitlement holder's unused water allocation. This may comprise water allocated against the water access entitlement, volumes of private

³⁰ Allocations announcements refer to percent values, this is equivalent to a minimum opening allocation of 50 percent.

carryover determined by the Minister and/or water traded to the water account from intrastate or interstate

Quarantined carryover volume = any carryover volume generated in a previous eligible year which was not available for use because the total volume of allocation obtained from allocations plus carryover exceeded an amount that is equal to 1 kL per unit share.

73. Subject to Principle 67, if there is sufficient water made available by the Minister for the purpose of private carryover to provide for the maximum carryover volume as specified in Principle 69, that volume will be granted as carryover to eligible water access entitlement holders.
74. Subject to Principle 66, if there is insufficient water made available for the purpose of private carryover to grant the maximum volume of carryover as specified in Principle 69, a water access entitlement holder will be granted a proportional share of the volume of water stored for the purpose of private carryover, as follows:

Carryover volume = proportional volume

Where:

Carryover volume = the volume of carryover allocation to be granted to an eligible water access entitlement holder

Proportional volume = unused allocation X proportional share of water made available for carryover

Unused allocation = a water access entitlement holder's unused water allocation (up to a maximum of 0.2 kL per unit share), which may comprise water allocated against the water access entitlement, volumes of private carryover determined by the Minister and/or water traded to the water account from intrastate or interstate

Proportional share of water volume made available for carryover = the volume of water made available by the Minister for the purpose of private carryover ÷ the total volume of unused allocations from all eligible water access entitlement holders (where the maximum proportional share = 1)

Storage loss = a volume equivalent to five percent of the volume in storage, that may otherwise have been made available by the minister for the purpose of private carryover

$$\begin{array}{l}
 \text{A water access entitlement holder's unused allocation (up to a maximum of 0.2 kL per unit share)} \\
 \times \left(\frac{\begin{array}{l} \text{Volume of water stored for the purpose of private carryover} \\ - \text{Five percent of volume stored for private carryover} \\ + \text{Volume of water allocation traded in the late season period.} \end{array}}{\text{Total volume of unused allocations from all water access entitlement holders}} \right)
 \end{array}$$

Example

Unused allocation = 200 ML

Volume of water stored and made available by the Minister for the purpose of private carryover = 60,000 ML (60 GL)

Volume of water traded into South Australia in the late season period for the purpose of private carryover = 0 GL

Total volume of all water access entitlement holder's unused allocations

= 70,000 ML (70 GL)

$$200 \times \text{MIN} \left[1, \left[\frac{(60,000 \times 0.95) + 0}{70,000} \right] \right] = 162.85 \text{ ML}$$

75. The Minister will publish a carryover announcement in a media release and on the Department's website following the announcement of minimum opening allocations.
76. Once a volume of carryover is granted to a water access entitlement holder, no reduction will be made to the volume granted if some or all of the carryover in storage spills during the remainder of the water use year.
77. For accounting purposes, any allocation not eligible for carryover is considered the first water taken; the next allocation taken is deemed to be carryover.

Example of quarantined carryover volume

The Minister announces that carryover will be granted in Year 2 because minimum opening allocations are equal to or less than 0.5 kL per unit share

Carryover volume in Year 1 = 200 ML

Allocations increase to 1 kL per unit share in Year 2. Allocations are limited to 1 kL per unit share so effectively carryover cannot be accessed.

The Minister announces that carryover will be granted in Year 3 because minimum opening allocations are equal to or less than 0.5 kL per unit share.

The full carryover volume of 200 ML from Year 1 can be rolled over into Year 3.

Allocations increase to 0.85 kL per unit share in Year 3. Allocations are limited to 1 kL per unit share so the full carryover volume cannot be accessed. Of the 200 ML carryover volume, 150 ML (75 per cent) can be utilised (taking the total allocation to 1 kL per unit share) and the remaining 50 ML (25 per cent) can be rolled over into Year 4.

The Minister announces that carryover won't be granted in Year 4 because minimum opening allocations are greater than 0.5 kL per unit share. The rollover volume of 50 ML from Year 3 no longer applies, as carryover is no longer applicable.

5.5.3 Artificial Water Bodies

By notice published in the *Gazette* pursuant to section 105 of the Landscape Act on 11 September 2008 (p. 4265), the Minister authorised the taking of water by means of excavation or infrastructure works adjacent to or within a prescribed watercourse for the purposes of:

- Creating or enlarging an artificial water body with a surface area equal to or less than 190 m², or
- Maintaining the water level of an artificial water body with a surface area equal to or less than 190 m² (including to compensate for water lost from the artificial water body through evaporation)

where the water body is not used for the collection and subsequent taking of water, for example, a dam.

As the creation or enlargement of an artificial water body will take water from the River Murray, a water allocation is required to create or enlarge an artificial water body with a surface area greater than 190 m². An annual water allocation will also be required to maintain the water level of the artificial water body.

Chapter 7 will apply to the transfer of water licences, water access entitlements and water allocations in relation to water required for an artificial water body.

The following principles are used to determine the volume of a water allocation required for the purpose of filling and maintaining an artificial water body.

78. For the initial fill of an artificial water body the water allocation that is required is:
- a. for a new artificial water body greater than 190 m², at least equal to the volume of water required to fill the artificial water body; or
 - b. for any artificial water body that is created by enlarging an anabranch, backwater or other natural watercourse, at least equal to the volume required to fill the enlarged area

in the first full water use year (or part of that year) that the artificial water body is filled.

79. For each subsequent water use year, after the initial fill of the artificial water body, the annual allocation required to cover the ongoing evaporative losses from the artificial water body will be determined in accordance with the following equation:

$$\text{Annual allocation} = \text{surface area}_{(AWB)} \text{ m}^2 \times \text{evaporation rate kL/m}^2$$

Where:

Surface area _(AWB) = the surface area in m² of the artificial water body

Evaporation rate = 0.80 kL/m² for artificial water bodies below Lock 1, or 1.0 kL/m² for artificial water bodies above Lock 1

80. Principles 78 to 79 will come into effect during the first full water use year following the date of adoption of the 2019 Plan (which came into effect on the 28 February).

6 MANAGEMENT OF THE TAKE AND USE OF WATER

This chapter sets out the objectives and principles for the sustainable taking and use of water from the River Murray PWC through water resource works approvals and site use approvals.

6.1 Objectives

The following objectives apply to the taking and use of water from the River Murray PWC.

- a. Promote the efficient use of water from the prescribed watercourse.
- b. Contribute to the prevention of loss of condition, number or extent of refuge habitats and dependent aquatic biota of floodplains, wetlands, and sites of significance.
- c. Contribute to the prevention of adverse impacts on water quality.
- d. Contribute to the prevention of increased soil salinity and acid sulfate soils, and associated land management issues.

6.2 Water Resource Works Approvals

The Landscape Act provides that in the case of a prescribed water resource, a water resource works approval is required to construct, maintain or operate any works for the purposes of taking water from the water resource. A water resource works approval must specify the site where the works are authorised to be located and the nature and extent of the works that are authorised, and is attached to the land constituting that site. A water resource works approval may include conditions relating to the operation and management of the works.

The principal driver of the ecology of the River Murray, its floodplains and wetlands, is its hydrology. This includes flow rates, water levels, volumes, inundation area, frequency and duration of wetting and drying periods. To contribute to the needs of river ecosystem function, manipulating flow regimes and weir pool levels is utilised. Pumping infrastructure (including pumps on backwaters) is likely to be vulnerable to operational difficulties due to these changes. All areas of the River Murray are subject to water level variability, both planned and natural. Consideration should be given, when maintaining or investing in pumping infrastructure, to the location and flexible operation of the works to minimise vulnerability to changes in surface water flows, including raising and lowering of water levels.

The Minister may vary a condition of a water resource works approval to provide consistency with actions taken in respect to the variation or transfer of a water licence that is relevant to the water resource works approval.

Water resource works approvals which permit the taking of water from the backwaters and anabranches of the River Murray are a specified class of approvals.

The following principles apply to water resource works approvals to manage the impacts of river management on infrastructure, and to manage the impacts of the take of water on ecosystems.

81. The Minister may not grant or vary a water resource works approval where the point of extraction of water lies on a backwater or anabranch of the River Murray PWC (as delineated in Figure 12 to Figure 17), where water was not being extracted from that point on or before 1 July 2002 (the date of adoption of the 2002 Plan), subject to the exception outlined in Principle 90.
82. Principle 81 also applies to the extraction of water from a point that lies on or within 100 metres of a tributary wetland of Lake Alexandrina (as delineated in Figure 18).
83. Principle 81 does not apply to water being delivered through infrastructure pursuant to a specified environment improvement program.
84. All water resource works approval holders between Lock 1 and the Lower Lakes barrages that wish to maximise their ability to extract water from the prescribed watercourse must ensure their pumps are able to operate within a variable water level range, consistent with the Barrage and Water Level Management Policy.
85. Where water was being extracted from a point on a backwater or anabranch on or before 1 July 2002 (the date of adoption of the 2002 Plan), a water resource works approval which permits the taking of water from a backwater or anabranch of the River Murray may be varied at any time in the following circumstances:
- a. If the taking of water has damaged or is likely to cause damage to the River Murray PWC, or
 - b. If the taking of water has impacted or is likely to impact other peoples' ability to lawfully take water from the River Murray PWC, or
 - c. If there has been a significant reduction in water levels in the River Murray PWC, or
 - d. If there has been a reduction in the water quality of the River Murray PWC, or
 - e. If the taking of water has caused or is likely to cause negative environmental impacts, or
 - f. If the taking of water has caused or is likely to cause damage to wetlands.

Approvals adjoining the Eastern Mount Lofty Ranges PWRA

86. It is a condition of all new and existing water resource works approvals where an extraction point is located on a watercourse of the Finnis River or Tookayerta Creek, within the River Murray PWC and upstream of where Winery Road crosses these watercourses (see Figure 20), that new or additional water allocations may only be taken where the taking of that water is compliant with Principles 33-46, 49-59 and 69-70 of the Water Allocation Plan for the Eastern Mount Lofty Ranges (where relevant).

6.2.1 Environmental Use

In accordance with section 135(1)(c)(ii) and 135(4)(b)(ii) of the Landscape Act, where water is being delivered through infrastructure to achieve environmental outcomes, the relevant water resource works approval will be subject to the following conditions:

87. The Minister may require by way of notice in writing that the person who has the benefit of the water resource works approval participates in a specified environment improvement program.

88. The use of water must be measured and reported by a person who has the benefit of a water resources works approval to the Minister through the following mechanisms:
- a. Where water is being delivered through pumping infrastructure, water shall be taken and measured in accordance with the South Australian Licensed Water Use Meter Specification (DEWNR 2012b), or any subsequent version, with final meter readings to be submitted to the Department by no later than 31 July of the current water-use year.
 - b. In all other cases, the taking of water is to be recorded using the best available information, which may include modelled values, with final estimate(s) of water use for the previous water-use year to be provided to the Department by no later than 31 July of the current water-use year.

6.2.2 Upper Pike River Extraction Management Zone

The Upper Pike River Extraction Management Zone was established (see Figure 11) in recognition of both the high ecological values of the floodplain and anabranch complex and that it also supports important agriculture, irrigated horticulture and dryland farming activities. This zone is managed in accordance with Principles 89 to 91, in recognition that unconstrained extraction from the zone could have negative environmental and water quality impacts. Water resource works approvals which permit the taking of water within the Upper Pike River Extraction Management Zone are a specified class of approvals.

The following principles apply to water resource works approvals where the construction, operation and maintenance of pumping infrastructure is located within the Upper Pike River Extraction Management Zone:

89. All water resource works approvals granted prior to the date of adoption of the 2019 Plan (which came into effect on the 28 February) are subject to the following condition:
- a. the maximum volume of water that may be taken by the works to which the water resource works approval relates is equal to the volume of water permitted to be used by all current site use approvals that existed as at 3 October 2017 and are attached to the same land as the water resource works approval.
90. The Minister may not grant or vary a water resource works approval where it will result in an increase to the total volume of water that is authorised to be taken from the Upper Pike River Extraction Management Zone as at the date of adoption of the 2019 Plan (which came into effect on the 28 February), unless:
- a. The grant or variation will only permit a pump inlet diameter no greater than 50 mm (2 inches)
 - b. The grant or variation will only permit a pump which is able to be operated when water levels are varied to between 14.0 m AHD and 17.0 m AHD, and
 - c. The applicant requires water for stock and / or domestic needs and there are no other suitable sources of water for stock and / or domestic needs available to the applicant.

91. The Minister may vary a condition of a water resource works approval in the Upper Pike River Extraction Management Zone in the following circumstances:
- a. If the total annual take within the Upper Pike River Extraction Management Zone exceeds the resource monitoring trigger set out at Principle 145, and if, in the Minister's opinion, the variation is appropriate or desirable to prevent, reduce or address damage to the River Murray, or
 - b. If at least 10 percent of the volume of water which may be taken by the works has not been taken during at least one water use year within any ten year period after the approval was granted.
92. If the Minister varies a water resource works approval in accordance with this Plan and the variation:
- a. Relates to the volume of water authorised to be taken by the works, and
 - b. Is inconsistent with the volume determined pursuant to Principle 89,
- the water resource works approval shall prevail to the extent of the inconsistency.

NB. The examples below are intended to aid in the interpretation of Principle 91b. These examples are not exhaustive and do not limit the application of Principle 91b in any way.

Example 1: Water User A has the benefit of a water resource works approval which is subject to a condition that no more than 100ML per annum may be taken through the works. Water User A doesn't use take water through the works until year nine of any ten year period. A total of 5ML is then taken in that water use year, and again during the following water use year. During each year of the ten year period in which water was taken, Water User A has taken 5% of the permitted volume. In this example, the Minister may vary the works approval under clause 91b as Water User A has not taken at least 10% of the approval volume in any water use year within a 10 year period.

Example 2: Water User B has the benefit of a water resource works approval which is subject to a condition that no more than 100ML per annum may be taken through the works. Water User B doesn't take any water until year nine of a ten year period. 40ML is taken during that water use year, and the following water use year. During each year of the ten year period in which water was taken, Water User B has taken 40% of the permitted volume. In this example, the works approval may not be varied under clause 91b as more than 10% of the approval volume has been taken in a single water use year within a ten year period.

Example 3: Water User C has the benefit of a water resource works approval which is subject to a condition that no more than 100ML per annum. Water User C takes 5ML in every water use year during the first four water use years of a ten year period (less than 10%). Water User C then increases water take to 10ML, 20ML and 30ML respectively for the next three years (all years over 10%). Water User C's take reverts to 0ML in the last three years of the ten year period. In this example, as more than 10% has been taken in water use years 5, 6 and 7 within the ten year period, the works approval may not be varied under clause 91b.

	SUA (ML)	Volume used (ML)											Minister may vary?
		Year											
		1	2	3	4	5	6	7	8	9	10		
Example 1 – Water User A	100	0	0	0	0	0	0	0	0	5	5	Yes	
Example 2 – Water User B	100	0	0	0	0	0	0	0	0	40	40	No	
Example 3 – Water User C	100	5	5	5	5	10	20	30	0	0	0	No	

6.2.3 Lower Murray Reclaimed Irrigation Areas Management Zone

Water resource works approvals that permit the taking of water allocations relating to Class 8 water access entitlements for the purpose of environmental land management within the Lower Murray Reclaimed Irrigation Area are a specified class of approval.

93. A water resource works approval that relates to water allocations relating to Class 8 water access entitlements may only be granted provided it can be demonstrated to the satisfaction of the Minister that the combined works, including but not limited to, pumps, siphons, sluice gates, drainage channels, levees and meters are able to deliver water allocations relating to Class 8 water access entitlements to the entire ELMA eligible land parcel area.
94. A works approval will be cancelled if infrastructure enabling the application of the water allocations relating to Class 8 water access entitlements is inadequate and/or is removed and not repaired or replaced within five water use years or is otherwise unable to efficiently deliver water to the ELMA eligible land parcel (for example, but not limited to, a collapsed or poorly maintained levee bank or pump/siphon related infrastructure).

Conditions of Works Approvals in the LMRIA

95. All works necessary to enable the application of water allocations relating to Class 8 water access entitlements over the entire ELMA eligible land area (in ha) must be maintained in good working order in order to achieve the objectives for the LMRIA.
96. In the event that works are damaged, the Department must be notified within 28 days and a plan submitted as to when the works infrastructure is likely to be repaired / reinstated.

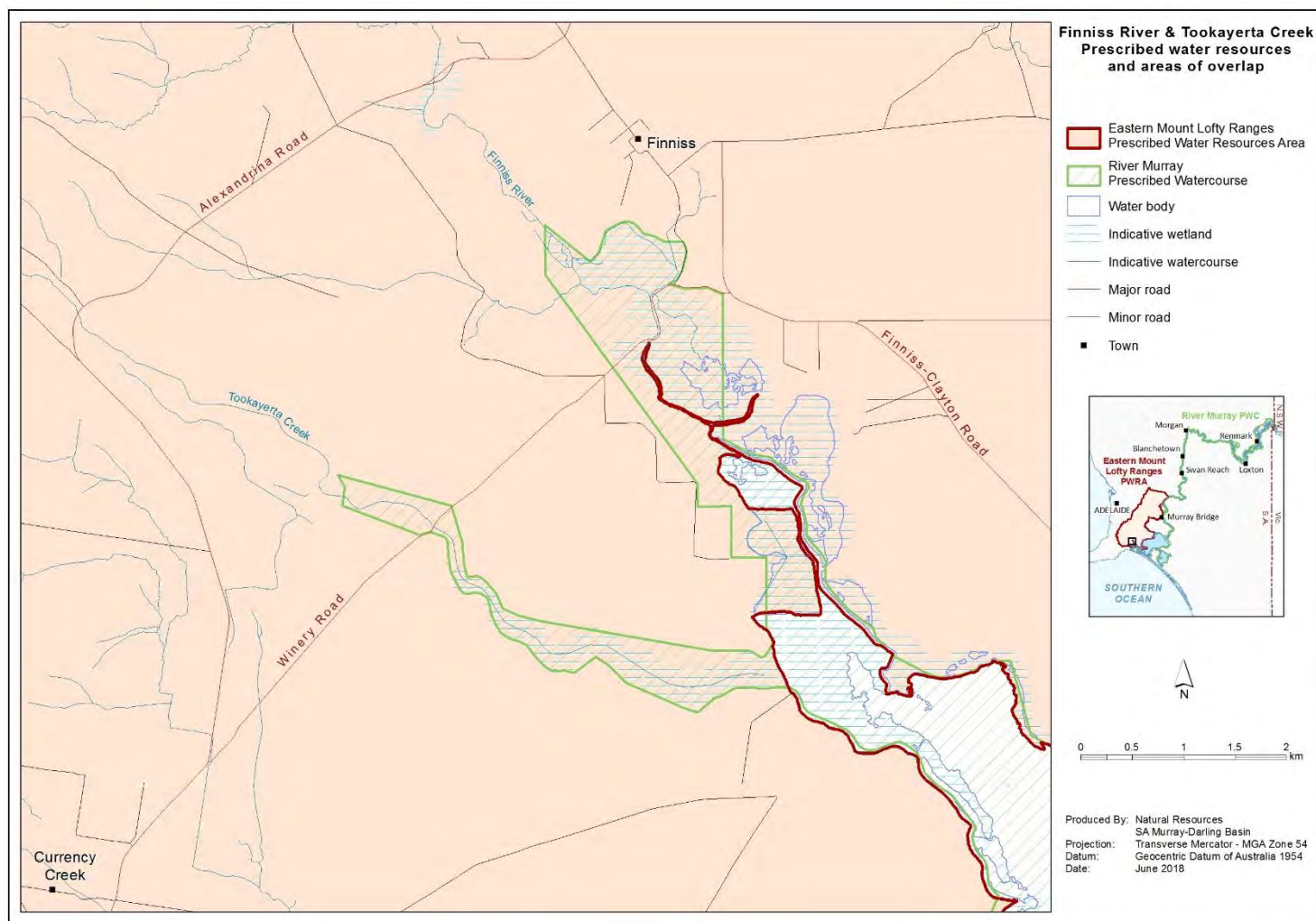


Figure 20: Finniss River and Tookayerta Creek Prescribed Water Resources and Areas of Overlap

6.3 Site Use Approvals

The Landscape Act provides that a site use approval must specify the place where the use is allowed, and other prescribed information relating to the proposed extent, manner and rate of use of water authorised by the approval.

A site use approval is attached to the land constituting that site. A site use approval is subject to conditions prescribed by the regulations, specified by the relevant water allocation plan or endorsed by the Minister.

The Minister may refuse to grant or vary a site use approval if it is contrary to the provisions of the relevant water allocation plan or if the use of the water would have an unreasonable impact on a water resource or other form of natural resource.

Site use approvals allow for management of localised issues that arise from the use of water.

For the purposes of managing the potential impacts of water use, the River Murray PWC has been divided into the following irrigation management zones:

- River Murray Irrigation Management Zone (this area covers the Murraylands and Riverland Landscape Board region with the exclusion of the Angas Bremer Irrigation Management Zone and the Lower Murray Reclaimed Irrigation Areas Management Zone)
- Lower Murray Reclaimed Irrigation Areas Management Zone (see Figure 8, Figure 9, Figure 10), and
- Angas Bremer Irrigation Management Zone (see Figure 21).

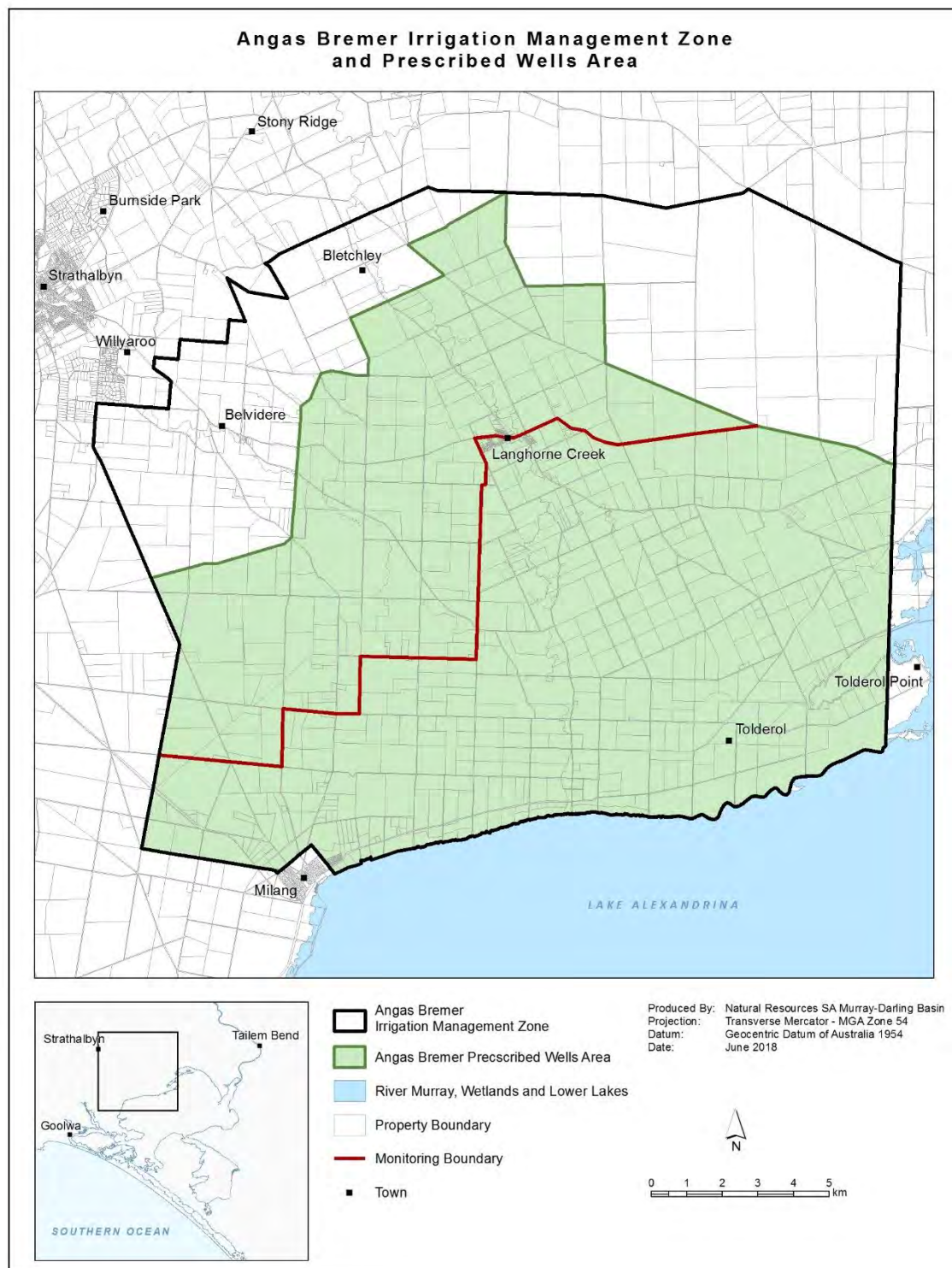


Figure 21: Angas Bremer Irrigation Management Zone and Prescribed Wells Area

6.3.1 The River Murray Irrigation Management Zone

The River Murray Irrigation Management Zone covers most of the Murraylands and Riverland Landscape Board region, excluding the Angas Bremer and Lower Murray Reclaimed Irrigation Areas Management Zones.

Under Schedule B of the Agreement, South Australia is obliged to ensure that actions which increase salinity in the River Murray are offset by actions which decrease salinity in the River Murray.

Basin Salinity Register credits and debits are the method of accounting for a Basin state's salinity impact on the River Murray and confirming that a state remains compliant with its obligations under the Agreement.

Under the Agreement, Basin states are required to maintain Basin Salinity Register entries in balance or in surplus by offsetting any actions which will increase salinity impacts (debits) such as irrigation, with actions that reduce salinity impacts (credits) such as salt interception schemes.

Salinity Impact Zones

For the purposes of managing salinity impacts and meeting South Australia's obligations under Schedule B of the Agreement, the River Murray Irrigation Management Zone contains two salinity management zones. These are:

- High Salinity Impact Zone, and
- Low Salinity Impact Zone.

These zones are referred to collectively as the salinity impact zones.

An overview map showing the location of the two zones is detailed at Figure 7.

Within the salinity impact zones, an application to grant or vary a site use approval needs to demonstrate to the Minister's satisfaction that it will not result in an increase to the total volume of water that is authorised to be used for irrigation purposes on site use approvals, or that any potential salinity impacts of the water use will be appropriately offset for the purpose of the Agreement.

Site use approvals which permit the use of water for irrigation purposes on land within the salinity impact zones are a specified class of approvals.

The following principles apply to water use within the salinity impact zones.

97. The Minister may not grant a site use approval where it will result in an increase, or further increase, to the total volume of water that is authorised to be used for irrigation purposes on site use approvals in the High Salinity Impact Zone or Low Salinity Impact Zone except in the following circumstances:
 - a. It can be demonstrated to the Minister's satisfaction that any potential salinity impacts can be offset, or
 - b. Where the applicant can demonstrate that they require the granting of the site use approval to meet the irrigation requirements of a development to which they have made a significant financial or legal commitment.
98. The Minister should not vary a site use approval where it will result in an increase, or further increase, to the total volume of water that is authorised to be used for irrigation purposes on site use approvals in the High Salinity Impact Zone or Low Salinity Impact Zone, except in the following circumstances:
 - a. It can be demonstrated to the Minister's satisfaction that any potential salinity impacts can be offset, or
 - b. Where an existing site use approval was in place as at 20 February 2018, and the variation relates to a change in crop type or an increase in water requirements for an existing crop and the current irrigated area (based on the maximum irrigated crop area over the past five years) will not be increased, or
 - c. Where the applicant can demonstrate that they require the variation of the site use approval to meet the irrigation requirements of a development to which they have made a significant financial or legal commitment.
99. For the purposes of Principles 97 and 98 the combined total volume of water that is authorised to be used for irrigation purposes on site use approvals in the High Salinity Impact Zone and the Low Salinity Impact Zone is 556 GL.
100. For the purposes of Principles 97 and 98 the total volume of water that is authorised to be used for irrigation purposes on site use approvals in the High Salinity Impact Zone is 523 GL.
101. The Minister may vary the conditions of any site use approval within a salinity impact zone in the following circumstance:
 - a. If the Minister is of the opinion that the variation is appropriate, necessary or desirable to enable the South Australian Government to meet its obligations under Schedule B of the Agreement.

Conditions on Site Use Approvals

River Murray Irrigation Management Zone

102. All site use approvals for the purposes of irrigation in the River Murray Irrigation Management Zone are subject to the following conditions:
- a. A person who has the benefit of a site use approval must use or apply water using water efficient technologies and techniques appropriate for the particular circumstance and in accordance with industry best practice standards, and/or consistent with the *Pressurised Irrigation Best Management Practice Guidelines* (Rural Solutions 2013a), and
 - b. The volume of water authorised to be used under the site use approval for the purpose of irrigation will not exceed the reasonable irrigation requirements determined in accordance with Appendix A.

Salinity Impact Zones

103. All site use approvals in the salinity impact zones, granted after the date of adoption of the 2019 Plan (which came into effect on the 28 February) in accordance with Principle 97.b are subject to the following conditions:
- a. At least 80 percent of the maximum volume of water authorised for use by the site use approval must be used during at least one water use year within ten years of the approval being granted, and
 - b. The volume of water authorised to be used in accordance with 97.b. will expire:
 - i. with respect to site use approvals granted in the High Salinity Impact Zone, after 30 years of it having been granted;
 - ii. with respect to site use approvals granted in the Low Salinity Impact Zone, after 60 years of it having been granted.
104. All site use approvals in the salinity impact zones, in existence at the date of adoption of the 2019 Plan (which came into effect on the 28 February), but varied after the date of adoption of the 2019 Plan so as to permit an additional volume of water to be used, in accordance with Principle 98.c., are subject to the following conditions:
- a. At least 80 percent of the additional volume of water authorised for use by the variation must be used during at least one water use year within ten years of the approval being varied, and
 - b. The additional volume authorised to be used by the variation will be deducted so that the volume of water authorised to be used by the site use approval will revert back to the volume authorised by the approval prior to it being varied pursuant to Principle 98.c:
 - i. with respect to site use approvals in the High Salinity Impact Zone, after 30 years of it having been varied;
 - ii. with respect to site use approvals in the Low Salinity Impact Zone, after 60 years of it having been varied.

6.3.2 The Angas Bremer Irrigation Management Zone

To address the issues of rising water tables and soil salinisation associated with irrigation, the following principles apply to the Angas Bremer Irrigation Management Zone, as delineated in Figure 21.

Principle 108 relates to a specified environment improvement program, pursuant to section 142(3)(b)(ii) of the Landscape Act, whereby revegetation is recognised as a mechanism to offset the impacts that irrigation has on the land within the Angas Bremer Irrigation Management Zone. Deep-rooted plants have the potential to intercept excess irrigation water before it reaches groundwater, and will help to manage shallow regional groundwater levels (Angas Bremer Water Management Committee 2013). Principles 105 and 106 set out the conditions that will apply to site use approvals for this zone.

105. A person who has the benefit of a site use approval for irrigation purposes must use or apply water using water efficient technologies and techniques appropriate for the particular circumstance and in accordance with industry best practice standards, and/or consistent with the *Pressurised Irrigation Best Management Practice Guidelines* (Rural Solutions 2013a).
106. A person who has the benefit of a site use approval for irrigation purposes shall not use water for irrigation in the area within the Angas Bremer Irrigation Management Zone that is south of the red line in Figure 21 (Monitoring Boundary), unless:
 - a. Where the total volume allocated to be taken on the property from all sources (including the River Murray PWC) in any one water-use year exceeds 500 ML, at least two water table monitoring wells are situated either within, or as close as practicable to, the area to be irrigated, or
 - b. In any other case, at least one water table monitoring well is situated either within, or as close as practicable to, the area to be irrigated.
107. For the purposes of Principle 106, a permit for a water table monitoring well may only be granted in accordance with Principles 136 and 137.
108. Where water is used for irrigation purposes in the Angas Bremer Irrigation Management Zone, non-irrigated vegetation must have been planted and nurtured at a rate of two (2) hectares for every 100 ML in accordance with the *Angas Bremer Irrigation Region Revegetation Booklet* (Angas Bremer Water Management Committee Inc. 2000). The non-irrigated vegetation must be planted with sufficient density to minimise the potential for water-logging on the land to be irrigated or on any other land in the Angas Bremer Irrigation Management Zone.
109. For the purposes of Principle 108:
 - a. 'planted' means vegetation that has been planted, or will be planted, on relevant land (in the case of land not owned by the person who has the benefit of the approval, pursuant to a legally binding agreement or obligation)
 - b. 'nurtured' means reasonable and practical measures are taken to maintain the health of the plants in a satisfactory condition, for example but not limited to, periodic weeding, feral animal control and minimal disturbance by grazing (in the case of land not owned by the person who has the benefit of the approval, pursuant to a legally binding agreement or obligation)

- c. 'relevant land' means land within the Angas Bremer Irrigation Management Zone that is:
- i. Owned by the licensee, or
 - ii. Owned by another person, with the written consent of that person for the use of that land for activities in accordance with Principle 108, or
 - iii. under the care, control and management of the relevant Local Council (under the *Local Government Act 1999*, the *Crown Land Management Act 2009* or other relevant legislation), the Murraylands and Riverland Landscape Board, or a Minister, instrumentality or agency of the Crown, with the written consent of that Council, Board, Minister, instrumentality or agency for the use of that land for activities in accordance with Principle 108.
110. Areas planted prior to the date of adoption of this Plan within the Angas Bremer Irrigation Management Zone to meet the requirements of Principle 108, or similar Principles in the *Water Allocation Plan for the Eastern Mount Lofty Ranges*, *Water Allocation Plan for the Angas Bremer Prescribed Wells Area* or an earlier version of the *Water Allocation Plan for the River Murray Prescribed Watercourse*, will continue to be recognised for those purposes under this Plan.
111. Future plantings should be located upon relevant land in areas where there is a high risk of rising shallow watertables, for example but not limited to, where the shallow watertable is within four (4) metres of the land surface and preferably south of the red line in Figure 21, unless it can be demonstrated it is not practical to do so.
112. The maximum spacing between individual plants should not exceed 10 m, regardless of whether the planting is a single row or block. The area of plantings will be calculated by application of the following formulae:
- a. The area of single row plantings is calculated as follows:

$$A_{SR} = 10_W \times (L + 10_L)$$
 Where:

A_{SR} = Area of single row planting (in m²)

10_W = 10 metres – assumed width of mature trees (regardless of the species planted)

L = Length of the row (in m)

10_L = 10 metres – allowance of additional length of 5 m either side of the first and last plant to be claimed and included in the row area calculation
 - b. The area of block plantings is calculated as follows:

$$A_B = (L + 5_L) \times (W + 5_W)$$
 Where:

A_B = Area of the block planting (in m²)

L = Length of block planting (in m)

5_L = 5 metres – allowance of additional length of 5 m to be claimed and included in the block area calculation

W = Width of block planting (in m)

$5_w = 5$ metres – allowance of additional width of 5 m to be claimed and included in the block area calculation (in m)

6.3.3 Lower Murray Reclaimed Irrigation Areas Management Zone

The following principles apply to the use of Class 3 (High Security) water allocations within the Lower Murray Reclaimed Irrigation Areas Management Zone, as delineated in Figure 8, Figure 9 and Figure 10. Principles 113 and 114 are conditions of the site use approvals for this zone.

- 113. A person who has the benefit of a site use approval must use or apply water using water efficient technologies and techniques, appropriate for the particular circumstance and in accordance with industry best practice standards and/or consistent with the *EPA Guidelines for Lower Murray Reclaimed Irrigation Areas* (EPA 2013).
- 114. The volume of water authorised to be used under the site use approval for the purpose of irrigation will not exceed the reasonable irrigation requirements determined in accordance with Appendix A.

The following principles apply to the use of Class 8 water allocations within the Lower Murray Reclaimed Irrigation Areas Management Zone, as delineated in Figure 8, Figure 9 and Figure 10 and listed in Table 21. Site use approvals that permit the use of Class 8 water allocations from the Lower Murray Reclaimed Irrigation Area for environmental land management purposes are a specified class of approvals.

- 115. The Minister will only grant site use approvals that relate to Class 8 water allocations to applicants who own or occupy land within the Lower Murray Reclaimed Irrigation Area that are identified as ELMA eligible land parcel/s as listed in Table 21.
- 116. The Minister may refuse to grant or may cancel a site use approval related to Class 8 water allocations where water has not been applied to the ELMA eligible land area for five or more consecutive water use years.

Conditions of Site Use Approvals

- 117. A person who has the benefit of a site use approval must use or apply water using water efficient technologies and techniques, appropriate for the particular circumstance and in accordance with industry best practice standards and/or consistent with the *EPA Guidelines for Lower Murray Reclaimed Irrigation Areas* (EPA 2013).
- 118. A person who has the benefit of a site use approval using water allocations that relate to Class 8 water access entitlements within the All Purpose Consumptive Pool, must:
 - a. Only apply water allocations relating to Class 8 water access entitlements on the specified area (in ha) of ELMA eligible land within the LMIRA as listed in Table 21.
 - b. Apply water allocations relating to Class 8 water access entitlements for the purpose of contributing to the objectives for the LMIRA set out in Section 5.5.1.
 - c. Apply water allocations relating to Class 8 water access entitlements on the land or each land parcel as specified on the approval at the rate applicable to the relevant irrigation area (as set out in Column 2 or 3 of Table 15).

- d. Apply Class 8 water allocations relating to Class 8 water access entitlements to the entire ELMA eligible parcel/s area (in ha) at least once within every five consecutive water use years.

6.3.4 Wetland Use

The following principles apply to the granting of site use approvals for wetlands.

- 119. A site use approval may only be granted with respect to a wetland or wetlands:
 - a. Where the water is proposed to be used consistent with the specified environment improvement program approved by the Minister
 - b. Where it will not cause, or be likely to cause, a significant increase in salinity of the River Murray except where the increase can be offset by an agreement, undertaking, or obligation for works, actions or practices or managed through an environmental improvement program to prevent increases in salinity, and
 - c. If the Minister is satisfied that the wetland or wetlands will be managed with a hydrological regime that will have environmental benefits, which may include those listed in Principle 54.

6.3.5 Artificial Water Bodies

The following principles apply to site use approvals where a water allocation is required for the purpose of filling and maintaining an artificial water body.

All site use approvals granted for artificial water bodies are subject to the conditions set out in Principles 121 and 122.

- 120. A site use approval will only be granted for an artificial water body where a water allocation is used to create or maintain the water level of the artificial water body, and where the use of water will not cause or be likely to cause a significant increase in salinity of the River Murray.
- 121. If required by the Minister, by notice in writing, the person who has the benefit of the site use approval for an artificial water body must develop an environment improvement program to the satisfaction of the Minister, which details how any increase in salinity of the River Murray that will arise as a result of the approved use will be offset.
- 122. If a program required by the Minister pursuant to Principle 121 is approved by the Minister, the person who has the benefit of the site use approval must comply with that program.
- 123. Water shall not be used within an artificial water body where it will cause detriment to the environment.
- 124. The maximum volume authorised to be used under the terms of a site use approval pursuant to Principle 120, will be the greater of:
 - a. The water required to fill and maintain the artificial water body, which will be considered to be:

- i. in the first water-use year (or part of that year) that the artificial water body is filled, a quantity of water that is at least equal to the volume of water required to fill the artificial water body as determined in accordance with Principle 78; and
- ii. the quantity of water lost through evaporation and required to maintain the water level of the artificial water body, as determined by Principle 79.

6.3.6 Water Use Outside of the Murraylands and Riverland Landscape Board Region

The following principles apply to the granting of site use approvals for the use of River Murray PWC water on land outside of the boundary of the Murraylands and Riverland Board region.

- 125. A site use approval may not be granted where:
 - a. It will cause, or is likely to cause, a rise in the underground water level resulting in detrimental effects to ecosystems
 - b. It results, or is likely to result in, adverse effects on the natural flow or quality of another water resource (excluding effluent)
 - c. It may adversely affect the productive capacity of the land, including salinity, waterlogging or perched water tables, or
 - d. It may adversely affect water-dependent ecosystems.
- 126. Principle 125 does not apply with respect to land within the Torrens and Onkaparinga Aqueducts as defined in Figure 22, Figure 23 and Figure 24.
- 127. Principle 125 does not apply if a Water Affecting Activity Control Policy or the water allocation plan applying to the region of the site use approval contains principles and policies about the granting of site use approvals.

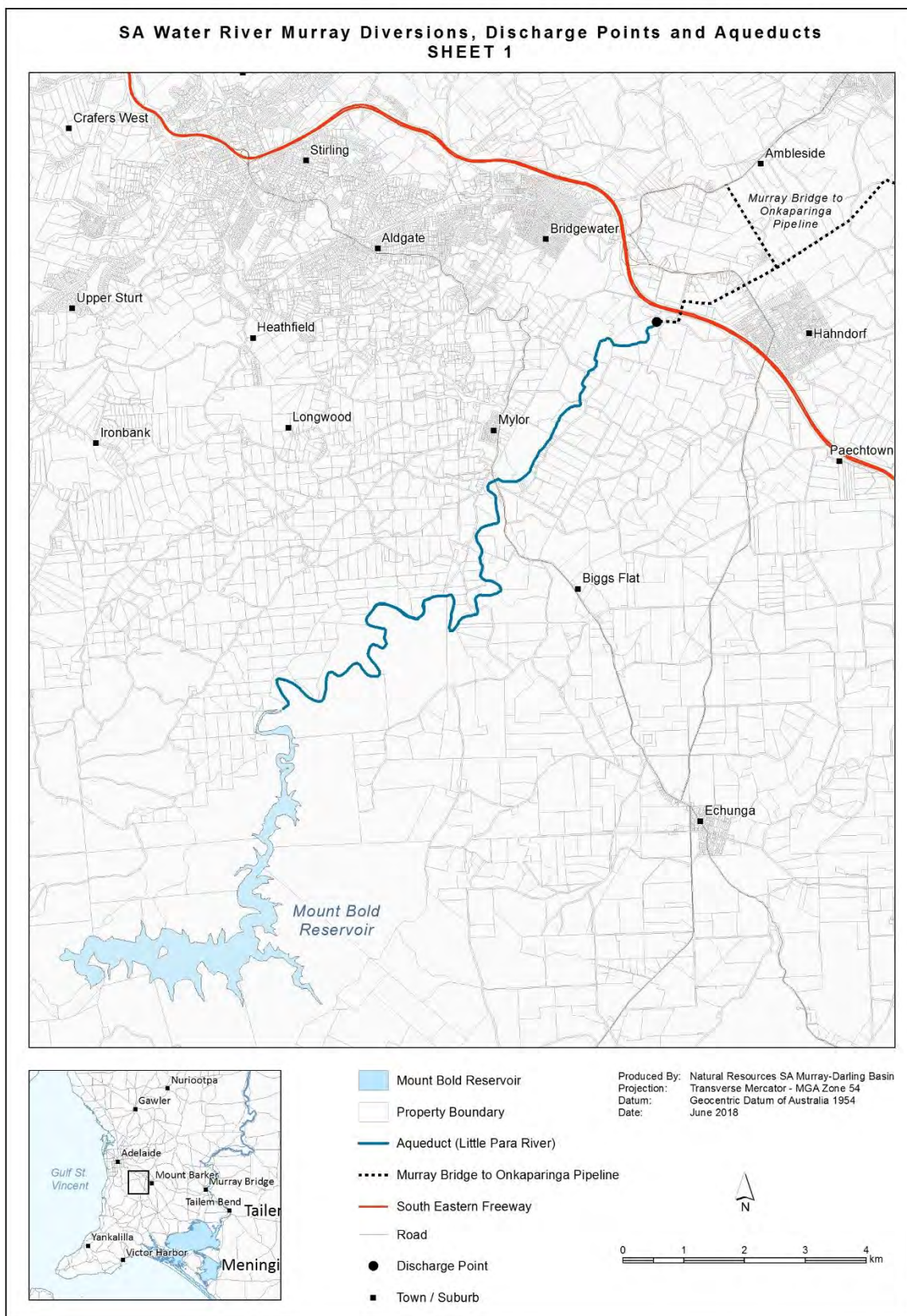


Figure 22: SA Water River Murray diversions, discharge points and aqueducts Sheet 1

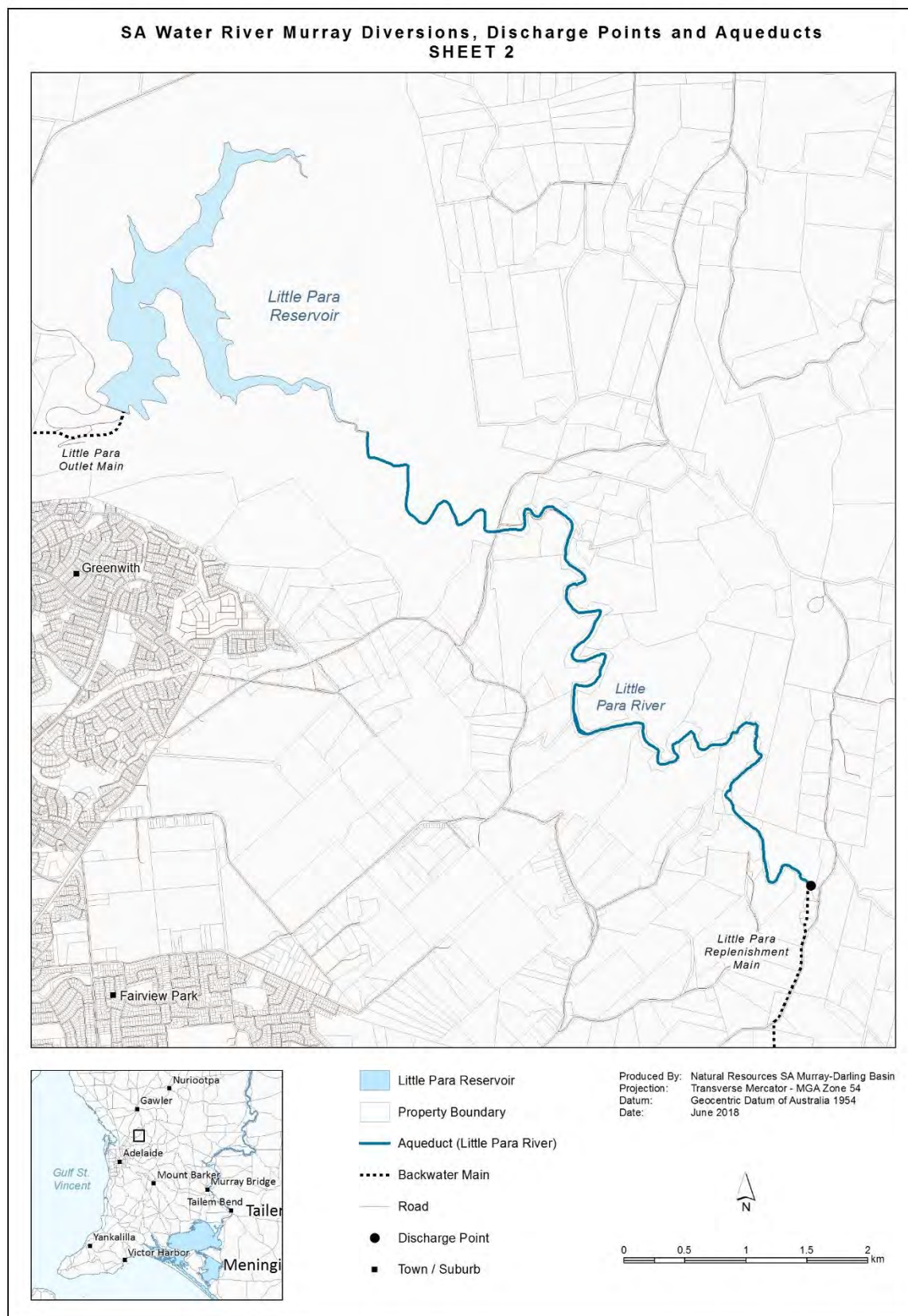


Figure 23: SA Water River Murray diversions, discharge points and aqueducts Sheet 2

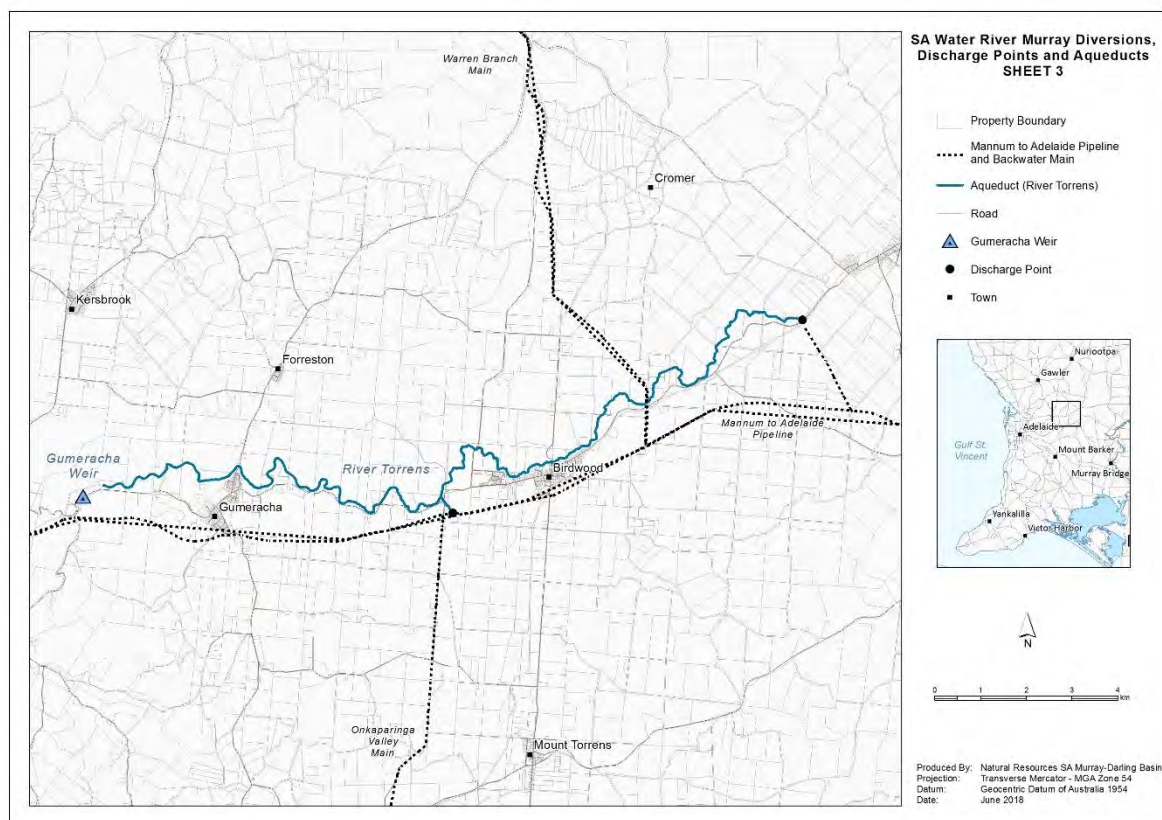


Figure 24: SA Water River Murray diversions, discharge points and aqueducts Sheet 3

7 TRANSFERS OF WATER ACCESS ENTITLEMENTS AND WATER ALLOCATIONS

This chapter sets out the objectives and principles for the transfer (or trade) of water access rights (including water licences, water access entitlements and water allocations) within the River Murray PWC or under an Interstate Water Entitlements Transfer Scheme (IWETS).

A transfer may involve a change in ownership of a water access right and/or a change in the location at which water to which the right relates may be taken. It includes the transfer of the whole or part of a water access right for a limited (temporary) or permanent (absolute) period, and includes a transfer that does not involve the payment of consideration.

In setting out rules that permit and regulate the transfer of water access rights, the Plan seeks to further the objectives and outcomes in relation to trading in the market set out in section 5.07 of the Basin Plan. Transfer criteria contained in the Plan is consistent with the water trading rules contained in Chapter 12 of the Basin Plan.

7.1 Objectives

The following objectives apply to the transfer of water licences, water access entitlements and water allocations – including orders for water made under tagged water access entitlements within the River Murray PWC or under an Interstate Water Entitlements Transfer Scheme.

- a. Enable the transfer of water rights in a sustainable manner.
- b. Facilitate an efficient water market and opportunities for trading.
- c. Contribute to the water needs of water-dependent ecosystems.
- d. Contribute to fulfilling South Australia's obligations under Basin-wide plans and legislation.
- e. Recognise and protect the needs of the environment.
- f. Contribute to the prevention of adverse impacts on water quality.
- g. Contribute to the prevention of increased soil salinity and acid sulfate soils and associated land management issues.

7.2 General Principles

The following principles apply to the transfer of water access entitlements and water allocations (water licences)³¹ – including orders for water made under tagged water access entitlements within the River Murray PWC or under an Interstate Water Entitlements Transfer Scheme (IWETS)³².

128. Water access entitlements and water allocations that relate to Class 8 within the All Purpose Consumptive Pool (ELMA) and water access entitlements that relate to the Metropolitan Adelaide Consumptive Pool must not be transferred. Transfer of water allocations that relate to the Metropolitan Adelaide Consumptive Pool may only be made where such a transfer does not contravene the requirements of the Agreement.
129. Water allocations obtained as carryover held against a South Australian water access entitlement under section 127(8) of the Landscape Act may be transferred³³.
130. In accordance with the Basin Plan, the Minister may be entitled to restrict the trade of a water access entitlement or a water allocation:
 - a. By imposing a restriction on changing the location at which the water to which the right relates may be taken, or
 - b. By imposing a volumetric limit whose purpose or effect is to cap the total volume of water that may be traded out of the area³⁴.
131. Pursuant to the Basin Plan, any such restriction on trade by the Minister in accordance with Principle 130 will also apply to the order for water under a tagged water access entitlement, except for as follows:
 - a. The restriction will not apply to a tagged water access entitlement which is established before 22 October 2010³⁵.
 - b. The restriction will also not apply to a tagged water access entitlement established on or after 22 October 2010 and before 24 November 2012, for the duration of the period 1 July 2014 and 1 July 2019³⁶.
132. An exchange rate must not be applied to the trade of a water access entitlement except in the circumstances permitted under section 12.22 of the Basin Plan.

³¹ A water allocation plan may set out policies and principles to assist in regulating the transfer of, or dealings with, water management authorisations, section 53(7)(a) Landscape Act.

³² Refer Landscape Act section 3. IWETS means (a) a scheme for the transfer of entitlements between two or more states under the Agreement; or (b) an agreement between South Australia and one or more other states or a territory entered into under section 154 of the Landscape Act.

³³ This principle is included to be consistent with Basin Plan 2012 (Cth) sections 12.11 – 12.12.

³⁴ This principle is included to be consistent with Basin Plan 2012 (Cth) sections 12.16, 12.17, 12.18 and 12.19.

³⁵ This principle is included to be consistent with Basin Plan section 12.38. Also see Basin Plan Explanatory Statement para 760 which explains that 22 October 2010 was the first public draft of the rule related to tagged trade.

³⁶ This principle is included to reflect Basin Plan 2012 (Cth) section 12.23.

8 PERMITS

A permit is required to undertake water affecting activities contained within sections 104(3) or 104(4) of the Landscape Act.

This chapter sets out principles used to assess an application for a permit to undertake certain water affecting activities (WAA) in the River Murray PWC.

The objectives and principles set out in this chapter operate in conjunction with the objectives and principles for assessing water affecting activity permit applications set out in the *Murraylands and Riverland Water Affecting Activities Control Policy* (Regional WAA Control Policy). Under section 102 (3)(c) of the Landscape Act, the Regional WAA Control Policy may set out the matters that the Minister will consider when exercising the powers to grant or refuse permits for water affecting activities. In addition to the matters set out in the Regional WAA Control Policy, section 53(1) (h)(iii) allows for this Plan to set out further principles that apply to the River Murray PWC regarding the granting of permits by the Minister. This chapter sets out principles to be considered in addition to those in the Regional WAA Control Policy.

As set out in the section of the Regional WAA Control Policy relating to water affecting activities:

A water allocation plan may set out additional policies that the relevant authority will take into account when considering an application for a WAA permit. The policies in a water allocation plan may be different to the policies in the WAA Control Policy. To the extent that a water allocation plan includes different policies, the policies in the WAA Control Policy will not apply to that prescribed water resource.

A person may only undertake the activities listed in sections 104(3) or 104(4) () of the Landscape Act if the relevant authority shown in Table 16 has granted a permit to authorise the activity, or if section 106 of the Landscape Act authorises the activity to be performed without a permit.

The Landscape Act and the *Planning, Development and Infrastructure Act 2016* have complementary roles in dealing with activities that are both a 'water affecting activity' and 'development' under the respective Acts. If development approval is required for an activity that would otherwise require a water affecting activity permit, the *Planning, Development and Infrastructure Act 2016* set out arrangements so that the development approval process takes into account natural resources management issues, thereby requiring only one authorisation. That is, a separate water affecting activity permit application under the Landscape Act would not be required.

In accordance with the *Native Title Act, 1994*, applications for permits to undertake an activity on land which may affect native title and where native title has not been extinguished will require the Minister to consider the requirements of the Native Title Act or, where modified by an ILUA, the process in the ILUA prior to grant of the permit.

Any person undertaking works related to any of the activities listed in Table 16 should also be aware of their legal obligations under the *Aboriginal Heritage Act, 1988*, which provides for the protection and preservation of Aboriginal sites, objects and remains within South Australia. Owners or occupiers of a parcel of land, and agents of these (including staff, contractors and subcontractors), have legal responsibilities under the Aboriginal Heritage Act when Aboriginal sites, objects or remains are discovered or where they may be at risk of damage, disturbance or interference.

Table 16: Relevant authorities for water affecting activities

Reference	Description of water affecting activity	Landscape Act Section	Relevant Authority
Section 8.1 & 8.2	Drilling, plugging, backfilling or sealing of a well	104 (3)(a)	Minister
Regional WAA Control Policy	Repairing, replacing or altering the casing, lining or screen of a well	104(3)(b)	Minister
Regional WAA Control Policy	Draining or discharging water directly or indirectly into a well	104 (3)(c)	Minister
Regional WAA Control Policy	The erection, construction, modification, enlargement or removal of a dam, wall or other structure that will collect or divert, or collects or diverts: <ul style="list-style-type: none"> • Water flowing in a prescribed watercourse; or • Water flowing in a watercourse in the Mount Lofty Ranges Watershed that is not prescribed; or • Surface water flowing over land in a surface water prescribed area or in the Mount Lofty Ranges Watershed 	104 (3)(d)	Board
Regional WAA Control Policy	The erection, construction, modification, enlargement or removal of a dam, wall or other structure that will collect or divert, or collects or diverts, water flowing in a watercourse that is not in the Mount Lofty Ranges Watershed and that is not prescribed or flowing over any other land that is not in a surface water prescribed area or in the Mount Lofty Ranges Watershed	104 (4)(a)	Board
Regional WAA Control Policy	The erection, construction or placement of any building or structure in a watercourse or lake or on the floodplain of a watercourse	104 (4)(b)	Board
Regional WAA Control Policy	Drainage or discharging water directly or indirectly into a watercourse or lake	104 (4)(c)	Board
Regional WAA Control Policy	Depositing or placing an object or solid material in a watercourse or lake	104 (4)(d)	Board
Regional WAA Control Policy	Obstructing a watercourse or lake in any other manner	104 (4)(e)	Board
Regional WAA Control Policy	Depositing or placing an object or solid material on the floodplain of a watercourse or near the bank or shore of a lake to control flooding from the watercourse or lake	104 (4)(f)	Board
Regional WAA Control Policy	Destroying vegetation growing in a watercourse or lake or growing on the floodplain of a watercourse	104 (4)(g)	Board
Regional WAA Control Policy	Excavating or removing rock, sand or soil from – <ul style="list-style-type: none"> • A watercourse or lake or the floodplain of a watercourse; or • An area near to the banks of a lake so as to damage, or create the likelihood of damage to, the banks of the lake 	104 (4)(h)	Board

Reference	Description of water affecting activity	Landscape Act Section	Relevant Authority
Regional WAA Control Policy	Using water in the course of carrying on a business in a landscape management region at a rate that exceeds the rate prescribed by a water allocation plan or a water affecting activity control policy if the water has been brought into the region by means of a pipe or other channel	104 (4)(i)	Minister
Regional WAA Control Policy	Using effluent in the course of carrying on a business in a landscape management region at a rate that exceeds a rate prescribed by a water allocation plan or a water affecting control policy	104 (4)(j)	Minister
Regional WAA Control Policy	Undertaking commercial forestry	104 (4)(k)	Minister
Regional WAA Control Policy	An activity prescribed by the regulations	104 (4)(l)	To be determined

8.1 Drilling of wells along the length of the River Murray

The following objectives and principles apply to permits for the activity of drilling or sealing a well under section 104(3)(a) of the Landscape Act.

8.1.1 Objectives

- a. Minimise or limit adverse impacts associated with connected water resources.

8.1.2 Principles

133. Wells shall not be permitted to be drilled for the purpose of irrigation at any location on the River Murray floodplain or within 1 km from the cliff edge (highlands) associated with the River Murray Prescribed Watercourse unless it can be demonstrated to the satisfaction of the Minister that:
 - a. The taking of water from the well is not likely to cause a lowering of the watertable to the extent that it may impact on the River Murray prescribed watercourse or other surface water feature; and
 - b. The taking of water from the well will not have a detrimental impact on any groundwater dependent ecosystems.
134. An exemption to principle 133 will apply where the taking of the groundwater would have an environmental benefit for example but not limited to, acting as a salt interception scheme and/or reducing an irrigation mound as a result of irrigation drainage.

8.2 Drilling of Monitoring Wells

The following objectives and principles apply to permits for the activity of drilling or sealing a monitoring well under section 104(3) (a) of the Landscape Act.

8.2.1 Objectives

- a. To monitor the effects of using water from the River Murray PWC on other water resources.

8.2.2 Principles

135. Principles 136 to 137 apply to the construction of monitoring wells where these wells are required by Principle 106.
136. A permit may only be granted for the purpose of drilling or sealing a water table monitoring well where:
 - a. The proposed well is completed to two (2) metres below the current standing water table to a maximum depth of six (6) metres
 - b. The proposed well is cased with 75 mm ID (internal diameter) Class 12 UPVC with three metres of slots directly above the bottom of the well, and a PVC bottom cap
 - c. The casing of the proposed well extends one (1) metre above the natural surface of the land
 - d. The slotted section of the proposed well is covered with a geotextile fabric commonly referred to as terra firma fibre cloth
 - e. The bottom metres of the annulus (area outside the casing) of the proposed well is backfilled with 1.5 mm graded sand
 - f. The annulus of the proposed well is backfilled with cement from the top of the graded sand (see above) to the surface, and
 - g. The casing of the proposed well that extends above the natural surface of the land is protected by an outer sleeve of galvanised pipe 1.5 m in length, with a wall thickness of 4 mm and a screw-on top cap, and set into cement at the ground surface.
137. A permit may only be granted for the purpose of drilling or sealing a water table monitoring well where the proposed location of the monitoring well is:
 - a. Within the property or area of land where allocated water is used for irrigation purposes, and
 - b. At the lowest practicable point on that property or area of land.

9 MONITORING AND EVALUATION

Section 53(1)(f) of the Landscape Act sets out that a water allocation plan must provide for regular monitoring of the capacity of the water resources to meet demands for water.

Monitoring and evaluation of water resources, water access entitlements, water use and water-dependent ecosystems provides a mechanism for assessing whether the Plan's objectives are being met, helps to identify actions that need to be taken to protect the resource and dependent users, and improves knowledge. Together, this information allows informed improvements in water management, including changes to the Plan over time.

The South Australian Aboriginal river nations have expressed overwhelmingly the need for adequate monitoring and evaluation of the Plan to assess whether its objectives for sustainable water resource management are being achieved. The Plan provides a mechanism for assessing whether the Plan's objectives are being met, helps to identify actions that need to be taken to protect the resource and dependent users, and improves knowledge. Together, this information allows informed improvements in water management, including changes to the Plan over time.

Aboriginal nations see the monitoring of their lands and waters as an ongoing process, embedded as part of their responsibility to speak for, care for and protect their Country. Through the monitoring, evaluation and reporting process, the Minister's Department and the Board will aim to:

- Provide opportunities for the involvement of Aboriginal nations in the management, planning and monitoring of water resources, and
- Provide opportunities for the capacity and experience building of Aboriginal nations in water resource management.

9.1 Objectives

Monitoring data is collected to achieve the following objectives:

1. To evaluate the assumptions that underpin the Plan to facilitate improvement
2. To evaluate the effectiveness of the Plan objectives, which are:
 - a) Provide allocations that contribute to the water needs of water-dependent ecosystems (WDEs)
 - b) Allocate water in a sustainable and equitable manner between the different users;
 - c) Promote the efficient use of water from the prescribed watercourse
 - d) Contribute to fulfilling South Australia's obligations under Basin wide plans and legislation
 - e) Contribute to the prevention of loss of condition, number or extent of refuge habitats and dependent aquatic biota of floodplains, wetlands, and sites of significance
 - f) Contribute to the prevention of adverse impacts on water quality, and
 - g) Contribute to the prevention of increased soil salinity and acid sulfate soils and associated land management issues.

9.1.1 Evaluation and Reporting

Table 17 provides information on what, when and how the resource is monitored. It indicates the measures or tools that, through best endeavours, will be undertaken or used to assess the level to which the Plan is achieving the objectives. The management of River Murray PWC and its environment is shared across several programs within South Australia and the Commonwealth. The evaluation of this Plan intends to use, where possible, the monitoring data, information and reports from programs regarding the state or condition of the River Murray PWC and the outcomes of allocations, water availability and water use. Principles in Section 9.2 identify where additional information is required to assess if the objectives are being met.

Table 17: Evaluation and reporting

Objective (a): Provide allocations that contribute to the water needs of water-dependent ecosystems (WDEs)			
Evaluation Question	Measure	Frequency/who	Explanation of measure
Was the water available to allocate to the WDEs?	Number and value of allocations from Wetland and Environmental Consumptive Pools	Annually, DEW	Allocations are for a 12 month period, and can be adjusted within the year. This measure indicates the level of activity and delivery of environmental allocations utilised for WDEs.
	The Annual Environmental Watering Plan, South Australia's River Murray Environmental Watering Report	Annually, DEW	The Plan indicates the priority wetlands/floodplains for watering and recommended watering requirements (regime, level of inundation, volume). The report indicate the sites that received watering and refers to monitoring that indicates changes to condition of WDEs. The reports also note any inhibiting or beneficial events (e.g. low flows, drought, unregulated flow or floods).
	River Murray flows reports	Fortnightly, DEW	The flow reports indicate the volume of water coming into South Australia, if Entitlement is received, forecasts for increases or decreases in flows and storage capacities. This information supports management decisions for variations to the value of consumptive pool shares and diverting unregulated flows.
Objective (b): Allocate water in a sustainable and equitable manner between the different users			
Evaluation Question	Measure	Frequency/who	Explanation of measure
To what extent have the model predictions eventuated?	Review actual conditions (from monitoring) to modelled scenarios. Recalibration of models with monitoring data	Review 1 in 5 years, DEW	Riverine Recovery project has designed several models to identify the appropriate extent for inundation and flows for creeks, wetlands and floodplains to improve riverine ecosystem health. River Murray flow and salt load models (Modflow) are used for Chowilla, Border to Lock 3, Lock 3 to Morgan, Waikerie to Morgan, Morgan to Wellington. The development of annual environmental watering priorities involves modelling of potential scenarios. A review of preferred delivery versus actual delivery is developed at the end of each water-use year.
	River Murray flow reports Real-time water data	Fortnightly, DEW Hourly, DEW	Real-time water data can be viewed online. There are 100 real-time water data loggers located in the River Murray channel from lock 9 in NSW to the Coorong. The loggers record some or all of the following parameters – level (m), storage percent, EC, pH, dissolved oxygen, air temperature, humidity, barometric pressure, wind speed and direction.

Objective (b): Allocate water in a sustainable and equitable manner between the different users (continued)

Evaluation Question	Evaluation Question	Evaluation Question	Evaluation Question
To what extent have the model predictions eventuated?	Ministers announcements on water available to consumptive pools	At least once a year, Gazette	Total volumes available for allocation are determined by the Minister from time to time and at least annually, based on conditions. Allocations can be compared against predictions. www.governmentgazette.sa.gov.au
	Licensing account reports	As needed, DEW	Expected Entitlement and demand of users is a basis for the distribution and value of Water Access Entitlements. Models and monitoring (of flow and demand) are used to assist in management decisions to alter entitlements, which ensure equity and sustainability for all users. WILMA is a database that tracks and stores information on water accounts, Water Access Entitlements, allocations, site use, metered use and trade information. A variety of reports can be extracted to indicate the actual activity of entitlements for comparison to modelled or expected conditions. WILMA is a confidential licensing system managed by DEW.
Was the quality of water provided through the allocations of sufficient quality for its intended use?	Real-time flow data	Hourly, DEW	Chapter 9 of the Basin Plan indicates the water quality targets for broad purposes.
	South Australia's River Murray Environmental Watering Report	Annually, DEW	The Environmental Watering Report contains information on quantity and quality of water applied for environmental watering and the suitability of these values.

Objective (c): Promote the efficient use of water from the Prescribed Watercourse

Evaluation Question	Measure	Frequency/who	Explanation of measure
To what level were efficient methods adopted by Water Access Entitlement holders?	Annual water use reporting	As required, DEW	The collection of water use data on particular crops, location and other scheduling details, can be used to interpret efficiency at a local and regional level and identify areas of improvement (efficiency adoption) over time. See Section 9.2.
	Licensing account reports	Annually, DEW	Variations of site use volumes where site use volumes are in excess of requirements may be an indication of increasing efficiencies. This could also be said for allocation trades and returns to state or transferred to the commonwealth.
	South Australian River Murray Environmental Watering Report	Annually, DEW	The consumptive pools available for wetlands and environment is currently considered less than required. Therefore the use of these allocations will need to be efficient and prioritised to particular areas, regime and ecosystem health and requirements.

Objective (c): Promote the efficient use of water from the Prescribed Watercourse (continued)

Evaluation Question	Evaluation Question	Evaluation Question	Evaluation Question
To what level were efficient methods adopted by Water Access Entitlement holders?	Progress reports from on-farm irrigation efficiency programs	Annually, DEW	The uptake of the <i>On-farm Irrigation Efficiency Programme</i> aims to improve efficiency in irrigation, which returns allocations to the Commonwealth of Australia and the environment. While this program is not directly related to the Plan, this program promotes efficiency and can provide an indication of improved efficiencies.
What were the influences for this adoption?	Annual water use reporting	As required, DEW	Information requested through annual water use reporting. See Section 9.2.
	Progress reports from on-farm irrigation efficiency projects	Annually, DEW	Progress reports and data from irrigation efficiency projects provide information regarding the level of water savings or efficiencies gained through financial incentives or business improvements.
	South Australia's River Murray Environmental Watering Report	Annually, DEW	The annual report on environmental watering outlines reasons for reduced water application, water application with multiple benefits, and where the use of hydrological models or infrastructure is used to promote the most efficient use of water.

Objective (d): Contribute to fulfilling South Australia's obligations under Basin-wide plans and legislation

Evaluation Question	Measure	Frequency/who	Explanation of measure
Have the obligations under Basin-wide plans or legislation remained constant?	Basin Plan reporting	As requested, DEW	The River Murray WAP will form part of the River Murray Water Resources Plan, which is to be Basin Plan compliant by 2019. Accreditation requirements are currently evolving. Communication and Basin Plan reporting requirements will identify the WAP's contribution to Basin Plan obligations.
	Water Planning Report Cards	Biennial, DEW	The Productivity Commission requires South Australia to complete report cards on each water resource area regarding the level of implementation to the national water agreements.
	Salinity reporting	As required, DEW	South Australia has obligations to report on water quality issues in relation to the Basin Plan, Schedule B of the Agreement, <i>Basin Salinity Management 2030</i> , and <i>South Australian Strategic Plan: Target 77</i> .

Objective (e): Contribute to the prevention of loss of condition, number or extent of refuge habitats and dependent aquatic biota of floodplains, wetlands, and sites of significance

Evaluation Question	Measure	Frequency/who	Explanation of measure
Was there the ability to assess the changing condition of the refuge habitats within the PWC?	Annual Environmental Watering Plan, South Australia's River Murray Environmental Watering Report	Annually, DEW	Environmental water is provided to prioritised sites, based on regime and ecosystem health and requirements. The environmental watering plan considers the use of unregulated flows. Monitoring of the wetlands and floodplains is undertaken and results are provided in the report.
There is sufficient water to meet and provide EWPs of the refuge habitats?	South Australia's River Murray Environmental Watering Report	Annually, DEW	The report indicates the volume (allocations and unregulated flow) of water that was received into South Australia. The report indicates the objectives and outcomes regarding the delivery of environmental water and unregulated flows.
	River Murray flow reports Real-time water data	Fortnightly, DEW Hourly, DEW	Flow reports and data indicate the volume of water coming into South Australia, and if Entitlements are being received or unregulated flows are available to assist environmental water provisions.
	Upper Pike River water extraction	At least once a year or as requested, DEW	It has been identified that if all the site use approval volumes in the Upper Pike Extraction Management Zone (UPREMZ) were taken, then environmental thresholds would be reached and there would be significant negative impacts on dependent aquatic ecosystems and particular species. A limit on the total volume on water resource works approvals in the UPREMZ has been introduced and it is important to monitor water extraction for any increasing trends, and to ensure use remains within the limits set by the Plan. A resource monitoring trigger is set out at Section 9.2.
	Annual water use reporting	As required, DEW	The time period for when water extraction occurs in the upper Pike River can be requested through annual water use reports. This is important information when considering the effects on flow regimes required for dependent aquatic ecosystem and environmental thresholds. See Section 9.2.

Objective (f): Contribute to the prevention of adverse impacts on water quality

Evaluation Question	Measure	Frequency/who	Explanation of measure
What was known about the quality of the water within the PWC?	State salinity register	Annually, DEW	It is the state's obligation to the Basin Salinity Management Strategy to monitor, assess, audit and report salinity impacts, and to allocate salinity credits and salinity debits.
	River Murray flow reports Real-time water data	Fortnightly, DEW Hourly, DEW	Water quality is measured in-channel with real-time water loggers. Data and the flow reports can be obtained through the <i>WaterConnect</i> website. www.waterconnect.sa.gov.au
	Water quality monitoring	Seasonally, DEW	Water quality parameters are regularly monitored as part of a variety of wetland/floodplain/CLLMM management programs through The Living Murray, Riverine Recovery program, DEW and MR Landscape Board levy funded programs.
Was there an understanding of how to manipulate the drivers of water quality to ensure it did not decrease?	River Murray salt load models	Every 5 years per model, DEW	Each of the salinity models (modflow) are reviewed every five years. There are 8 models. It is planned to gather standard data from each of the model areas 4 out of 5 years, then 1 of out 5 years collect more details to enable calculations of drainage rates. See Section 9.2.
	Salt Interception Scheme (SIS)	Ongoing, SA Water	The SIS diverts saline groundwater before it enters the River Murray through salt interception and drainage diversion schemes, maintaining the River Murray salinity at Morgan below 800 EC for 95 percent of the time.
	Site use approval volumes and location	Annually, DEW	Site use approval limits are a tool to manage the adverse salinity impacts of irrigation. Variations to site use approval volumes or locations can impact on the management of drainage potential and salinity credits. WILMA reports to be produced and used to identify change.
	Annual water use reporting	As required, DEW	Through annual water use reporting information is collected on water use to crop type, soil moisture monitoring, salinity of applied and underground water. This can inform the contribution of water salinity to drainage. See Section 9.2.
	Annual Environmental Watering Plan	Annually, DEW	Identifies priority sites to deliver environmental water aimed at water quality improvement objectives.

Objective (f): Contribute to the prevention of adverse impacts on water quality (continued)

Evaluation Question	Evaluation Question	Evaluation Question	Evaluation Question
Was there an understanding of how to manipulate the drivers of water quality to ensure it did not decrease?	Upper Pike River flow regime	As required, DEW	Information gained from hydraulic modelling and ecological assessments indicate negative impacts to the upper Pike River ecosystems and water quality (salinity, pathogens, deoxygenation) begin to occur below certain volumes and velocity of flow (thresholds). The historic extraction of water for licensed purposes has been lower than the thresholds, although authorisations to use water, in the Upper Pike River Extraction Management Zone, are much higher. Even with the increased flows intended through the Riverine Recovery Project infrastructure works, if all authorisations were utilised and extracted it would cause significant negative impacts to the ecosystems and water quality. A limit on the total volume held on water resource works approvals in the UPREMZ has been introduced in this Plan and monitoring of the water quality and flow through the upper Pike system is required, so that environmental and water quality protection action can be taken if extractions become too high or flows become too low. See Section 9.2.
Were stakeholders able to manage their resources to prevent decreases in water quality?	Annual water use reporting	As required, DEW	Information sourced on improved efficiency, reduced drainage, soil moisture monitoring, water quality, extraction season and rates (particularly for Upper Pike River Extraction Management Zone), use of EPA guidelines for Lower Murray River Reclaimed Irrigation Area. See Section 9.2.
	Salt Inception Scheme (SIS)	Annually, SA Water	Results of salt loads intercepted.

Objective (g). Contribute to the prevention of increased soil salinity and acid sulfate soils and associated land management issues

Evaluation Question	Measure	Frequency/who	Explanation of measure
Was there the ability to quantify soil salinity, acid sulfate soils and associated land management issues?	Baseline data available, Australian Soil Resource Information System (ASRIS), CSIRO.	As required, CSIRO, EPA ⁵	Due to drought conditions before and during 2008, acid sulfate soils became a significant issue. As a result CSIRO were commissioned to undertake studies contributing to the updating of ASRIS, assessment, identification and management publications. This has provided baseline data.
	Annual Environmental Watering Plan	Annually, DEW	The plan identifies the environmental assets with soil salinity, acid sulfate or other land management issues. The severity and urgency of these issues are considered in the prioritisation of watering sites.
	Riverine Recovery Program monitoring and evaluation	Annually, DEW	The Murray Futures and Riverine Recovery Program's monitoring and evaluation programs have a variety of information that quantifies or identifies areas with soil salinity, acid sulfate or other land management issues that need to be managed as part of the riverine recovery.
<p>Were stakeholders able to manage soil salinity, acid sulfate soils and associated land management issues?</p> <p>Reliant on:</p> <ul style="list-style-type: none"> Water availability Infrastructure availability 	Annual water use reporting	As required, DEW	Reporting will indicate the rates and application for areas with known acid sulfate soils issues such as Environment Land Management Allocations in the Lower Murray Reclaimed Irrigation Area and Upper Pike River Extraction Management Zone, Lakes Alexandrina and Albert, and any other area affected by ASS. See Section 9.2.
	South Australia's River Murray Environmental Watering Report	Annually, DEW	The report indicates if soil, water salinity, acid sulfate soils and associated land management issues are identified, and the management outcomes from the delivery of environmental water or unregulated flows.
	South Australian Weir Pool Manipulation Project reports	Annually, DEW	Water level can be manipulated and delivered through infrastructure of locks, weirs and regulators. Where weir pool manipulation is undertaken to enhance water-dependent ecosystems, the actions and outcomes are reported.
	River Murray flow reports	Fortnightly, DEW	The flow reports will indicate if water was available.

9.2 Monitoring

9.2.1 Annual Water Use Reporting

River Murray Irrigation Management Zone and Lower Murray Reclaimed Irrigation Areas Management Zone

The following principles set out the conditions that will apply to relevant site use approvals.

138. If required by way of notice in writing from the Minister, a person who has the benefit of a site use approval, and has used water in the River Murray Irrigation or Lower Murray Reclaimed Irrigation Areas Management Zones, must provide to the Department by 31 August of each year an annual water use report for the previous water-use year.
139. An annual water use report required by Principle 138 must include the following data:
 - a. Location, time period or irrigation season dates, rate and volume of water applied
 - b. Crop type or purpose for water application
 - c. Type of irrigation or other water delivery system
 - d. Use and type of soil moisture monitoring equipment, where utilised
 - e. Drainage and groundwater salinity information, where measured
 - f. Any changes to irrigation systems, equipment, crop type or area, or any other practice change that has contributed to variation in water use, and
 - g. Any other information required by the Minister.

Angas Bremer Irrigation Management Zone

Historically, the Angas Bremer Water Management Committee Inc. (the Committee) has, through private arrangements, collected and provided irrigation annual reports to the Department on behalf of the irrigators within this region. The Committee has the broad support of its community and takes an interest in ensuring water resources are used sustainably, through the development and implementation of innovative water management policies.

140. If required by way of notice in writing from the Minister, a person who has the benefit of a site use approval, and has used water in the Angas Bremer Irrigation Management Zone, must provide to the Minister by 31 August of each year an irrigation annual report for the previous water-use year.

141. The irrigation annual report required by Principle 140 must include the following data:
- a. Volume of water allocated during the water-use year
 - b. Volume of water actually used and recorded on each meter during the water-use year
 - c. Volume of water actually used and recorded on each meter during the water-use year for the purpose of shallow saline watertable management
 - d. Volume of water recharged for each meter in the twelve months prior to the 31 October of the water-use year
 - e. Salinity of equipped production bores
 - f. Location and area of each crop type irrigated
 - g. Percentage of the total volume of water actually used on each crop type
 - h. Drainage past the root zone (including the volume of water, the salinity and the concentration of nutrients)
 - i. Level of the watertable below the natural surface level of the land upon which the water endorsed on the approval is used measured in September, December, March and June of every water-use year
 - j. Area and duration of any flooding (whether natural or artificial)
 - k. The nature of any soil moisture monitoring devices used on the relevant land
 - l. Area of non-irrigated vegetation on relevant land, and
 - m. Any other information required by the Minister.

Salinity Modelled Areas

The following principles set out conditions that apply to site use approvals in the Chowilla, Border to Lock 3, Lock 3 to Morgan, Waikerie to Morgan, and Morgan to Wellington salinity modelled areas. The principles require specified data that can be used to calculate targeted root zone drainage for the salinity modelled areas.

142. If required by way of notice in writing from the Minister, a person who has the benefit of a site use approval in the Chowilla, Border to Lock 3, Lock 3 to Morgan, Waikerie to Morgan, and Morgan to Wellington salinity modelled areas must provide to the Department water use data once every five years.
143. The data required to be provided to the Department by Principle 142 must include:
- a. Number of irrigations and application rates
 - b. Crop details (e.g. type, location, area, plant spacing)
 - c. Groundwater level and salinity monitoring, where measured, and
 - d. Any other information required by the Minister.

Upper Pike River Extraction Management Zone

The issues identified for the upper Pike River anabranch are explained in Section 2.5.3. It is important to measure the flows and extraction by consumptive use to ensure critical water quantity and quality outcomes are achieved.

The following condition will apply to water resource works approvals where water is taken from the Upper Pike River Extraction Management zone. The information required by Principle 144 will be particularly relevant during critical flow requirement periods.

144. If required by notice in writing from the Minister, a person who has the benefit of a water resource works approval in the Upper Pike River Extraction Management Zone must provide meter readings to the Department.

9.2.2 Resource Monitoring Trigger for the Upper Pike River

There have been significant investigations focused on improving the floodplain inundation and associated ecological condition of the Pike anabranch complex. Infrastructure upgrades are underway to introduce additional water into the anabranch complex in order to reinstate a more natural flow regime. While flows will increase into the upper Pike River as a result of these works, it is recognised that unlimited extraction for consumptive use is likely to decrease the intended environmental and water quality benefits associated with the additional water. To ensure existing water users have a secure supply as well as improving ecological health, a resource monitoring trigger has been established as an early warning of potential adverse trends in resource condition, in addition to the extraction limit set out in Section 6.2.2. If the resource monitoring trigger is reached, this will trigger a review as described in Principle 145.

Extraction – Resource Monitoring Trigger

To monitor potential negative environmental impacts due to combined extraction rates from the Upper Pike River Extraction Management Zone, a monitoring trigger is set out below.

145. If the take of water from the Upper Pike River Extraction Management Zone exceeds 80 percent of the total volume authorised to be taken on account of Principle 89, or if there is other evidence that the environment is experiencing further adverse impacts, or in any event within 5 years of the 2019 Plan being adopted (which occurred on the 28 February), the Minister will undertake a review to:
- a. Determine the impacts of extraction on the upper Pike River anabranch and floodplain health and other dependent water users
 - b. Identify options to mitigate the impacts in consultation with the community, and
 - c. Implement the appropriate course of action to reduce further negative impact on the upper Pike River anabranch and floodplain, and other dependent water users, should this be necessary.

9.2.3 Review of Salinity Management

146. A review of salinity management policy will commence in 2027, or earlier, if:
- a. Monitoring identifies that within the salinity impact zones there is a high risk, in the short term, of the annual water use for irrigation reaching 500 GL or the actual total irrigated area approaching the area of irrigation offset on the Basin Salinity Registers (as at 20 February 2018), or
 - b. South Australia's Basin Salinity Register balance is projected to go into debit prior to 2050.

10 CONNECTION WITH OTHER LEGISLATION

In preparing this Plan, the Board has had regard to, and is consistent with requirements of the:

- *Landscape South Australia Act 2019*
- *Native Vegetation Act 1991*
- *Environment Protection Act 1993*
- *The State Landscape Strategy* and Murraylands and Riverland Landscape Plan.
- *Intergovernmental Agreement on a National Water Initiative 2004*
- *Murray-Darling Basin Agreement 2008*
- *Water Act 2007 (Cth)*
- *Environment Protection and Biodiversity Conservation Act 1999 (Cth)*
- *Native Title Act 1994*
- *Aboriginal Heritage Act 1988*
- the *Planning, Development and Infrastructure Act 2016*, and
- Relevant plans of management under the *National Parks and Wildlife Act 1972*.

11 GLOSSARY AND ABBREVIATIONS

11.1 Glossary

Aboriginal – the term *Aboriginal* is used throughout this Plan instead of *Indigenous* as endorsed by the former South Australian Aboriginal State-wide Advisory Committee.

Aboriginal Cultural Heritage – means Aboriginal objects, Aboriginal remains and Aboriginal sites that are protected under the Aboriginal Heritage Act 1988. It is an offence to damage, disturb or interfere with Aboriginal sites objects or remains without the authorisation of the Minister or agreement of the Registered Aboriginal Representative Body.

Aboriginal engagement - Aboriginal 'engagement' is defined as *any process that involves Aboriginal people in problem solving or decision making, and uses community input to make better decisions* (Commonwealth of Australia, 2016).

Aboriginal nations – is used throughout the Plan and is defined for the purposes of the Plan as a group or community of Aboriginal people who identify as descendants of the original inhabitants of the Plan area and may share a single common territory, or it may be located as a nation within another larger Nation. The Aboriginal nation may include the native title holder or claimant body. All decisions and consultations about native title matters that impact on the Plan must be done with the native title body. An ILUA may provide that the native title holder or claimant is acknowledged as representing the nation on all matters dealt within the ILUA over all land and water within the ILUA area. Otherwise the representative body of the Nation will be a body that demonstrates that it represents the members of the Nation that hold the authority and responsibility with respect to Aboriginal culture and heritage for the specified area.

Aboriginal object – as defined in the *Aboriginal Heritage Act 1988*, is an object –

- Of significance according to Aboriginal tradition, or
- Of significance to Aboriginal archaeology, anthropology or history

And includes an object or an object of a class declared by regulation to be an Aboriginal object but does not include an object or an object of a class excluded by regulation from the ambit of this definition.

Aboriginal remains – as defined in the *Aboriginal Heritage Act 1988*, is the whole or part of the skeletal remains of an Aboriginal person but does not include remains that have been buried in accordance with the law of the state.

Aboriginal site – as defined in the *Aboriginal Heritage Act 1988*, is an area of land –

- that is of significance according to Aboriginal tradition, or
- that is of significance to Aboriginal archaeology, anthropology or history

and includes an area or an area of a class declared by regulation to be an Aboriginal site but does not include an area or an area of a class excluded by regulation from the ambit of this definition.

Aboriginal water interests - is used to describe native title rights and interests or other uses of water that are currently permitted under the Landscape Act. It also includes aspirations to other legal interests in water that are not currently permitted under existing law including to the "cultural flow" as a separate and distinct entitlement. The term also describes the outcomes and objectives to the use and management of water that accords with the social, cultural and spiritual values of Aboriginal people as expressed by them.

Act, the – in this document, refers to the *Landscape South Australia Act 2019*, which replaced the repealed *Natural Resource Management Act 2004*. Also referred to as the Landscape Act.

Adaptive management – a natural resource management approach where you identify actions, implement changes, monitor the outcomes, investigate the assumptions, and regularly evaluate and review the required actions. Consideration must be given to the temporal and spatial scale of monitoring and the evaluation processes appropriate to the natural resource being managed.

Agreement, the – see *Murray-Darling Basin Agreement 2008*.

Allotment – as defined in the *Real Property Act 1886*.

Anabranch – a branch of the prescribed watercourse which leaves the watercourse and either enters it again or dries up.

Aquatic ecosystem – the stream channel, lake or estuary bed, water, and/or biotic communities, and the habitat features that occur therein.

Aquifer – an underground layer of rock or sediment that holds water and allows water to percolate through.

Australian Height Datum (AHD) – the datum adopted for vertical control, measured in metres. Zero metres AHD is approximately mean sea level.

Backwater – a temporary or permanent body of water that fills from the main river channel but excludes the Coorong, Lake Alexandrina and Lake Albert.

Baseflow – the water in a stream that results from underground water discharge to the stream. It often maintains flows during seasonal dry periods and has important ecological functions.

Biodiversity – as defined in the Landscape Act – the variety of life forms represented by plants, animals and other organisms and micro-organisms, the genes that they contain, and the ecosystems and ecosystem processes of which they form a part.

Biota – all the organisms at a particular locality.

Building – a structure with a roof and walls, or a portion of such a structure, whether temporary or permanent, moveable or immovable, including but not limited to, a boat or pontoon permanently moored or fixed to land, or a caravan permanently fixed to land, a shed, and a pump station.

Carryover – the portion of a water allocation made available for use under a water access entitlement that is not taken in a water-use year that may be taken in a subsequent water-use year pursuant to a water allocation plan, or if allowed by the Minister.

Catchment – the catchment of a particular point is all of the land, determined by natural topographic features, from which runoff has potential to naturally drain to that point.

Consumptive pool – as defined in the Landscape Act – the water that will from time to time be taken to constitute the resource within a particular part of a prescribed water resource for the purpose of Part 8 of the Landscape Act, as determined:

- by or under a water allocation plan for that water resource, or
- in prescribed circumstances, by the Minister.

Consumptive use – as defined in the *Water Act 2007* (Cth) – the use of water for private benefit consumptive purposes including irrigation, industry, urban, and stock and domestic use.

Country – with respect to Aboriginal nations, is a non-Aboriginal term that recognises the connections, relationships, authority and responsibilities of particular Aboriginal nations (including native title holders and claimants where native title rights are concerned and or as described in an ILUA) to the living entities of land and sea. 'Sea Country' – the coasts and oceans – forms an integral part of 'Country' as the lands and seas are not considered separately. It has a markedly different meaning than the English language definition. For Aboriginal people they are a part of the living body of their Country, they are Country. Country is capitalised when used. Country also refers to area(s) that an Aboriginal person has rights and responsibilities for (and where the Aboriginal person is a native title holder or claimant will include responsibilities according to the laws and customs that form the native title rights and interests.. All parts of South Australia, the lands, waters, seas, sky and even metropolitan and townships are the Country of an Aboriginal nation.

Country towns – Renmark, Cooltong, Berri, Glossop, Monash, Barmera, Moorook, Kingston, Loxton, Waikerie, Woolpunda (Moorook Country Lands), Cadell, Blanchetown, Cowirra, Jervois, Milang, Morgan No.1 Pump Station, Mypolonga, Pompoota, Swan Reach Water District, Tailem Bend No.1 Pump Station and Wall.

Critical Human Water Needs (CHWN) – as defined under section 86A(2) of the *Water Act 2007* (Cth) – the minimum amount of water, that can only reasonably be provided from Basin water resources, required to meet: a) core human consumption requirements in urban and rural areas; and b) those non-human consumption requirements that a failure to meet would cause prohibitively high social, economic or national security costs.

Cultural flows - described in paragraphs 30-31 of schedule 1 of the Murray-Darling Basin Plan.

Indigenous uses includes use for cultural, social, environmental, spiritual and economic purposes. Many indigenous people view water spiritually – people, land and rivers are inextricably connected. Indigenous economic interests include trading, hunting, gathering food and other items for use that alleviate the need to purchase similar items and the use of water to support businesses in industries such as pastoralism and horticulture. The environmental and cultural health of the Murray-Darling Basin is of paramount importance in serving these interests.

The concept of cultural flows helps translate the complex relationship described above into the language of water planning and management. The following definition of cultural flows is currently used by the Northern Murray-Darling Basin Aboriginal nations and the Murray-Lower Darling Rivers Indigenous nations: — Water entitlements that are legally and beneficially owned by the Indigenous nations and are of sufficient and adequate quantity to improve the spiritual, cultural, environmental, social and economic conditions of those Indigenous nations. This is our inherent right — the provision of cultural flows will benefit Indigenous people in improving health, wellbeing and provides empowerment to be able to care for their country and undertake cultural activities.

Deferred water –

- any part of the Entitlement under clause 88 of the Agreement that South Australia stores under clause 91 of the Agreement, and
- any allocations that South Australia may have acquired for use in South Australia from within an upstream state, the delivery of which has been deferred in accordance with Schedule G of the Agreement.

Department, the or DEW– the Department for Environment and Water (Government of South Australia), or any subsequent South Australian Government agency administering the relevant sections of the Landscape Act.

Domestic purpose – in relation to the taking of water, as defined in the Landscape Act, and does not include:

- taking water for the purpose of watering or irrigating land, other than land used solely in connection with a dwelling, or
- without limiting the above point – taking water for the purpose of watering or irrigating more than 0.4 of a hectare of land, or
- taking water to be used in carrying on a business (except for the personal use of persons employed in the business).

Ecological processes – all biological, physical or chemical processes that maintain an ecosystem.

Ecosystem – as defined in the Landscape Act – a dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit.

Effluent – as defined in the Landscape Act – domestic or industrial wastewater.

Entitlement, the – the monthly quantities of River Murray water South Australia is entitled to receive, as determined by the Murray-Darling Basin Agreement 2008.

Environmental asset – a permanent pool or red gum swamp. The locations of environmental assets used for the purposes of this Plan will be identified in a database.

Environmental land management – in the context of this Plan, the use of water in the Lower Murray Reclaimed Irrigation Areas to minimise the historical effects of high saline groundwater levels and minimise the production of acid sulfate soils, thereby minimising impacts of irrigation activity on the river. Pursuant to Schedule E of the *Water Act 2007*, 22.2 GL is reserved for environmental land management purposes within the Lower Murray Reclaimed Irrigation Areas.

Environmental water provisions – those parts of environmental water requirements that can be met at any given time.

Environmental water requirements – as defined in the Landscape Act – those water requirements that must be met in order to sustain the ecological values of ecosystems that depend on the water resource, including their processes and biodiversity, at a low level of risk.

Environmental water use – water for non-profit environmental purposes including, but not limited to, the maintenance or rehabilitation of aquatic or riparian ecosystems.

First Peoples of the River Murray and Mallee (First Peoples) - descendents of the Ngaiawang, Ngawait, Nganguruku, Erawirung, Ngintait, Ngaralte, and Ngarkat peoples, and determined native title holders pursuant to the determination made by the Federal Court of Australia (Turner v State of South Australia [2011] FCA 1312 (18 November 2011)) – referred to fully as the First Peoples of the Murray and Mallee.

Floodplain – as defined in the Landscape Act – any area of land adjacent to a watercourse, lake or estuary that is periodically inundated with water and includes any other area designated as a floodplain:

- by a regional landscape plan, a water allocation plan or a water affecting activities control policy; or by the Planning and Design Code under the *Planning, Development and Infrastructure Act 2016*.

Flow path – the natural preferential path or direction of surface water flow, including a drainage path.

Flow regime – the character of the timing and amount of flow in a stream.

Gazette – the *South Australian Government Gazette*.

Gigalitre (GL) – equal to one thousand million litres (1,000,000,000).

Groundwater – see *underground water*.

High conservation value ecosystem – an identified and categorised value, based on an accepted or approved set of criteria for aquatic ecosystems, which may include rivers, wetlands, floodplains, lakes, inland saline ecosystems, groundwater-dependent ecosystems and estuaries but not the marine environment.

Hydrogeology – the study of underground water, which includes its occurrence, recharge and discharge processes, and the properties of aquifers; see also 'hydrology'.

Hydrologic connections and water supply considerations – as defined in section 12.18 of the Basin Plan – in relation to a water access right, any of the following:

- the amount of transmission loss that may be incurred through evaporation, seepage, or other means
- the potential impact, as a result of the trade of a water access right, on water availability in relation to a water access right held by a third party (other than an impact arising solely because of an increase in use of the traded water access right)
- the ability to:
 - deliver water from the same storage from which it is currently delivered, or
 - adjust valley and state transfer accounts to facilitate trade, for example by way of a back trade.

Note 1: See clause 3 of Schedule D to the Agreement for the meaning of *valley account*.

Note 2: See clause 5 of the *Murray-Darling Basin Agreement (adjusting Valley Accounts and State Transfer Accounts) Protocol 2010* for the meaning of *state transfer account*.

Hydrology – the study of the characteristics, occurrence, movement and utilisation of water on and below the Earth's surface and within its atmosphere. See also 'hydrogeology'.

HYDSTRA – a time series data management system that stores continuously recorded water related data such as water level, rainfall, evaporation, salinity and temperature. It provides a powerful data analysis, modelling and simulation system, and contains details of site locations, setup and other supporting information.

Indigenous Land Use Agreement (ILUA) - is a voluntary statutory agreement between a native title group or holder and the government made pursuant to Division 3 Subdivision of the *Native Title Act 1993*. Once registered an ILUA allows for the application of certain parts of the *Native Title Act* to be modified, for example the processes and effects of the future act provisions. It can also provide for compensation for extinguishment of native title and provide for the exercise of native title rights and interests.

Industrial water use – water for an industrial purpose or purposes including, but not limited to, processing, manufacturing, construction, fabrication, mining, quarrying, smelting, bulk handling, slaughtering, commercial, business, aquaculture or intensive farming.

Infrastructure – as defined in the Landscape Act – artificial lakes, dams or reservoirs, embankments, walls, channels or other works or earthworks, bridges and culverts, buildings or structures, roads, pipes, machinery or other plant or equipment, any device, any item or thing used in connection with:

- testing, monitoring, protecting, enhancing or re-establishing any natural resource, or any aspect of a natural resource, and
- any other program or initiative associated with the management of a natural resource.

Intensive farming – as defined in the Landscape Act – a method of keeping animals in the course of carrying on the business of primary production in which the animals are usually confined to a small space or area and usually fed by hand or mechanical means.

Interstate Water Entitlements Transfer Scheme or IWETS – as defined in the Landscape Act –

- a scheme for the transfer of entitlements between two or more states under the Murray-Darling Basin Agreement, or
- an agreement between South Australia and one or more other states or a territory entered into under section 154 of the Landscape Act.

Irrigation water use – water for primary production and/or for watering a crop or crops.

Irrigation season – the period in which major irrigation diversions occur, usually starting in August–September and ending in April–May.

Kilolitre (kL) – equal to one thousand litres (1,000).

Kungun Ngarrindjeri Yunnan Agreement 2009 – an agreement (Listen to Ngarrindjeri people talking) between three Ngarrindjeri representative corporations and the South Australian Government which was entered to frame the Ngarrindjeri strategy for negotiating Ngarrindjeri interests in natural resource management.

Lake – as defined in the Landscape Act – a natural lake, pond, lagoon, wetland or spring (whether modified or not) and includes:

- part of a lake, or
- a body of water designated as a lake –
 - by a regional landscape plan, a water allocation plan or a water affecting activities control policy; or by the Planning and Design Code under the *Planning, Development and Infrastructure Act 2016*.

Land – as defined in the Landscape Act – according to the context: land as a physical entity, including land under water; or any legal estate or interest in, or right in respect of, land, and includes any building or structure fixed to land.

Licensee – a person who holds a water licence.

Mannum Aboriginal Community Association (MACAI) - an Ngarrindjeri Regional Authority member organisation and an incorporated body that represents descendants of the ancestors who comprise some or all of the traditional owners of the Peramangk nation. Whilst the Peramangk area is not subject to a native title claim should one be made in the future then both MACAI and the claimants or holders of native title will be entitled to be consulted and dealt with in the Peramangk area about their respective responsibilities within the Peramangk nation.

Megalitre (ML) – equal to one million litres (1,000,000).

Minister, the – South Australian Minister for Environment and Water, unless otherwise specified.

Murray-Darling Basin – as defined in the *Water Act 2007* (Cth) – the area falling within the Murray-Darling Basin drainage division as specified in the dataset held by the Commonwealth, dated 28 May 2007 and with a scale of 1:250,000, which is derived from the Australian Drainage Divisions defined by the Australian Water Resources Management Commission in 1997.

Murray-Darling Basin Agreement 2008 (the Agreement) – the agreement between the Commonwealth of Australia, New South Wales, Victoria, Queensland, South Australia and the Australian Capital Territory, as set out in Schedule 1 of the *Water Act 2007* (Cth).

Murray-Darling Basin Authority (MDBA) – a body established under the *Water Act 2007* (Cth).

Murray-Darling Basin Commission (MDBC) – a body established by the *Murray-Darling Basin Act 1993*. Superseded by the Murray-Darling Basin Authority.

Ngarrindjeri – the Indigenous People of the Lower River Murray, Lakes and Coorong (Ngarrindjeri Nation Yarlular-Ruwe Plan, 2006)

Ngarrindjeri Regional Authority (NRA) - Ngarrindjeri contemporary governing organisation recognised by state and federal governments as the peak governing body for the Ngarrindjeri nation. The NRA Board includes representative from the Ngarrindjeri Native Title Holding Body, the Ngarrindjeri Heritage Committee and the Ngarrindjeri Tendi as well as representatives from MACAI.

Landscape Act, the – see *Act, the*.

Occupier of land – as defined in the Landscape Act – a person who has, or is entitled to, possession or control of the land (other than a mortgagee in possession unless the mortgagee has assumed active management of the land), or who is entitled to use the land as the holder of native title in the land.

Owner of land – as defined in the Landscape Act –

- if the land is unalienated from the Crown – the Crown; or
- if the land is alienated from the Crown by grant in fee simple – the owner (at law or in equity) of the estate in fee simple; or
- if the land is held from the Crown by lease or licence – the lessee or licensee, or a person who has entered into an agreement to acquire the interest of the lessee or licensee; or
- if the land is held from the Crown under an agreement to purchase – the person who has the right to purchase; or
- a person who holds native title in the land; or

- a person who has arrogated to themselves (lawfully or unlawfully) the rights of an owner of the land;

and includes an occupier of the land and any other person of a prescribed class included within the ambit of this definition by the regulations.

Peramangk - Aboriginal people who identify with the Country on the eastern side of the escarpment of the Mount Lofty Ranges. The Peramangk people share close relationships, culture and some language with the nations of the Kaurna to the west, Ngadjuri to the north, Ngarrindjeri to the south and Meru to the east. Whilst the Peramangk area is not subject to a native title claim, should one be made in the future then both MACAI and the claimants or holders of native title will be entitled to be consulted and dealt with in the Peramangk area about their respective responsibilities within the Peramangk nation.

Percentile – a way of describing sets of data by ranking the dataset and establishing the value for each percentage of the total number of data records. For example, the 90th percentile of the distribution is the value such that 90 percent of the observations fall at or below it.

Plant – as defined in the Landscape Act – vegetation of any species, including the seeds and any part of any such vegetation, or any other form of plant material, but does not include any vegetation or material excluded from the ambit of this definition by the regulations.

Prescribed area – an area or watercourse, lake or well declared by the Governor to be prescribed, in accordance with section 101 of the Landscape Act. May include, but is not limited to, a prescribed water resources area, surface water prescribed area, prescribed watercourse, or prescribed wells area.

Prescribed watercourse – a watercourse declared to be a prescribed watercourse under section 101 of the Landscape Act.

Prescribed water resource – a surface water prescribed area, or a prescribed watercourse, lake or well.

Prescribed well – a well declared to be a prescribed well under section 101 of the Landscape Act.

Private carryover – see *carryover*.

Proponent – the person or persons (who may be a body corporate) seeking approval to take water from a prescribed water resource.

Property – an allotment or contiguous allotments owned or occupied by the same person, persons or body and operated as a single unit. Allotments will be considered to be contiguous if they abut at any point, or are separated only by a road, street, lane, footway, court, alley, railway, thoroughfare, easement, right-of-way, watercourse, channel or a reserve or similar open space.

Ramsar Convention – an international treaty on wetlands titled *The Convention on Wetlands of International Importance Especially as Waterfowl Habitat*. It is administered by the International Union for Conservation of Nature and Natural Resources. It was signed in the town of Ramsar, Iran in 1971, hence its common name. The convention includes a list of wetlands of international importance and protocols regarding the management of these wetlands. Australia became a signatory in 1974.

Recreational water use – water taken and/or used for recreational purposes including, but not limited to, the watering of land commonly used for playing sports or games, or the use of a body of water for recreational purposes including swimming, boating and recreational fishing.

Resilience – the capacity to recover quickly from difficulties.

Restriction or restrict – as defined in the Basin Plan – in relation to trade, includes refuse, prevent, deter, delay or impose a condition or a barrier on.

Reticulated water – water supplied through a piped distribution system.

Riparian zone – that part of the landscape adjacent to a water body that influences and is influenced by watercourse processes. This can include landform, hydrological or vegetation definitions. It is commonly used to include the in-stream habitats, bed, banks and sometimes floodplains of watercourses.

River Murray Indigenous Land Use Agreement (RM ILUA) - Indigenous Land Use Agreement entered into by the State of South Australia and the First Peoples of the River Murray and Mallee Region native title claimants and the River Murray and Mallee Aboriginal Corporation (ICN 7494) in 2012.

Ruwe / Ruwar - Ngarrindjeri philosophy relating to the interconnectedness between lands, waters, body, spirit and all living things.

SA Water – South Australian Water Corporation (Government of South Australia).

Section 105 Authorisations - In accordance with schedule 5, clause 101 of the Landscape Act, an authorisation in force under section 128 of the repealed Act (and in effect immediately before 1 July 2020) will continue to have effect as if it had been issued under section 105 of this Act.

Stock purposes – water that is taken for drinking water for stock not subject to intensive farming (as defined in the Landscape Act).

Site use approval – an authorisation under the Landscape Act to use water at a particular site in a particular manner.

South Australian Murray-Darling Basin Natural Resources Management Region – the region established by proclamation on 2 September 2004 as varied by proclamation on 9 October 2008, which is defined in GRO Plan 27/.

Specified environment improvement program - a program established pursuant to the Landscape Act, that outlines requirements of site use or water resource works approval holders to undertake specific actions to support the objectives of the Plan.

Structure – something built or constructed, including, but not limited to, a ford, causeway, culvert, fence, jetty, boat mooring, weir or retaining wall.

Surface water – as defined in the Landscape Act –

- water flowing over land (except in a watercourse),
 - after having fallen as rain or hail or having precipitated in any another manner,
 - or after rising to the surface naturally from underground;
- water of the kind referred to in the first point that has been collected in a dam or reservoir;
- water of the kind referred to in the first point that is contained in any stormwater infrastructure;
- water in a watercourse if the watercourse, or a particular part of a watercourse, is declared by a water allocation plan as forming part of the surface water prescribed area, under section 101 of the Landscape Act.

Tagged Water Access Entitlement – as defined in section 12.23(5) of the Basin Plan – a Water Access Entitlement:

- which is registered on a water register in relation to one place; and
- under which the water allocation is extracted in a different place (which is tagged on the register);

pursuant to an arrangement for Water Access Entitlement tagging.

Tagged trade – an arrangement under which every allocation made under an entitlement in a state of origin is made available for use in a state of destination either permanently or for a fixed term.

To take water from a water resource – as defined in the Landscape Act – includes:

- to take water by pumping or syphoning the water
- to stop, impede or divert the flow of water over land (whether in a watercourse or not) for the purpose of collecting the water
- to stop, impede or direct the flow of water in any stormwater infrastructure for the purpose of collecting the water, or to extract any water from stormwater infrastructure
- to divert the flow of water in a watercourse from the watercourse;
- to release water from a lake
- to permit water to flow under natural pressure from a well
- to permit stock to drink from a watercourse, a natural or artificial lake, a dam or reservoir, and
- to cause, permit or suffer any activity referred to in a preceding paragraph.

Total Dissolved Solids (TDS) – a measure of water salinity, measured in milligrams per litre (mg/L).

Tributary – a river or creek that flows into a larger river.

Underground water or **groundwater** – as defined in the Landscape Act –

- water occurring naturally below ground level, and
- water pumped, diverted or released into a well for storage underground.

Unregulated flows – a river flow that does not result from a controlled release made to service an allocation, or flows declared to be unregulated by the appropriate authority.

Unused water allocation – the volume held in a water account that relates to a South Australian Water Access Entitlement that may comprise water allocated against the Water Access Entitlement, volumes of private carryover determined by the Minister and/or water traded to the water account from intrastate or interstate.

Watercourse – as defined in the Landscape Act – a river, creek or other natural watercourse (whether modified or not) in which water is contained or flows whether permanently or from time to time and includes:

- a dam or reservoir that collects water flowing in a watercourse
- a lake through which water flows
- a channel (but not a channel declared by regulation to be excluded from the ambit of this definition) into which the water of a watercourse has been diverted
- part of a watercourse
- an estuary through which water flows
- any other natural resource, or class of natural resource, designated as a watercourse for the purposes of the Landscape Act by a regional landscape plan, a water allocation plan or a water affecting activities control policy.

Waterlogging – the permanent or temporary saturation of the soil profile so as to impede plant growth.

Water Access Entitlement – in respect of a water licence, an entitlement to gain access to a share of the Consumptive Pool to which a licence relates.

Water affecting activities – activities referred to in section 104 of the Landscape Act.

Water allocation – as defined in the Landscape Act –

- in respect of a water licence, an allocation of water under the terms of the licence in accordance with Part 8 Division 3 Subdivision 2 of the Landscape Act and includes, if the context so requires, a component or part of such an allocation, or the water available in connection with the entitlement.
- in respect of an Interstate Water Entitlements Transfer Scheme, an allocation of water under the terms of that scheme and the provisions of Part 8 Division 3 Subdivision 2 of the Landscape Act and includes, if the context so requires, a component or part of such an allocation, or the water available in connection with the entitlement.
- in respect of water taken pursuant to an authorisation under section 105, the maximum quantity of water that can be taken and used pursuant to the authorisation.

Water allocation plan – as defined in the Landscape Act – a water allocation plan prepared under Part 4 Division 2 of the Landscape Act.

Water licence – as defined in the Landscape Act – a licence granted by the Minister under section 121 of that Act.

Water Management Authorisation – as defined in the Landscape Act –

- a water licence; or
- a water allocation; or
- a site use approval; or
- a water resource works approval; or
- a delivery capacity entitlement.

Water resource – as defined in the Landscape Act – a watercourse or lake, surface water, underground water, stormwater and effluent.

Water resource works approval – a water management authorisation granted under the Landscape Act to construct, maintain or operate any works for the purpose of taking water.

Water-use year – the period between 1 July in any given calendar year and 30 June the following calendar year.

Water-dependent ecosystems – those parts of the environment, the species composition and natural ecological processes, that are determined by the permanent or temporary presence of flowing or standing water, above or below ground; the in-stream areas of rivers, riparian vegetation, springs, wetlands, floodplains, estuaries and lakes are all water-dependent ecosystems.

Well – as defined in the Landscape Act –

- an opening in the ground excavated for the purpose of obtaining access to underground water
- an opening in the ground excavated for some other purpose but that gives access to underground water, and
- a natural opening in the ground that gives access to underground water.

Wetland or wetlands – as defined in the Landscape Act – an area that comprises land that is permanently or periodically inundated with water (whether through a natural or artificial process) where the water may be static or flowing and may range from fresh water to saline water and where the inundation with water influences the biota or ecological processes (whether permanently or from time to time) and includes any other area designated as a wetland:

- by a regional landscape plan, a water allocation plan or a water affecting activities control policy, or
- by the *Planning and Design Code under the Planning, Development and Infrastructure Act 2016*, But does not include:
- a dam or reservoir that has been constructed by a person wholly or predominantly for the provision of water for primary production or human consumption
- an area within an estuary or within any part of the sea, or
- an area excluded from the ambit of this definition by the regulations.

This definition encompasses a number of concepts that are more specifically described in the definition used in the Ramsar Convention on Wetlands of International Importance. This describes wetlands as areas of permanent or periodic to intermittent inundation, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water, the depth of which at low tides does not exceed six metres. For the purposes of the River Murray PWC, this does not include the principal channel of the River Murray, any marina, or any land inundated for the purpose of primary production (whether such inundation occurs directly or indirectly, and whether or not such inundation is incidental or ancillary to the purpose of primary production).

Yarluwar-Ruwe - Ngarrindjeri 'Sea Country': represents the interconnectedness between what western traditions understand as sea and land, fresh water and salt. The Peake, Roby and Sherlock Prescribed Wells Area forms part of Ngarrindjeri Yarluwar-Ruwe.

11.2 Abbreviations

ABS – Australian Bureau of Statistics

AHD – Australia Height Datum

BOM – Bureau of Meteorology

CEWH – Commonwealth Environmental Water Holder, as defined by the *Water Act 2007*

CHWN – Critical Human Water Needs

CLLMM – Coorong, Lower Lakes and Murray Mouth

Cth – Commonwealth of Australia

DEW – The Department for Environment and Water (Government of South Australia)

EC — Electrical conductivity, 1 EC unit = 1 micro-Siemen per centimetre ($\mu\text{S}/\text{cm}$) measured at 25°C, commonly used to measure water salinity as it is quicker and easier to measure than TDS

ELMA – Environmental Land Management Allocation

EPA — Environment Protection Authority (Government of South Australia)

EWPs – Environmental Water Provisions

EWRs – Environmental Water Requirements

GL – Gigalitre, equal to one thousand million litres (1,000,000,000)

GRO – General Registry Office, location for registered maps or plan and held at the Land Titles Office

kL – Kilolitre, equal to one thousand litres (1,000)

LWMP – Land and Water Management Plan

LMRIA – Lower Murray Reclaimed Irrigation Area

LTWP – Long Term Watering Plan

MDBA – Murray-Darling Basin Authority

MDBC – Murray-Darling Basin Commission

ML – Megalitre, equal to one million litres (1,000,000)

MR – Murraylands and Riverland

PWA — Prescribed Wells Area

PWC — Prescribed Watercourse

PWRA — Prescribed Water Resources Area

QSA – flow at the South Australian border

RBLAP – Renmark to Border Local Action Planning Association

River Murray PWC – River Murray Prescribed Watercourse, as per Figure 1

RRP – Riverine Recovery Project

SIS – Salt Interception Scheme

TDS – Total Dissolved Solids, a measure of water salinity, measured in milligrams per litre (mg/L)

TLM – The Living Murray program

WAP — Water Allocation Plan, a plan prepared by a Landscape Board and adopted by the Minister in accordance with the Landscape Act

WRP – Water Resource Plan, as described in the Basin Plan (2012)

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APPENDIX A

Reasonable Irrigation Requirements

For the purpose of Principles 97.b., 'reasonable irrigation requirement' means the amount of water required by a reasonably efficient irrigator to deliver crop production, excluding effective precipitation.

Reasonable irrigation requirements can be calculated for a range of crops grown in the South Australian Murray-Darling Basin region using average regional monthly evaporation and effective precipitation (Table 18 and Table 19), FAO 56 Crop Factors (Table 20) and a field application efficiency of 85 percent³⁷.

If it can be demonstrated that the calculated reasonable irrigation requirement is insufficient to meet crop needs, or if crop factors are not included in Table 20 for the proposed crop, professional advice or literature may be considered when determining reasonable irrigation requirements.

How to Calculate Reasonable Irrigation Requirements

Step 1 – Identify monthly long-term average evaporation rates (Table 18) and effective precipitation (Table 19) for the station nearest to the land upon which water is to be used.

Step 2 – For each calendar month, calculate the crop water requirements by multiplying evaporation (Table 19) by the corresponding crop factor (Table 20) and subtracting effective precipitation (Table 19). A negative number indicates no moisture deficit and can be disregarded for the purposes of step 3.

Step 3 – Calculate the annual crop water requirement by summing the individual monthly crop water requirements.

Step 4 – Divide the annual crop water requirement by 0.85 to provide for delivery losses and leaching.

$$\text{Reasonable Irrigation Requirement} = \frac{(\text{Evaporation} \times \text{Crop Factor}) - \text{Effective Precipitation}}{0.85 \text{ Field Application Efficiency}}$$

³⁷ Tables are taken direct from the 2002 Plan

Table 18: Monthly average evaporation (epan) in millimetres (mm)

Name	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total
Barmera	52	95	134	184	271	329	324	288	260	143	97	56	2233
Berri	53	95	133	183	269	328	326	286	257	143	96	55	2224
Blanchetown	50	91	127	170	275	311	303	275	261	137	98	59	2157
Bow Hill	50	84	114	151	248	281	271	243	226	129	86	56	1939
Cadell	50	95	136	186	281	326	315	289	275	142	103	59	2257
Chowilla	56	100	140	194	270	340	338	297	264	148	99	56	2302
Claypans	50	85	115	154	254	286	277	249	230	130	88	56	1974
Cooltong	54	97	137	189	270	334	331	292	261	145	98	56	2264
Eden Valley	49	85	113	150	254	283	260	247	237	129	88	57	1952
Goolwa	49	73	95	129	206	240	206	199	187	116	73	52	1625
Kingston om	51	95	134	184	273	328	322	288	262	143	98	57	2235
Langhorne Creek	50	76	101	139	212	251	225	206	200	122	76	52	1710
Loxton doa	52	93	130	177	266	320	321	280	251	140	94	55	2179
Mannum	50	83	111	147	241	276	257	235	221	127	84	55	1887
Meningie	50	72	96	131	196	238	224	201	191	115	73	52	1639
Milangews	50	74	99	135	209	246	218	202	195	119	75	52	1674
Morgan	50	94	135	184	281	324	312	287	276	142	103	59	2247
Murray Bridge	50	79	106	144	223	262	246	218	210	125	80	53	1796
Mypolonga	50	81	109	146	232	269	254	227	215	126	82	54	1845
Nildottie	50	87	119	158	263	296	285	260	240	132	91	57	2038
Qualco	50	95	136	185	279	327	317	289	272	143	102	59	2254
Renmark	55	97	136	188	269	334	332	291	259	145	97	55	2258
Swan Reach	50	89	122	161	269	302	289	266	248	134	94	58	2082
Tailem Bend	50	77	104	144	214	256	247	214	206	123	78	52	1762
Wailkerie	50	95	134	183	277	325	317	288	267	142	100	58	2236
Wellington	50	76	103	140	211	254	243	212	204	123	78	52	1746

Table 19: Monthly average effective precipitation in millimetres (mm)

Name	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total
Barmera	15	13	14	16	13	10	11	10	7	10	14	13	146
Berri	17	16	17	19	14	10	13	10	7	11	14	14	162
Blanchetown	14	16	14	16	11	11	10	11	8	13	16	15	154
Bow Hill	27	29	22	19	18	7	10	5	11	20	24	26	217
Cadell	13	12	13	15	10	11	10	13	7	10	13	11	137
Chowilla	11	13	14	13	11	9	9	11	7	8	13	14	133
Claypans	20	19	18	19	14	13	11	11	10	14	19	18	185
Cooltong	17	16	16	20	11	7	14	11	8	12	13	14	160
Eden Valley	75	73	42	32	16	17	11	14	11	36	68	46	443
Goolwa	38	34	29	25	17	14	12	12	13	23	31	37	286
Kingston om	13	14	15	15	12	10	10	11	8	8	14	14	144
Langhorne Creek	26	26	24	22	16	15	11	11	13	20	25	26	235
Loxton doa	20	19	16	18	13	12	10	7	6	8	16	19	164
Mannum	17	19	18	16	13	12	10	10	10	15	18	19	177
Meningie	37	34	28	24	17	15	12	10	14	24	32	37	284
Milangews	30	28	22	19	13	12	11	12	12	20	22	28	227
Morgan	13	14	14	14	11	11	8	11	8	10	15	14	143
Murray Bridge	21	22	22	20	15	14	10	10	12	17	21	22	207
Mypolonga	18	20	19	19	16	14	9	11	11	14	21	18	190
Nildottie	17	15	17	16	11	10	10	7	8	10	17	16	154
Qualco	12	13	14	17	12	11	8	13	8	8	11	14	142
Renmark	14	15	16	17	13	11	10	11	8	11	14	14	154
Swan Reach	16	16	17	16	11	11	10	11	10	11	17	17	164
Tailem Bend	24	24	23	22	17	16	10	12	13	17	24	24	226
Wailkerie	14	14	14	16	11	11	10	13	7	10	15	16	152
Wellington	26	29	26	29	20	14	13	10	16	24	22	28	257

Note: Values in the above table have been determined by multiplying average monthly precipitation by 0.6 where monthly precipitation <75mm or 0.8 where precipitation >75mm

Table 20: Crop factors

Crop	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Almond		0.33	0.63	0.97	0.82	0.78	0.75	0.76	0.65	0.61	0.29	
Avocado	0.41	0.49	0.53	0.53	0.57	0.61	0.6	0.6	0.56	0.52	0.51	0.47
Citrus	0.48	0.49	0.46	0.46	0.46	0.46	0.46	0.46	0.45	0.48	0.47	0.47
Lucerne	0.61	0.63	0.63	0.64	0.67	0.68	0.67	0.67	0.66	0.65	0.61	0.61
Olive	0.34	0.35	0.46	0.5	0.5	0.5	0.5	0.5	0.49	0.48	0.47	0.34
Pistachio			0.28	0.43	0.57	0.79	0.78	0.78	0.56	0.31		
Pomefruit*			0.42	0.5	0.6	0.68	0.67	0.67	0.66	0.59	0.51	
Stonefruit^			0.39	0.5	0.57	0.64	0.64	0.64	0.63	0.55	0.44	
Vine			0.21	0.21	0.35	0.5	0.5	0.5	0.49	0.31		
Walnut			0.39	0.57	0.78	0.79	0.78	0.78	0.77	0.76	0.44	
Carrot[#]	0.2	0.2	0.2	0.5	0.64	0.75	0.71	0.2	0.2	0.2	0.2	0.2
Onion[#]	0.2	0.2	0.49	0.64	0.74	0.75	0.74	0.53	0.2	0.2	0.2	0.2
Potato[#]	0.2	0.2	0.35	0.6	0.81	0.81	0.68	0.53	0.2	0.2	0.2	0.2
Pumpkin[#]	0.2	0.2	0.2	0.35	0.53	0.72	0.71	0.57	0.2	0.2	0.2	0.2

* Pomefruit includes apple, cherry and pear (FAO 56)

^ Stonefruit includes apricots, peach, pecan and plum (FAO 56)

Vegetable crop factors are shown in a typical season, but planting time and harvest are variable. The 0.2 crop factor outside of the growing season for vegetable crops allows for water requirement of groundcover for (sandy) soil stabilisation.

APPENDIX B

ELMA Eligible Land Parcels

For the purpose of Principles 37 and 118.a, Table 21 lists land parcels that are eligible to ELMA based on land in the LMRIA management zones irrigated as at 30 June 1994. ELMA eligible land parcels were identified when water use requirements were addressed in the 2001 review of the Lower Murray CAP. For historic context the parcels originally identified as being eligible for ELMA in 2001 are listed in Table 21 below, in some instances the area of the parcel is grouped due to changes in allotment boundaries over time.

Table 21: The area (hectares) of historic ELMA eligible land parcels with the current equivalent parcel area (ha) for the 2018-19 water year listing Certificate of Title and Deposited Plan/Allotment.

Irrigation Management Zone	Historic Title Reference	Historic Parcel	Historic Area (hectare)	Hundred	Certificate of Title (Volume/ Folio)	Deposited Plan / Allotment	Area (ha)
Cowirra	CT5930/986	411	1.60	Younghusband	CT5930/986	H750800 S411	1.60
Cowirra	CT5930/986	412	2.70	Younghusband	CT5930/986	H750800 S412	2.70
Cowirra	CT5930/986	614	2.10	Younghusband	CT5930/986	H750800 S614	2.10
Cowirra	CL768/43	439	2.50	Younghusband	CT5992/786	H750800 S439	2.50
Cowirra	CL1582/27	444	5.20	Younghusband	CT5992/786	H750800 S444	5.20
Cowirra	CL1582/27	445	5.10	Younghusband	CT5992/786	H750800 S445	5.10
Cowirra	CT5945/254	451	6.40	Younghusband	CT5945/254	H750800 S451	6.40
Cowirra	CT5945/254	457	3.10	Younghusband	CT5945/254	H750800 S457	3.10
Cowirra	CT5945/254	462	6.60	Younghusband	CT5945/254	H750800 S462	6.60
Cowirra	CT5945/254	599	3.20	Younghusband	CT5945/254	H750800 S599	3.20
Cowirra	CT5945/254	456	6.10	Younghusband	CT5945/254	H750800 S456	6.10
Cowirra	CT5945/254	463	3.40	Younghusband	CT5945/254	H750800 S463	3.40
Cowirra	CT5974/132	480	5.70	Younghusband	CT6019/39	H750800 S480	5.70
Cowirra	CL768/43	605	3.20	Younghusband	CT5992/786	H750800 S605	3.20
Cowirra	CT5715/168	415	1.70	Younghusband	CT6071/935	F217333 Q51	1.70
Cowirra	CT5715/168	416	3.90	Younghusband	CT6071/935	F217333 Q54	3.90
Cowirra	CT5715/168	420	4.60	Younghusband	CT6071/935	F217333 Q57	4.60
Cowirra	CT5715/168	421	2.10	Younghusband	CT6071/935	F217333 Q63	2.10
Cowirra	CT5715/168	426	5.00	Younghusband	CT6071/935	D49430 Q14	5.00

Irrigation Management Zone	Historic Title Reference	Historic Parcel	Historic Area (hectare)	Hundred	Certificate of Title (Volume/ Folio)	Deposited Plan / Allotment	Area (ha)
Cowirra	CT5930/985	432	3.00	Younghusband	CT5930/985	H750800 S432	3.00
Cowirra	CT5930/985	433	6.60	Younghusband	CT5930/985	H750800 S433	6.60
Cowirra	CT5930/985	608	2.70	Younghusband	CT5930/985	D23524 Q2	2.70
Cowirra	CT5715/168	611	2.60	Younghusband	CT6071/935	F217333 Q60	2.60
Cowirra	CT5930/985	Pt 427	2.40	Younghusband	CT5930/985	D23524 Q2	2.40
Cowirra	CT5715/168	Pt 427	2.90	Younghusband	CT6071/935	D49430 Q14	2.90
Cowirra	CL842/44	438	6.80	Younghusband	CT6036/119	H750800 S438	6.80
Cowirra	CT5960/818	450 & 602	5.90	Younghusband	CT6036/117	H750800 S450 H750800 S602	5.90
Cowirra	CT5964/705	468	3.40	Younghusband	CT5964/705	H750800 S468	3.40
Cowirra	CT5964/705	469	6.90	Younghusband	CT5964/705	H750800 S469	6.90
Cowirra	CT5964/705	474	6.10	Younghusband	CT5964/705	H750800 S474	6.10
Cowirra	CT5964/705	475	3.20	Younghusband	CT5964/705	H750800 S475	3.20
Cowirra	CT5960/818	481	7.20	Younghusband	CT6054/300	H750800 S481	7.20
Cowirra	CT5960/818	485	3.90	Younghusband	CT6054/300	H750800 S485	3.90
Cowirra	CT5960/818	486	6.30	Younghusband	CT6054/300	H750800 S486	6.30
Cowirra	CT5960/818	491	5.60	Younghusband	CT6054/300	H750800 S491	5.60
Cowirra	CT5960/818	589	2.60	Younghusband	CT6054/300	H750800 S589	2.60
Cowirra	CT5960/818	592	2.70	Younghusband	CT6054/300	H750800 S592	2.70
Cowirra	CT5964/705	593	3.10	Younghusband	CT5964/705	H750800 S593	3.10
Cowirra	CT5964/705	596	3.30	Younghusband	CT5964/705	H750800 S596	3.30
Cowirra	CT5964/705	635	3.80	Younghusband	CT5964/705	H750800 S635	3.80
Cowirra	CT5947/54	492	2.90	Younghusband	CT5947/54	H750800 S492	2.90

Irrigation Management Zone	Historic Title Reference	Historic Parcel	Historic Area (hectare)	Hundred	Certificate of Title (Volume/ Folio)	Deposited Plan / Allotment	Area (ha)
Cowirra	CT5944/793	497	5.60	Younghusband	CT5944/793	H750800 S497	5.60
Cowirra	CT5944/793	498	5.00	Younghusband	CT5944/793	H750800 S498	5.00
Cowirra	CT5944/793	586	2.40	Younghusband	CT5944/793	H750800 S586	2.40
Cowirra	CT5944/793	503	2.20	Younghusband	CT5944/793	H750800 S503	2.20
Cowirra	CT5944/793	504	5.60	Younghusband	CT5944/793	H750800 S504	5.60
Cowirra	CT5944/793	509	5.50	Younghusband	CT5944/793	H750800 S509	5.50
Cowirra	CT5944/793	584	2.30	Younghusband	CT5944/793	H750800 S584	2.30
Cowirra	CL712/20	510	2.70	Younghusband	CT6035/558	H750800 S510	2.70
Cowirra	CL712/20	514	4.90	Younghusband	CT6035/558	H750800 S514	4.90
Cowirra	CL712/20	515	5.10	Younghusband	CT6035/558	H750800 S515	5.10
Cowirra	CL977/14	518	2.30	Younghusband	CT6035/558	H750800 S518	2.30
Cowirra	CL850/45	622	2.40	Younghusband	CT6035/558	H750800 S622	2.40
Cowirra	CT5973/672	519	4.80	Younghusband	CT6068/564	H750800 S519	4.80
Cowirra	CT5973/672	522	4.20	Younghusband	CT6068/564	H750800 S522	4.20
Cowirra	CT5973/672	523	2.10	Younghusband	CT6068/564	H750800 S523	2.10
Cowirra	CT5973/672	526	3.60	Younghusband	CT6068/564	H750800 S526	3.60
Cowirra	CT5973/672	527	3.10	Younghusband	CT6068/564	H750800 S527	3.10
Cowirra	CT5973/672	530	2.40	Younghusband	CT6068/564	H750800 S530	2.40
Cowirra	CT5973/672	531	2.20	Younghusband	CT6068/564	H750800 S531	2.20
Cowirra	CT5973/672	637	1.80	Younghusband	CT6068/564	H750800 S637	1.80
Cowirra	CT5973/672	167	4.80	Younghusband	CT6068/563	D53114 A103	4.80
Neeta North	CL1500/47	218	13.20	Younghusband	CT6008/951	D73823 A101	13.20
Neeta North	CL1500/47	219		Younghusband	CT6008/944	H750800 S219	

Irrigation Management Zone	Historic Title Reference	Historic Parcel	Historic Area (hectare)	Hundred	Certificate of Title (Volume/ Folio)	Deposited Plan / Allotment	Area (ha)
Neeta North	CL1500/47	220		Younghusband	CT6008/943	H750800 S220	
Neeta North	CL1500/47	221		Younghusband	CT6008/951	D73823 A102	
Neeta North	CL1500/47	230		Younghusband	CT6008/951	D73823 A103	
Neeta North	CL1500/47	231		Younghusband	CT6008/945	D73823 A111	
Neeta North	CL1500/47	242	6.36	Younghusband	CT6008/951	D73823 A105	6.36
Neeta North	CL1500/47	243		Younghusband	CT6008/948	D73823 A109	
Neeta North	CL1500/47	244 & 245		Younghusband	CT6008/949	D73823A108 D73823A106	
Neeta North	CL1500/47	254	4.80	Younghusband	CT6008/951	D73823A107	4.80
Neeta North	CR5747/788	631		Younghusband			
Baseby	CT5913/469	743	18.00	Finniss	CT6244/181	D124805 Q1026	20.20
Baseby	CT5913/469	742	2.20	Finniss	CT6180/591	D113055 A50	
Baseby	CT5913/466	742	18.10	Finniss	CT6132/233	F42491 Q50	18.10
Baseby	CL1326/17	765 upper	2.80	Finniss	CT6163/438	H170300 S765	2.80
Baseby	CL1326/17	766	14.10	Finniss	CT6163/438	H170300 S766	14.10
Baseby	CL1326/17	765	14.10	Finniss	CT6163/438	H170300 S765	14.10
Baseby	CL1326/17	738	12.00	Finniss	CT6163/438	H170300 S738	12.00
Baseby	CL1326/17	738	10.10	Finniss	CT6163/438	H170300 S738	10.10
Neeta	CL852/37	255	2.40	Younghusband	CT6048/339	H750800 S255	2.40
Neeta	CL852/37	264	4.20	Younghusband	CT6048/338	H750800 S264	4.20
Neeta	CL1294/13	304	0.90	Younghusband	CT6048/340	H750800 S304	0.90
Neeta	CT5954/166	633	4.20	Younghusband	CT6065/420	H750800 S633	4.20
Neeta	CL852/36	265	4.20	Younghusband	CT6048/337	H750800 S265	4.20

Irrigation Management Zone	Historic Title Reference	Historic Parcel	Historic Area (hectare)	Hundred	Certificate of Title (Volume/ Folio)	Deposited Plan / Allotment	Area (ha)
Neeta	CL719/1	272	1.50	Younghusband	CT6057/459	H750800 S272	1.50
Neeta	CL719/1	273	3.00	Younghusband	CT6057/460	H750800 S273	3.00
Neeta	CL852/36	632	1.60	Younghusband	CT6057/468	H750800 S632	1.60
Neeta	CL719/1	280	3.20	Younghusband	CT6053/234	H750800 S280	3.20
Neeta	CL719/1	281	3.60	Younghusband	CT6053/234	H750800 S281	3.60
Neeta	CL996/37	288	3.80	Younghusband	CT6048/335	H750800 S288	3.80
Neeta	CL1398/15	289	3.80	Younghusband	CT6048/335	H750800 S289	3.80
Neeta	CL1294/13	296	3.80	Younghusband	CT6025/9	H750800 S296	3.80
Neeta	CT5965/17	297	5.80	Younghusband	CT5965/17	H750800 S297	5.80
Neeta	CT5965/17	305	5.50	Younghusband	CT5965/17	H750800 S305	5.50
Neeta	CT5965/17	312	5.30	Younghusband	CT5965/17	H750800 S312	5.30
Neeta	CT5954/166	330	4.20	Younghusband	CT6135/793	H750800 S330	8.7
Neeta	CT5954/170	331	4.50				
Neeta	CT5954/172	337	4.50	Younghusband	CT5954/172	H750800 S338	13.2
Neeta	CT5954/172	338	8.70				
Neeta	CT5954/170	344	9.00	Younghusband	CT5954/170	H750800 S344	17.7
Neeta	CT5954/170	343	8.70				
Neeta	CT5954/170	349	9.30	Younghusband	CT5954/170	H750800 S349	9.30
Neeta	CL712/26	350	7.70	Younghusband	CT5954/179	H750800 S350	8.1
Neeta	CL712/26	571	0.40				
Neeta	CL712/26	355	7.80	Younghusband	CT5954/179	H750800 S355	7.80
Neeta	CL712/26	356	7.90	Younghusband	CT5954/179	H750800 S356	7.90
Neeta	CL712/26	361	8.10	Younghusband	CT5954/179	H750800 S361	8.10

Irrigation Management Zone	Historic Title Reference	Historic Parcel	Historic Area (hectare)	Hundred	Certificate of Title (Volume/ Folio)	Deposited Plan / Allotment	Area (ha)
Neeta	CL712/26	362	7.20	Younghusband	CT5954/179	H750800 S362	7.20
Neeta	CT5954/172	634	4.20	Younghusband	CT5954/172	H750800 S634	4.20
Neeta	CT5954/171	656	4.70	Younghusband	CT5954/171	H750800 S656	4.70
Neeta	CT5954/170	701	0.40	Younghusband	CT5954/170	H750800 S701	0.40
Neeta	CT5954/166	313	6.30	Younghusband	CT6135/793	H750800 S313	6.30
Neeta	CT5954/166	322	6.70	Younghusband	CT6135/793	H750800 S322	6.70
Neeta	CT5954/166	323	7.50	Younghusband	CT6135/793	H750800 S323	7.50
Neeta	CL729/46	655	3.80	Younghusband	CT6059/166	H750800 S655	3.80
Neeta	CT5962/474	367	3.30	Younghusband	CT6029/120	H750800 S367	3.30
Neeta	CT5962/474	368	7.40	Younghusband	CT6029/121	H750800 S368	7.40
Neeta	CT5962/474	373	8.90	Younghusband	CT6029/121	H750800 S373	8.90
Neeta	CT5977/570	374	3.40	Younghusband	CT5977/570	D37936 Q4	31.21
Neeta	CT5977/570	377	4.00				
Neeta	CT5977/570	378	7.50				
Neeta	CT5977/570	382	8.80				
Neeta	CT5977/570	383	7.51				
Wall Flat	CT5963/38	629	6.60	Finniss	CT5963/38	H170300 S629	6.60
Wall Flat	CT5963/38	785	4.50	Finniss	CT5963/38	H170300 S785	4.50
Wall Flat	CT5963/38	786	2.00	Finniss	CT5963/38	H170300 S786	2.00
Wall Flat	CT5963/38	787	2.00	Finniss	CT5963/38	H170300 S787	2.00
Wall Flat	CL723/15	625	5.10	Finniss	CT6192/883	H170300 S625	5.10
Wall Flat	CL723/15	688	1.00	Finniss	CT6192/883	D67404 Q3	3.80
Wall Flat	CL723/15	689	1.00				

Irrigation Management Zone	Historic Title Reference	Historic Parcel	Historic Area (hectare)	Hundred	Certificate of Title (Volume/ Folio)	Deposited Plan / Allotment	Area (ha)
Wall Flat	CL723/15	691	1.80				
Wall Flat	CL723/15	696	4.40	Finniss	CT6192/883	D67405 Q5 D67405 Q6 D67405 Q7 D67405 Q8	8.10
Wall Flat	CL723/15	783	3.70				
Wall Flat	CL723/15	788	4.80	Finniss	CT6192/883	H170300 S788	4.80
Wall Flat	CL723/15	789	5.00	Finniss	CT6192/883	H170300 S789	5.00
Wall Flat	CL723/15	792	1.90	Finniss	CT6192/883	H170300 S792	1.90
Wall Flat	CL723/15	793	0.80	Finniss	CT6192/883	H170300 S793	0.80
Wall Flat	CL723/17	680	2.90	Finniss	CT6068/941	H170300 S680	2.90
Wall Flat	CL1437/14	612	9.20	Finniss	CT6047/479	H170300 S612	9.20
Wall Flat	CL1435/27	618	3.60	Finniss	CT6053/226	H170300 S618	3.60
Wall Flat	CL751/31	619	2.30	Finniss	CT6053/226	H170300 S619	2.30
Wall Flat	CL1435/27	781	2.20	Finniss	CT6053/225	H170300 S781	2.20
Wall Flat	CL1437/14	877	5.90	Mobilong	CT6047/479	H170700 S877	5.90
Wall Flat	CL1437/14	879	5.20	Mobilong	CT6047/479	H170700 S879	5.20
Wall Flat	CL1435/27	901	0.80	Finniss	CT6053/226	H170300 S901	0.80
Wall Flat	CT5969/157	622	5.50	Finniss	CT5965/157	D67163 Q1 D67163 Q3 D67163 Q2	5.50
Wall Flat	CT5969/157	697	4.40	Finniss	CT5965/157	H170300 S697	4.40
Wall Flat	CT5969/157	782	3.10	Finniss	CT5965/157	D67163 Q4	3.10
Wall Flat	CL1270/46	620	3.50	Finniss	CT6053/228	H170300 S620	3.50
Wall Flat	CL1270/46	621	4.90	Finniss	CT6053/228	H170300 S621	4.90

Irrigation Management Zone	Historic Title Reference	Historic Parcel	Historic Area (hectare)	Hundred	Certificate of Title (Volume/ Folio)	Deposited Plan / Allotment	Area (ha)
Wall Flat	CL1304/31	623	4.60	Finniss	CT6008/441	H170300 S623	4.60
Wall Flat	CL1304/31	624	5.80	Finniss	CT6008/441	H170300 S624	5.80
Wall Flat	CL848/28	628	6.10	Finniss	CT6008/441	H170300 S628	6.10
Wall Flat	CL1270/47	750	2.40	Finniss	CT6053/228	H170300 S750	2.40
Wall Flat	CL1270/46	751	3.40	Finniss	CT6053/227	H170300 S751	3.40
Wall Flat	CL1270/46	752	3.10	Finniss	CT6053/229	H170300 S752	3.10
Wall Flat	CL1304/31	763	3.80	Finniss	CT6008/441	H170300 S763	3.80
Wall Flat	CL1304/31	764	7.50	Finniss	CT6008/441	H170300 S764	7.50
Wall Flat	CL1270/47	958	1.80	Finniss	CT6053/228	H170300 S958	1.80
Wall Flat	CT5985/313	878	3.20	Mobilong	CT6125/281	H170700 S878	3.20
Wall Flat	CL1439/50	626	4.10	Finniss	CT6068/946	H170300 S626	4.10
Wall Flat	CL1439/50	627	5.00	Finniss	CT6030/453	H170300 S627	5.00
Wall Flat	CL1439/50	676	3.60	Finniss	CT6068/946	H170300 S676	3.60
Wall Flat	CL1439/50	677	3.00	Finniss	CT6068/946	H170300 S677	3.00
Wall Flat	CL1439/50	902	3.20	Mobilong	CT6068/946	H170700 S902	3.20
Wall Flat	CL1439/50	676a (Now 784)	4.60	Finniss	CT6030/454	H170300 S784	4.60
Wall Flat	CL723/19	876	2.70	Mobilong	CT6009/185	H170700 S876	2.70
Wall Flat	CL783/6	956	2.40	Mobilong	CT6009/185	H170700 S956	2.40
Wall Flat	CL1437/15	613	2.60	Finniss	CT6023/206	H170300 S613	2.60
Wall Flat	CL1437/15	614	2.80	Finniss	CT6023/206	H170300 S614	2.80
Wall Flat	CL1437/15	615	3.10	Finniss	CT6023/206	H170300 S615	3.10
Wall Flat	CL1437/15	616	3.10	Finniss	CT6023/206	H170300 S616	3.10

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Wall Flat	CL1437/15	617	2.00	Finniss	CT6023/201	H170300 S617	2.00
Wall Flat	CL1437/15	776	2.00	Finniss	CT6023/206	H170300 S776	2.00
Wall Flat	CL1437/15	777	2.00	Finniss	CT6023/202	H170300 S777	2.00
Wall Flat	CL1437/15	778	2.00	Finniss	CT6023/203	H170300 S778	2.00
Wall Flat	CL1437/15	779	2.10	Finniss	CT6023/204	H170300 S779	2.10
Wall Flat	CL1437/15	780	2.10	Finniss	CT6023/205	H170300 S780	2.10
Wall Flat	CL1437/15	Sec 903/ 957	5.20	Finniss	CT6023/206	H170700 S903 H170700 S904 H170700 S957	5.20
Wall Flat	CT5969/838	875	4.90	Mobilong	CT5969/838	H170700 S875	4.90
Pompoota	CL855/34	268	4.80	Burdett	CT6050/718	D72472 A24	4.8
Pompoota	CL855/34	269	3.80	Burdett	CT6050/718	D72472 A23	3.8
Pompoota	CL855/34	270	3.10	Burdett	CT6050/718	D72472 A22	3.1
Pompoota	CL855/34	271	1.50	Burdett	CT6050/718	D72472 A21	1.5
Pompoota	CL855/34	388	6.00	Burdett	CT6050/718	D72472 A25	6.4
Pompoota	CL855/34	399	0.40				
Pompoota	CL1310/8	266	5.60	Burdett	CT6044/711	D69209 Q3	5.60
Pompoota	CL1310/8	354	1.40	Burdett	CT6044/711	H750200 S354	1.40
Pompoota	CT5973/928	260	6.40	Burdett	CT6135/738	D66945 A1	10.8
Pompoota	CT5973/928	409	4.40				
Pompoota	CL1432/37	262	2.50	Burdett	CT6022/948	D71030 A1	4.5
Pompoota	CL1432/	387	2.00				
Pompoota	CL1432/37	263	5.00	Burdett	CT6022/948	H750200 S263	5.00
Pompoota	CL1432/37	264	7.70	Burdett	CT6022/948	H750200 S264	7.70

Irrigation Management Zone	Historic Title Reference	Historic Parcel	Historic Area (hectare)	Hundred	Certificate of Title (Volume/ Folio)	Deposited Plan / Allotment	Area (ha)
Pompoota	CL1432/37	265	8.00	Burdett	CT6022/948	H750200 S265	8.00
Pompoota	CT5868/388	408	3.50	Burdett	CT5868/388	H750200 S408	3.50
Pompoota	CT5868/378	252	7.10	Burdett	CT5868/378	H750200 S252	7.10
Pompoota	CT5868/379	253	7.70	Burdett	CT5868/379	H750200 S253	7.70
Pompoota	CT5868/380	254	6.40	Burdett	CT5868/380	H750200 S254	6.40
Pompoota	CT5868/381	255	3.80	Burdett	CT5868/381	H750200 S255	3.80
Pompoota	CT5868/382	256	3.40	Burdett	CT5868/382	H750200 S256	3.40
Pompoota	CT5868/383	257	6.90	Burdett	CT5868/383	H750200 S257	6.90
Pompoota	CT5868/384	258	3.20	Burdett	CT5868/384	H750200 S258	3.20
Pompoota	CT5868/386	385	2.70	Burdett	CT5868/386	H750200 S385	2.70
Pompoota	CT5973/929	259	6.40	Burdett	CT5973/929	D66945 Q2 D66945 Q3	6.40
Pompoota	CT5915/225	386	3.20	Burdett	CT5915/225	H750200 S386	3.20
Pompoota	CT5973/96	250	9.30	Burdett	CT6192/47	H750200 S250	9.30
Pompoota	CT5973/96	251	3.30	Burdett	CT6192/47	H750200 S251	3.30
Pompoota	CT5973/96	422	3.60	Burdett	CT6192/47	H750200 S422	3.60
Pompoota	CT5973/96	423	3.70	Burdett	CT6192/47	H750200 S423	3.70
Pompoota	CL701/30	247	5.80	Burdett	CT6016/415	D72400 A3	5.80
Pompoota	CL1011/4	248	7.50	Burdett	CT6016/415	D72400 A2	7.50
Pompoota	CL1011/4	249	4.50	Burdett	CT6016/415	D72400 A1	4.50
Pompoota	CL729/47	246	4.90	Burdett	CT6016/414	D72400 A7	4.90
Pompoota	CL1017/20	300	4.90	Burdett	CT6016/414	D72400 A4	4.90
Pompoota	CL1017/20	301	3.70	Burdett	CT6016/414	D72400 A5	3.70

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Pompoota	CL729/47	302	4.20	Burdett	CT6016/414	D72400 A6	4.20
Mypolonga	CT5956/846	652	4.80	Mobilong	CT5956/846	H170700 S652	4.80
Mypolonga	CT5956/846	653	4.20	Mobilong	CT5956/846	H170700 S653	4.20
Mypolonga	CT5956/846	654	4.34	Mobilong	CT5956/846	H170700 S654	4.34
Mypolonga	CT5952/745	656	5.00	Mobilong	CT6060/948	H170700 S656	5.00
Mypolonga	CT5952/745	1103	2.00	Mobilong	CT6213/421	H170700 S1103	2.00
Mypolonga	CT5948/228	702	3.00	Mobilong	CT6035/447	D77477 A52	3.00
Mypolonga	CT5948/228	703	2.30	Mobilong	CT6107/537	D77477 A51	2.30
Mypolonga	CT5948/228	1153	3.40	Mobilong	CT6035/446	D77477 A53	3.40
Mypolonga	CT5971/876	675	8.1	Mobilong	CT5971/876	H170700 S675	8.10
Mypolonga	CT5971/876	676	10.3	Mobilong	CT5971/876	H170700 S676	10.30
Mypolonga	CT6024/236	667	3.70	Mobilong	CT6026/86	H170700 S667	3.70
Mypolonga	CL722/21	668	6.80	Mobilong	CT6026/87	H170700 S668	6.80
Mypolonga	CL647/32	669	7.80	Mobilong	CT6026/86	H170700 S669	7.80
Mypolonga	CL1073/39	670	4.70	Mobilong	CT6026/86	H170700 S670	4.70
Mypolonga	CL1591/45	671	7.30	Mobilong	CT6026/86	H170700 S671	7.30
Mypolonga	CL1003/14	672	4.60	Mobilong	CT6026/86	H170700 S672	4.60
Mypolonga	CL1197/45	673	9.10	Mobilong	CT6026/86	H170700 S673	9.10
Mypolonga	CL749/8	674	4.00	Mobilong	CT6026/86	H170700 S674	4.00
Mypolonga	CL1028/45	677	9.80	Mobilong	CT6011/18	H170700 S677	9.80
Mypolonga	CL1005/2	679	6.80	Mobilong	CT6011/18	H170700 S679	6.80
Mypolonga	CL982/10	680	9.90	Mobilong	CT6011/18	H170700 S680	9.9

Irrigation Management Zone	Historic Title Reference	Historic Parcel	Historic Area (hectare)	Hundred	Certificate of Title (Volume/ Folio)	Deposited Plan / Allotment	Area (ha)
Mypolonga	CL911/30	681	10.70	Mobilong	CT6011/18	H170700 S681	10.7
Mypolonga	CL1195/23	682	8.20	Mobilong	CT6011/18	H170700 S682	8.2
Mypolonga	CL1416/25	683	7.10	Mobilong	CT6011/18	H170700 S683	7.1
Mypolonga	CL863/3	684	5.50	Mobilong	CT6011/18	H170700 S684	5.5
Mypolonga	CT5945/937	685	9.90	Mobilong	CT5945/937	H170700 S685	9.9
Mypolonga	CL1137/20	686	4.20	Mobilong	CT6011/18	D54265 Q2	4.20
Mypolonga	CL1205/33	687	1.90	Mobilong	CT6011/18	H170700 S687	1.90
Mypolonga	CT5945/937	688	9.30	Mobilong	CT5945/937	H170700 S688	9.30
Mypolonga	CT5945/938	691	7.00	Mobilong	CT5945/938	H170700 S691	7.00
Mypolonga	CT5946/858	692	8.90	Mobilong	CT5946/858	H170700 S692	8.90
Mypolonga	CT5946/858	693	8.40	Mobilong	CT5946/858	H170700 S693	8.40
Mypolonga	CT5946/858	694	8.00	Mobilong	CT5946/858	H170700 S694	8.00
Mypolonga	CT5946/858	695	6.00	Mobilong	CT5946/858	H170700 S695	6.00
Mypolonga	CT5946/858	696	5.80	Mobilong	CT5946/858	H170700 S696	5.80
Mypolonga	CT5946/858	697	5.40	Mobilong	CT5946/858	H170700 S697	5.40
Mypolonga	CT5946/858	698	6.10	Mobilong	CT5946/858	H170700 S698	6.10
Mypolonga	CT5946/858	699	3.90	Mobilong	CT5946/858	H170700 S699	3.90
Mypolonga	CT5946/858	700	3.40	Mobilong	CT5946/858	H170700 S700	3.40
Mypolonga	CT5946/858	701	3.30	Mobilong	CT5946/858	H170700 S701	3.30
Mypolonga	CL647/32	849	8.60	Mobilong	CT6026/86	H170700 S849	8.60
Mypolonga	CL1591/45	850	8.30	Mobilong	CT6026/86	H170700 S850	8.30
Mypolonga	CL1003/14	901	4.80	Mobilong	CT6026/86	H170700 S901	4.80

Irrigation Management Zone	Historic Title Reference	Historic Parcel	Historic Area (hectare)	Hundred	Certificate of Title (Volume/ Folio)	Deposited Plan / Allotment	Area (ha)
Mypolonga	CL855/37	939	5.80	Mobilong	CT6011/18	H170700 S939	5.80
Mypolonga	CL1197/45	951	4.10	Mobilong	CT6026/86	H170700 S951	4.10
Mypolonga	CL764/4	972	4.50	Mobilong	CT6026/86	H170700 S972	4.50
Mypolonga	CL1283/24	1082	8.50	Mobilong	CT6011/18	H170700 S1082	8.50
Mypolonga	CL722/21	1162	1.70	Mobilong	CT6026/86	H170700 S1162	1.70
Mypolonga	CL1293/1	689	6.00	Mobilong	CT6011/18	H170700 S689	6.00
Mypolonga	CL717/40	666	9.20	Mobilong	CT6106/632	H170700 S666	9.20
Mypolonga	CL1156/17	894	1.70	Mobilong	CT6106/632	H170700 S894	1.70
Mypolonga	CL1156/17	895	1.70	Mobilong	CT6106/632	H170700 S895	1.70
Mypolonga	CL1040/46	899	0.50	Mobilong	CT6106/632	H170700 S899	0.50
Mypolonga	CL1040/46	900	0.50	Mobilong	CT6106/632	H170700 S900	0.50
Mypolonga	CL1009/12	1148	2.80	Mobilong	CT6106/632	H170700 S1148	2.80
Mypolonga	CL1009/12	1149	0.80	Mobilong	CT6106/632	H170700 S1149	0.80
Mypolonga	CL1009/12	1150	3.20	Mobilong	CT6106/632	H170700 S1150	3.20
Mypolonga	CL1009/12	1151	1.00	Mobilong	CT6106/632	H170700 S1151	1.00
Mypolonga	CL997/25	1159	3.80	Mobilong	CT6106/632	H170700 S1159	3.80
Mypolonga	CL997/25	1160	3.00	Mobilong	CT6106/632	D75382 A100	3.00
Mypolonga	CL730/4	1161	1.30	Mobilong	CT6106/632	H170700 S1161	1.30
Mypolonga	CT5956/854	665	1.60	Mobilong	CT5956/854	H170700 S665	1.60
Mypolonga	CT5956/855	893	1.60	Mobilong	CT5956/855	H170700 S893	1.60
Mypolonga	CT5956/856	1163	3.30	Mobilong	CT5956/856	H170700 S1163	3.30
Mypolonga	CT5956/857	1164	1.00	Mobilong	CT5956/857	H170700 S1164	1.00

Irrigation Management Zone	Historic Title Reference	Historic Parcel	Historic Area (hectare)	Hundred	Certificate of Title (Volume/ Folio)	Deposited Plan / Allotment	Area (ha)
Mypolonga	CT5956/858	1166	3.40	Mobilong	CT5956/858	H170700 S1166	3.40
Mypolonga	CT5956/859	1171	3.70	Mobilong	CT5956/859	H170700 S1171	3.70
Mypolonga	CL1066/35	659	8.80	Mobilong	CT5994/479	H170700 S659	8.80
Mypolonga	CL704/31	905	2.70	Mobilong	CT5994/479	H170700 S906	2.70
Mypolonga	CL1066/35	906	1.80	Mobilong	CT5994/479	H170700 S905	1.80
Mypolonga	CL1066/35	907	2.30	Mobilong	CT5994/479	H170700 S907	2.30
Mypolonga	CL722/22	1168	2.40	Mobilong	CT5994/479	H170700 S1169	2.40
Mypolonga	CL722/22	1169	3.00	Mobilong	CT5994/479	H170700 S1168	3.00
Mypolonga	CT5948/596	942	2.60	Mobilong	CT5948/596	H170700 S942	2.60
Mypolonga	CT5963/107	657	7.30	Mobilong	CT5963/107	H170700 S657	7.30
Mypolonga	CT5952/745	658	6.30	Mobilong	CT6213/420	H170700 S658	6.30
Mypolonga	CT5958/504	638	5.30	Mobilong	CT5958/504	H170700 S638	5.30
Mypolonga	CT5958/504	639	6.40	Mobilong	CT5958/504	H170700 S639	6.40
Mypolonga	CL725/1	641	5.50	Mobilong	CT6193/164	H170700 S641	5.50
Mypolonga	CL725/1	642	9.20	Mobilong	CT6193/164	D70672 Q2	9.20
Mypolonga	CT5926/838	649	8.20	Mobilong	CT5926/838	H170700 S649	8.20
Mypolonga	CL611/59	650	7.70	Mobilong	CT6060/948	H170700 S650	7.70
Mypolonga	CL747/47	655	5.60	Mobilong	CT6060/948	H170700 S655	5.60
Mypolonga	CL1153/5	1033	4.70	Mobilong	CT6193/164	H170700 S1033	4.70
Mypolonga	CL668/38	1146	6.80	Mobilong	CT6193/164	H170700 S1146	6.80
Mypolonga	CL1025/8	1147	5.00	Mobilong	CT6193/164	H170700 S1147	5.00
Mypolonga	CL635/89	1170	4.60	Mobilong	CT6193/164	H170700 S1170	4.60

Irrigation Management Zone	Historic Title Reference	Historic Parcel	Historic Area (hectare)	Hundred	Certificate of Title (Volume/ Folio)	Deposited Plan / Allotment	Area (ha)
Mypolonga	CL1040/32	1337	4.90	Mobilong	CT6193/164	H170700 S1337	4.90
Mypolonga	CL1343/42	628	6.60	Mobilong	CT6025/7	H170700 S628	6.60
Mypolonga	CL611/87	629	8.00	Mobilong	CT6025/7	H170700 S629	8.00
Mypolonga	CL1343/42	630	7.30	Mobilong	CT6025/7	H170700 S630	7.30
Mypolonga	CL1054/12	631	9.60	Mobilong	CT6025/7	H170700 S631	9.60
Mypolonga	CL611/16	632	8.60	Mobilong	CT6025/7	H170700 S632	8.60
Mypolonga	CL1054/12	633	8.10	Mobilong	CT6025/7	H170700 S633	8.10
Mypolonga	CL1153/47	634	9.70	Mobilong	CT6025/7	H170700 S634	9.70
Mypolonga	CT5949/170	635	4.70	Mobilong	CT5949/170	D65988 Q3	12.50
Mypolonga	CT5949/170	636	7.80				
Mypolonga	CT5949/170	637	6.60	Mobilong	CT5949/170	H170700 S637	6.60
Mypolonga	CT5953/202	640	2.90	Mobilong	CT5953/202	H170700 S640	2.90
Mypolonga	CL911/31	940	4.10	Mobilong	CT6025/7	H170700 S940	4.10
Burbridge	CL582/114	600	26.40	Burdett	CT6058/820	D75291 A202	26.40
Paiwalla	CL333/14	34	56.60	Burdett	CL6186/725	H750200 S34	56.60
Glen Lossie	CL1219/19	454	7.25	Burdett	CT6178/840	D74218 A3	7.25
Glen Lossie	CL1219/18	455	4.45	Burdett	CT6178/840	D74218 A2	4.45
Glen Lossie	CL1241/47	462	12.70	Burdett	CT6178/840	D74218 A5	12.70
Glen Lossie	CL1238/1	573	13.10	Burdett	CT6178/840	D74218 A4	13.10
Glen Lossie	CL1241/41	531	13.30	Burdett	CT6178/840	D74218 A6	13.30
Glen Lossie	CL1219/17	456	7.30	Burdett	CT6013/718	D74218 A1	7.30
Glen Lossie	CL1372/20	36	45.20	Burdett	CL6181/981	H750200 S36	45.20

Irrigation Management Zone	Historic Title Reference	Historic Parcel	Historic Area (hectare)	Hundred	Certificate of Title (Volume/ Folio)	Deposited Plan / Allotment	Area (ha)
Glen Lossie	CL1372/18	37	58.30	Burdett	CL6181/982	H750200 S37	58.30
Glen Lossie	CL1372/21	532	17.80	Burdett	CL6181/984	H750200 S532	17.80
Glen Lossie	CL1372/22	533	1.70	Burdett	CL6181/985	H750200 S533	1.70
Glen Lossie	CL1372/19	547	48.60	Burdett	CL6181/986	H750200 S547	48.60
Toora	CT5120/237 CT5120/237	466 467	7.50	Mobilong	CT5120/237 CT5120/237	F25406 A13 F25406 A12	7.50
Toora	CT5982/153	459	53.00	Mobilong	CT5982/153	D68550 A7	53.00
Toora	CT5982/152 CT5982/151 CT5979/284 CT5979/284	460 461 454 455	23.10	Mobilong	CT5982/152 CT5982/151 CT5979/284	D68550 A6 D68550 A5 D68691 A77	23.10
Toora	CT5951/578 CT5951/578 CT5951/576 CT5951/576	462 463 464 465	34.60	Mobilong	CT5951/578 CT5951/578 CT5951/576	H170700 S462 F5702 A2 F5702 A1	34.60
Toora	CT5832/504 CL313/6 CL321/15 CT5798/979	Pt 458 456 457 Pt 458	57.90	Mobilong	CT5832/504 CL6191/74 CL6191/75 CT5798/979	F168058 A291 H170700 S456 H170700 S457 F168057 A290	57.90
Mobilong	CT5941/799	Pt 74	1.40	Mobilong	CT5941/799	D66868 Q52	1.40
Mobilong	CT5979/280	588	4.90	Mobilong	CT5979/280	D68691 A73	4.90
Mobilong	CT5979/279	589	2.90	Mobilong	CT5979/279	D68691 A72	2.90
Mobilong	CT5979/281	591	4.10	Mobilong	CT5979/281	D68691 A74	4.10
Mobilong	CT5979/282	592	4.10	Mobilong	CT5979/282	D68691 A75	4.10

Irrigation Management Zone	Historic Title Reference	Historic Parcel	Historic Area (hectare)	Hundred	Certificate of Title (Volume/ Folio)	Deposited Plan / Allotment	Area (ha)
Mobilong	CT5979/273	593	7.30	Mobilong	CT5979/273	D68691 Q64	7.30
Mobilong	CT5979/272	594	6.70	Mobilong	CT5979/272 CT5979/272	D68691 Q63 D68691 Q62	6.70
Mobilong	CT5979/283	595	3.80	Mobilong	CT5979/283	D68691 A76	3.80
Mobilong	CT5945/234	571	3.90	Mobilong	CT5945/234	H170700 S571	3.90
Mobilong	CT5945/234	573	5.50	Mobilong	CT5945/234	H170700 S573	5.50
Mobilong	CL1153/8	557	9.20	Mobilong	CL1153/8	H170700 S557	9.20
Mobilong	CL1153/8	558	4.50	Mobilong	CL1153/8	H170700 S558	4.50
Mobilong	CL1153/7	559	4.10	Mobilong	CL1153/7	H170700 S559	4.10
Mobilong	CL772/20	560	4.20	Mobilong	CL772/20	H170700 S560	4.20
Mobilong	CL539/119	563	4.20	Mobilong	CL539/119	H170700 S563	4.20
Mobilong	CL539/119	564	4.00	Mobilong	CL539/119	H170700 S564	4.00
Mobilong	CL539/30	565	4.00	Mobilong	CL539/30	H170700 S565	4.00
Mobilong	CL537/106	566	4.00	Mobilong	CL1153/9	H170700 S567	4.00
Mobilong	CL1153/9	567	4.50	Mobilong	CL537/106	H170700 S566	4.50
Mobilong	CL1153/10	568	4.50	Mobilong	CL1153/10	H170700 S568	4.50
Mobilong	CL1153/11	569	4.04	Mobilong	CL1153/11	H170700 S569	4.04
Mobilong	CL1153/12	570	4.13	Mobilong	CL1153/12	H170700 S570	4.13
Mobilong	CL594/38	1135	1.52	Mobilong	CL594/38	H170700 S1135	1.52
Mobilong	CL577/30	572	4.00	Mobilong	CL577/30	H170700 S572	4.00
Mobilong	CL537/109	574	4.00	Mobilong	CL537/109	H170700 S574	4.00
Mobilong	CL1062/25	575	4.00	Mobilong	CL1062/25	H170700 S575	4.00

Irrigation Management Zone	Historic Title Reference	Historic Parcel	Historic Area (hectare)	Hundred	Certificate of Title (Volume/ Folio)	Deposited Plan / Allotment	Area (ha)
Mobilong	CL1062/25	576	2.50	Mobilong	CL1062/25	H170700 S576	2.50
Mobilong	CL1062/25	577	2.90	Mobilong	CL1062/25	H170700 S577	2.90
Mobilong	CL537/110	578	2.50	Mobilong	CL537/110	H170700 S578	2.50
Mobilong	CL555/69	579	3.10	Mobilong	CL555/69	H170700 S579	3.10
Mobilong	CL538/122	587	4.70	Mobilong	CL538/122	H170700 S587	4.70
Mobilong	CL537/112	583	4.00	Mobilong	CL537/112	H170700 S583	4.00
Mobilong	CL594/37	1136	1.90	Mobilong	CL594/37	H170700S1136	1.90
Mobilong	CL539/123	1137	2.00	Mobilong	CL539/123	H170700S1137	2.00
Mobilong	CL687/91	580	2.20	Mobilong	CL687/91	H170700 S580	2.20
Mobilong	CL537/111	581	5.90	Mobilong	CL537/111	H170700 S581	5.90
Mobilong	CL538/120	582	4.00	Mobilong	CL538/120	H170700 S582	4.00
Mobilong	CL538/121	585	4.50	Mobilong	CL538/121	H170700 S585	4.50
Mobilong	CL539/93	586	4.90	Mobilong	CL539/93	H170700 S586	4.90
Mobilong	CL1423/42	590	4.50	Mobilong	CL1423/42	H170700 S590	4.50
Mobilong	CL687/92	928	0.60	Mobilong	CL687/92	H170700 S928	0.60
Mobilong	CL902/44	985	2.30	Mobilong	CL902/44	H170700 S985	2.30
Mobilong	CL1153/6	1034	1.80	Mobilong	CL1153/6	H170700S1034	1.80
Mobilong	CL539/34	1138	2.00	Mobilong	CL687/94	H170700 S930	2.00
Mobilong	CL687/94	Pt Sec 930	2.30	Mobilong	CL687/94	H170700 S930	2.20
Burdett	CL556/9	50	1.30	Burdett	CT6115/91	H750200 S50	1.3
Burdett	CR5757/333	582	1.20	Burdett	CR6105/14	H750200 S582	1.2
Burdett	CL538/116	51	1.60	Burdett	CT6115/90	H750200 S51	1.6

Irrigation Management Zone	Historic Title Reference	Historic Parcel	Historic Area (hectare)	Hundred	Certificate of Title (Volume/ Folio)	Deposited Plan / Allotment	Area (ha)
Burdett	CL539/87	52	1.70	Burdett	CT6115/90	H750200 S52	1.7
Burdett	CL537/101	53	1.70	Burdett	CT6115/90	H750200 S53	1.7
Burdett	CL537/102	54	3.20	Burdett	CT6115/90	H750200 S54	3.20
Burdett	CL1417/21	552	1.70	Burdett	CT6115/89	D85683 A55	6.40
Burdett	CL1417/21	553	1.60				
Burdett	CL539/35	585	1.60				
Burdett	CL539/36	586	1.50				
Burdett	CT5875/108	57	2.20	Burdett	CT5875/108 CT5875/108	D48596 Q5 D48596 Q6	2.20
Burdett	CL537/104	59	2.20	Burdett	CT6004/79	H750200 S59	2.20
Burdett	CL537/104	60	2.30	Burdett	CT6004/79	H750200 S60	2.30
Burdett	CL539/96	61	3.10	Burdett	CT6004/79	D68367 A100	3.10
Burdett	CT5978/217	56	3.40	Burdett	CT5978/217	H750200 S56	3.40
Burdett	CT5930/431	58	2.40	Burdett	CT5930/431 CT5930/431	D48596 Q2 D48596 Q3	2.40
Burdett	CL674/59	62	3.60	Burdett	CT6004/78	D68367 Q102	3.60
Burdett	CL539/29	64	1.90	Burdett	CT6004/78	H750200 S64	1.90
Burdett	CL537/105	65	2.00	Burdett	CT6004/78	H750200 S65	2.00
Burdett	CL539/118	Blk 63	3.30	Burdett	CT6004/78	H750200 S63	3.30
Long Flat	CT5907/912	85	5.90	Burdett	CT5907/912	H750200 S85	5.90
Long Flat	CL555/122	71	74.70	Burdett	CT6026/106	H750200 S71	74.70
	CL1326/3	72			CT6026/106	H750200 S72	
	CL720/1	74			CT6005/441	H750200 S74	

Irrigation Management Zone	Historic Title Reference	Historic Parcel	Historic Area (hectare)	Hundred	Certificate of Title (Volume/ Folio)	Deposited Plan / Allotment	Area (ha)
	CL555/124 CL1290/25 CL555/113 CL555/71 CT5977/706 CL1314/13 CL725/2 CL1598/89 CL1598/89	75 77 78 80 81 82 407 83 84			CT6026/106 CT6026/106 CT6026/106 CT5988/513 CT5977/706 CT5997/842 CT6005/441 CT5997/842 CT5997/842	H750200 S75 H750200 S77 H750200 S78 H750200 S80 H750200 S81 H750200 S82 H750200 S407 H750200 S83 H750200 S84	
Long Flat	CL762/3 CT5979/590 CT5976/632 CL729/50	73 76 79 406	19.60	Burdett	CT6180/234 CT6180/235 CT6180/236 CT6180/237	H750200 S73 H750200 S76 H750200 S79 H750200 S406	19.60
Long Flat	CL555/118 CL1239/5 CL1060/30 CL1300/37 CL555/121 CL1239/5 CL1239/6	66 67 68 69 70 426 463	37.80	Burdett	CT6094/992 CT6094/992 CT6094/992 CT6094/992 CT6094/992 CT6094/992 CT6094/992	H750200 S66 H750200 S67 H750200 S68 H750200 S69 H750200 S70 H750200 S426 H750200 S463	37.80
Long Island	CT5418/601	Pt Blk A & pt 53	20.40	Mobilong	CT5418/601	D45924 A10	20.40
Long Island	CT5418/603	Pt Blk A & pt 53	60.50	Mobilong	CT5418/603	D45924 A12	60.50
Swanport	CT5369/354 CT5369/354	853 854	40.80	Mobilong	CT5369/354	D30879 A20	40.80

Irrigation Management Zone	Historic Title Reference	Historic Parcel	Historic Area (hectare)	Hundred	Certificate of Title (Volume/ Folio)	Deposited Plan / Allotment	Area (ha)
	CT5369/354	855					
	CT5369/354	856					
	CT5369/354	857					
	CT5369/354	858					
	CT5369/354	859					
	CT5369/354	860					
	CT5369/354	861					
	CT5369/354	863					
	CT5369/354	959					
	CT5369/354	960					
	CT5369/354	961					
	CT5369/354	964					
	CT5369/354	994					
	CT5369/354	995					
	CT5369/354	1140					
	CT5369/354	1141					
	CT5369/354	1142					
	CT5369/354	1143					
Yiddinga	CL1575/24	42	34.70	Burdett	CT6000/815	D72640 A103	34.70
	CL1575/24	449			CT6000/815	D72640 A102	
	CL1575/24	Pt 738			CT6000/815	D72640 A101	
Yiddinga	CT5890/255	42A (& 730 in 1993)	20.00	Burdett	CT5890/255	D60900 A201	20.00
Yiddinga	CL635/15	528	23.00	Burdett	CT6035/854	D71228 A2	23.00
River Glen	CT5873/844	Blk B	0.60	Mobilong	CT5873/844	D59138 A60 [#]	0.00
River Glen	CT5873/845	Blk B	33.12	Mobilong	CT5873/845	D59138 A61	33.12

Irrigation Management Zone	Historic Title Reference	Historic Parcel	Historic Area (hectare)	Hundred	Certificate of Title (Volume/ Folio)	Deposited Plan / Allotment	Area (ha)
River Glen	CL658/56	115	19.87	Mobilong	CL6196/608	H170700 S115	19.87
River Glen	CL658/57	919	17.10	Mobilong	CT6196/611	H170700 S919	17.10
River Glen	CT5214/473	1090	8.45	Mobilong	CT5214/473	F122630 A8	8.45
River Glen	CT5876/415	1090	38.65	Mobilong	CT6234/846	D118617 A3	38.65
River Glen	CT5214/469	Blk C	11.69	Mobilong	CT5214/469	H170700 BC	11.69
River Glen	CT5975/294	1090	43.48	Mobilong	CT6191/375	D115389 A51	32.20
River Glen	CT5422/329		18.95		CT6191/376	D115389 A52	30.20
River Glen	CT5814/703	1090	1.10	Brinkley	CT5814/703	F168142 A375	1.10
River Glen	CT5090/627	1090	9.29	Brinkley	CT6055/360 CT6152/196	D83149A102 D95206A201	9.29
Monteith	CL999/20	492	9.30	Burdett	CT6169/757	H750200 S492	9.30
Monteith	CL999/20	493	9.20	Burdett	CT6169/757	H750200 S493	9.20
Monteith	CL999/20	494	8.60	Burdett	CT6169/757	H750200 S494	8.60
Monteith	CL563/79	491	9.20	Burdett	CT6039/783	D70869 A101	11.20
Monteith	CT5951/942	490	10.30		CT6063/653	D70869 A102	8.30
Monteith	CT5952/942	489	11.20	Burdett	CT5952/942	H750200 S489	11.20
Monteith	CL948/14	115	3.10	Burdett	CT5997/249	H750200 S115	3.10
Monteith	CL564/61	488	12.90	Burdett	CT5997/249	H750200 S488	12.90
Monteith	CT5981/964	114	5.70	Burdett & Seymour	CT6008/646	F219054 A1	5.70
Monteith	CL1199/28	479	8.00	Burdett & Seymour	CT6022/813	F219020 A8	8.00
Monteith	CL563/75	480	12.70	Burdett & Seymour	CT6022/813	F219020 A7	12.70
Monteith	CT5981/965	481	13.80	Burdett & Seymour	CT5981/965	F219056 A11	13.80

Irrigation Management Zone	Historic Title Reference	Historic Parcel	Historic Area (hectare)	Hundred	Certificate of Title (Volume/ Folio)	Deposited Plan / Allotment	Area (ha)
Monteith	CT5981/966	482	14.60	Burdett & Seymour	CT5981/966	F219055 A10	14.60
Monteith	CL1537/12	484	5.50	Burdett & Seymour	CT6012/791	F219087 A601	5.50
Monteith	CL1537/12	485	12.00	Burdett & Seymour	CT6012/791	F219087 A600	12.00
Monteith	CT5981/964	486	12.10	Burdett & Seymour	CT6008/646	F219054 A2	12.10
Monteith	CT5981/964	487	3.60	Burdett & Seymour	CT6008/646	F219054 Q3	3.60
Monteith	CL1199/27	545	5.60	Burdett & Seymour	CT6022/813	F219092 A10	5.60
Monteith	CL1537/12	565	6.80	Burdett & Seymour	CT6012/791	F219087 A602	6.80
Monteith	CT5973/977	483	14.20	Burdett & Seymour	CT5973/977	F219085 A20	14.20
Monteith	CT5983/14	474	6.20	Burdett & Seymour	CT6170/279^	F219084 A19	6.20
Monteith	CT5983/14	475	12.30	Burdett & Seymour	CT6170/279^	F219084 A18	12.30
Monteith	CT5968/41	478	11.80	Burdett & Seymour	CT5968/41	D68278 A12	11.80
Monteith	CT5961/243	476	12.30	Burdett & Seymour	CT5961/243	F219046 A102	12.30
Monteith	CT5961/243	477	6.60	Burdett & Seymour	CT5961/243	F219046 A100	6.60
Monteith	CT5961/243	571	5.10	Burdett & Seymour	CT5961/243	F219046 A101	5.10
Monteith	CT5951/625	473	13.60	Burdett & Seymour	CT5951/625	F219045 A41	13.60
Monteith	CT5951/625	605	6.20	Burdett & Seymour	CT5951/625	F219045 A40	6.20
Monteith	CT5987/196	463	7.00	Seymour	CT6008/661	H750700 S463	7.00
Monteith	CT5987/196	464	7.10	Seymour	CT6008/661	H750700 S464	7.10
Monteith	CT5987/196	465	7.60	Seymour	CT6008/661	H750700 S465	7.60
Monteith	CT5987/196	466	8.70	Seymour	CT6008/661	H750700 S466	8.70
Monteith	CT5987/196	467	10.20	Seymour	CT6008/661	H750700 S467	10.20
Monteith	CT5987/196	468	10.90	Seymour	CT6008/661	H750700 S468	10.90

Irrigation Management Zone	Historic Title Reference	Historic Parcel	Historic Area (hectare)	Hundred	Certificate of Title (Volume/ Folio)	Deposited Plan / Allotment	Area (ha)
Monteith	CT5987/196	469	2.10	Burdett & Seymour	CT6233/561	F219021 A6	2.10
Monteith	CL1244/37	470	12.00	Burdett & Seymour	CL6210/674	F253306 A50	12.00
Monteith	CL1244/37	504	8.40	Seymour	CL6210/674	H750700 S504	8.40
Monteith	CT5969/209	471	14.90	Seymour	CT5969/209	F219064 A1	14.90
Monteith	CT5969/208	472	13.70	Burdett & Seymour	CT5969/208	F219065 A2	13.70
Monteith	CT5974/595	458	6.20	Seymour	CT5974/595	H750700 S458	6.20
Monteith	CT5974/595	459	6.40	Seymour	CT5974/595	H750700 S459	6.40
Monteith	CT5974/595	460	5.60	Seymour	CT5974/595	H750700 S460	5.60
Monteith	CT5956/50	461	5.90	Seymour	CT5956/50	H750700 S461	5.90
Monteith	CT5956/50	462	6.70	Seymour	CT5956/50	H750700 S462	6.70
Kilsby	CT5455/254	Pt 1095 & Q	41.60	Seymour	CT5455/254	D21442 A7	41.60
Kilsby	CT5938/27 CT5938/28 CT5938/30	Pt 1095	80.60	Seymour	CT5938/27 CT5938/28 CT5938/30	D62865 A71 D62865 A72 D62865 A74	80.60
Woods Point	CT5402/140	1088	19.93	Brinkley	CT6009/59	D75290 A50	19.93
Woods Point	CT5496/37 CT5638/637	684 689	129.39	Brinkley	CT6075/225 CT6069/342	D80615 A73 D80615 A72	129.39
Woods Point	CT5231/613	1087	30.94	Brinkley	CT5231/613 CT5865/745	F126923 A1 F168135 A368	30.94
Woods Point	CT5706/758	1098	22.29	Brinkley	CT5706/758	F168134 A367	22.29
Woods Point	CT5872/116	682	47.01	Brinkley	CT5872/116 CT5284/233	D29040 A19 D4114 A11	47.01
Woods Point	CT5875/694	1086	30.49	Brinkley	CT6092/905	F128724 A1	30.49

Irrigation Management Zone	Historic Title Reference	Historic Parcel	Historic Area (hectare)	Hundred	Certificate of Title (Volume/ Folio)	Deposited Plan / Allotment	Area (ha)
					CT6092/906	F128724 A2	
Westbrook	CT5359/484	1096 & R	40.4	Seymour	CT6113/577	D89271 A21	4.1
					CT6113/578	D89271 A22	36.3
Jervois	CT5951/281	780	1.50	Brinkley	CT5951/281	H170200 S780	1.50
Jervois	CT5923/295	988	2.00	Brinkley	CT5923/295	H170200 S988	2.00
Jervois	CT5961/864	774	9.20	Brinkley	CT6201/488	H170200 S774	9.20
Jervois	CT5961/864	775	4.70	Brinkley	CT6201/488	H170200 S775	4.70
Jervois	CT5961/864	776	8.70	Brinkley	CT6201/488	H170200 S776	8.70
Jervois	CT5969/311	777	9.20	Brinkley	CT6201/489	H170200 S777	9.20
Jervois	CT5969/311	778	5.10	Brinkley	CT6201/489	H170200 S778	5.10
Jervois	CT5969/311	779	8.50	Brinkley	CT6201/489	H170200 S779	8.50
Jervois	CT5961/864	931	5.00	Brinkley	CT6201/489	H170200 S931	5.00
Jervois	CT5969/311	932	4.00	Brinkley	CT6201/489	H170200 S932	4.00
Jervois	CT5969/311	987	3.30	Brinkley	CT6201/489	H170200 S987	3.30
Jervois	CT5969/311	989	0.20	Brinkley	CT6201/489	H170200 S989	0.20
Jervois	CT5974/999	770	8.20	Brinkley	CT5974/999	H170200 S770	8.20
Jervois	CT5974/998	771	7.50	Brinkley	CT5974/998	H170200 S771	7.50
Jervois	CT5974/998	772	3.60	Brinkley	CT5974/998	D68063 Q51	3.60
Jervois	CT5974/998	773	10.10	Brinkley	CT5974/998	H170200 S773	10.10
Jervois	CT5974/998	930	4.50	Brinkley	CT5974/998	H170200 S930	4.50
Jervois	CT5974/999	990	4.00	Brinkley	CT5974/999	H170200 S990	4.00
Jervois	CT5974/998	992	0.60	Brinkley	CT5974/998	D68063 Q52	0.60

Irrigation Management Zone	Historic Title Reference	Historic Parcel	Historic Area (hectare)	Hundred	Certificate of Title (Volume/ Folio)	Deposited Plan / Allotment	Area (ha)
Jervois	CT5985/808	765	5.30	Brinkley	CT5985/808	H170200 S765	5.30
Jervois	CT5966/556	766	9.00	Brinkley	CT5966/556	H170200 S766	9.00
Jervois	CT5966/556	767	4.20	Brinkley	CT5966/556	H170200 S767	4.20
Jervois	CT5948/336	768	8.30	Brinkley	CT5948/336	H170200 S768	8.30
Jervois	CT5948/336	769	4.10	Brinkley	CT5948/336	H170200 S769	4.10
Jervois	CT5948/336	929	4.20	Brinkley	CT5948/336	H170200 S929	4.20
Jervois	CT5970/369	375	4.40	Brinkley	CT5970/369	H170200 S756	9.10
Jervois	CT5970/369	756	4.70				
Jervois	CT5951/283	746	6.10	Brinkley	CT5951/283	H170200S 746	6.10
Jervois	CT5973/584	753	9.80	Brinkley	CT5973/584	H170200S 753	9.80
Jervois	CT5954/838	928	5.00	Brinkley	CT5954/838	H170200 S928	5.00
Jervois	CT5946/11	991	3.80	Brinkley	CT5946/11	H170200 S991	3.80
Jervois	CT5946/10	757	9.10	Brinkley	CT6074/973	H170200 S757	9.10
Jervois	CT5985/807	764	4.60	Brinkley	CT5985/807	H170200 S764	4.60
Jervois	CT5985/807	763	9.00	Brinkley	CT5985/807	D68006 Q1	12.80
Jervois	CT5985/807	869	3.80		CT5985/807	D68006 Q2	
Jervois	CL950/15	758	4.10	Brinkley	CT6098/359	H170200 S758	4.10
Jervois	CL699/78	759	8.80	Brinkley	CT6098/374	H170200 S759	8.80
Jervois	CL718/50	760	8.80	Brinkley	CT6098/375	H170200 S760	8.80
Jervois	CL718/50	761	4.20	Brinkley	CT6098/376	H170200 S761	4.20
Jervois	CL719/3	762	3.70	Brinkley	CT6098/379	D69328 Q11	3.70
Jervois	CL719/3	871	0.70	Brinkley	CT6098/379	D69328 Q12	0.70

Irrigation Management Zone	Historic Title Reference	Historic Parcel	Historic Area (hectare)	Hundred	Certificate of Title (Volume/ Folio)	Deposited Plan / Allotment	Area (ha)
Jervois	CL719/2	872	0.70	Brinkley	CT6098/377	H170200 S872	0.70
Jervois	CL699/78	926	4.40	Brinkley	CT6098/372	H170200 S926	4.40
Jervois	CL719/2	927	4.50	Brinkley	CT6098/378	H170200 S927	4.50
Jervois	CL701/33	750	9.40	Brinkley	CT6034/164	H170200 S750	9.40
Jervois	CL701/33	751	4.90	Brinkley	CT6034/164	H170200 S751	4.90
Jervois	CT5977/161	1458	4.50	Brinkley	CT5977/161	H170200 S1458	4.50
Jervois	CL709/16	752	9.60	Brinkley	CT6066/31	H170200 S752	9.60
Jervois	CL711/35	754	8.20	Brinkley	CT6035/110	H170200 S754	8.20
Jervois	CL711/35	755	4.60	Brinkley	CT6066/110	H170200 S755	4.60
Jervois	CL709/16	911	5.00	Brinkley	CT6066/31	H170200 S911	5.00
Jervois	CL711/35	925	4.60	Brinkley	CT6066/110	H170200 S925	4.60
Jervois	CL923/9	740	8.10	Brinkley	CT6005/911	H170200 S740	8.10
Jervois	CL923/9	839	4.90	Brinkley	CT6005/921	H170200 S839	4.90
Jervois	CL923/9	907	4.40	Brinkley	CT6005/917	H170200 S907	4.40
Jervois	CT5939/900	737	8.90	Brinkley	CT5939/900	H170200 S737	8.90
Jervois	CT5939/901	738	9.00	Brinkley	CT5939/901	H170200 S738	9.00
Jervois	CT5939/902	739	4.40	Brinkley	CT5939/902	H170200 S739	4.40
Jervois	CT5939/906	906	4.60	Brinkley	CT5939/906	H170200 S906	4.60
Jervois	CL1419/7	741	8.30	Brinkley	CT6005/912	H170200 S741	8.30
Jervois	CL1419/7	742	4.10	Brinkley	CT6005/913	H170200 S742	4.10
Jervois	CL1568/11	743	8.20	Brinkley	CT6005/914	H170200 S743	8.20
Jervois	CL704/28	744	8.60	Brinkley	CT6005/919	H170200 S744	8.60

Irrigation Management Zone	Historic Title Reference	Historic Parcel	Historic Area (hectare)	Hundred	Certificate of Title (Volume/ Folio)	Deposited Plan / Allotment	Area (ha)
Jervois	CL704/28	745	4.50	Brinkley	CT6005/919	H170200 S745	4.50
Jervois	CL1419/7	747	4.50	Brinkley	CT6005/919	H170200 S747	4.50
Jervois	CL729/37	748	4.70	Brinkley	CT6005/919	H170200 S748	4.70
Jervois	CT5920/740	734	8.90	Brinkley	CT5920/740	D63961 Q1	20.80
Jervois	CT5920/740	853	7.80				
Jervois	CT5920/740	854	4.10				
Jervois	CT5920/740	855	1.50	Brinkley	CT5920/740	D63961 Q2	2.00
Jervois	CT5920/740	905	0.50				
Jervois	CL1568/11	908	4.20	Brinkley	CT6005/918	H170200 S908	4.20
Jervois	CL950/14	909	6.10	Brinkley	CT6005/919	H170200 S909	6.10
Jervois	CL1603/41	1459	9.00	Brinkley	CT6005/919	H170200 S1459	9.00
Jervois	CL703/1	732	9.40	Brinkley	CT6202/698	H170200 S732	9.40
Jervois	CL703/1	733	4.60	Brinkley	CT6202/698	H170200 S733	4.60
Jervois	CL962/4	981	4.10	Brinkley	CT6202/613	H170200 S981	4.10
Jervois	CT5940/907	95	12.00	Brinkley	CT6069/359 CT6069/359	D82824Q21 D82824Q22	21.30
Jervois	CT5940/907	96	4.90				
Jervois	CT5940/907	904	4.40				
Jervois	CL701/36	99	4.40	Brinkley	CT6029/259	H170200 S99	4.40
Jervois	CL701/36	100	9.00	Brinkley	CT6029/259	H170200 S100	9.00
Jervois	CL1091/31	903	4.60	Brinkley	CT6029/259	H170200 S903	4.60
Jervois	CL962/3	97	9.50	Brinkley	CT6033/313	H170200 S97	9.50
Jervois	CL701/37	98	9.60	Brinkley	CT6033/314	H170200 S98	9.60

Irrigation Management Zone	Historic Title Reference	Historic Parcel	Historic Area (hectare)	Hundred	Certificate of Title (Volume/ Folio)	Deposited Plan / Allotment	Area (ha)
Jervois	CT5923/941	544	22.70	Brinkley	CT5923/941	H170200 S544	22.70
Jervois	CT5923/941	713	21.10	Brinkley	CT5923/941	H170200S713	21.10
Jervois	CT5757/950	101	9.80	Brinkley	CT5957/950 CT5957/950 CT5957/944 CT5957/944	D68203Q312 D68203Q313 D67307Q225 D67307Q226	124.20
Jervois	CT5757/950	102	5.20				
Jervois	CT5757/950	104	10.20				
Jervois	CT5757/950	105	5.30				
Jervois	CT5757/950	106	10.80				
Jervois	CT5757/950	711	4.90				
Jervois	CT5757/950	901	5.10				
Jervois	CT5757/950	712	4.72				
Jervois	CT5757/950	902	4.33				
Jervois	CT5957/944	107	10.90				
Jervois	CT5957/944	108	5.70				
Jervois	CT5957/944	109	10.70				
Jervois	CT5957/944	110	11.10				
Jervois	CT5957/944	111	5.50				
Jervois	CT5957/944	112	9.30				
Jervois	CT5957/944	899	5.20				
Jervois	CT5957/944	900	5.40				
Jervois	CL702/21	113	6.10	Brinkley	CT6017/653	H170200 S113	6.10
Jervois	CL702/28	114	9.10	Brinkley	CT6017/654	H170200 S114	9.10
Jervois	CL1575/34	115	8.90	Brinkley	CT6017/655	H170200 S115	8.90

Irrigation Management Zone	Historic Title Reference	Historic Parcel	Historic Area (hectare)	Hundred	Certificate of Title (Volume/ Folio)	Deposited Plan / Allotment	Area (ha)
Jervois	CL1575/34	116	4.70	Brinkley	CT6017/656	H170200 S116	4.70
Jervois	CL1575/34	117	9.60	Brinkley	CT6017/657	H170200 S117	9.60
Jervois	CL1575/34	118	9.20	Brinkley	CT6017/658	H170200 S118	9.20
Jervois	CL1575/34	898	4.80	Brinkley	CT6017/662	H170200 S898	4.80
Jervois	CR5744/739	976	1.90	Brinkley	CR6012/213	H170200 S976	1.90
Jervois	CL1596/61	119	5.20	Brinkley	CT6010/653 CT6010/653	D69559 Q7 D69559 Q8	5.20
Jervois	CL1596/61	120	10.10	Brinkley	CT6010/653 CT6010/653	D69559 Q12 D69559 Q13	10.10
Jervois	CL1596/61	121	10.00	Brinkley	CT6010/653 CT6010/653	D69559 Q17 D69559 Q18	10.00
Jervois	CL1596/61	122	4.50	Brinkley	CT6010/653	D69559 Q22	8.50
Jervois	CL1596/61	874	4.00		CT6010/653	D69559 Q23	
Jervois	CL1596/61	873	5.30	Brinkley	CT6010/653 CT6010/653	D69559 Q3 D69559 Q4	5.30
Jervois	CL1414/45	123	9.30	Brinkley	CT6028/668	H170200 S123	9.30
Jervois	CL1005/15	124	9.30	Brinkley	CT6028/669	H170200 S124	9.30
Jervois	CL1608/88	125	4.90	Brinkley	CT6028/670	H170200 S125	4.90
Jervois	CL1005/15	848	1.00	Brinkley	CT6028/673	H170200 S848	1.00
Jervois	CL1005/15	851	8.30	Brinkley	CT6028/674	H170200 S851	8.30
Jervois	CL1005/15	875	4.90	Brinkley	CT6028/675	H170200 S875	4.90
Jervois	CL1608/72	126	9.40	Brinkley	CT6043/230 CT6043/230	D73138 Q82 D73138 Q83	9.40

Irrigation Management Zone	Historic Title Reference	Historic Parcel	Historic Area (hectare)	Hundred	Certificate of Title (Volume/ Folio)	Deposited Plan / Allotment	Area (ha)
Jervois	CL756/31	833	19.10	Brinkley	CT6043/227 CT6043/227	D81312 Q44 D81312 Q45	19.10
Jervois	CL771/8	366	24.30	Brinkley	CT6043/229 CT6043/229	D81312Q49 D81312Q50	28.70
Jervois	CL840/27	849	1.00				
Jervois	CL840/27	850	3.40				
Jervois	CT5810/421	367	4.40	Brinkley	CT6028/351	D47925 Q3	4.40
Jervois	CL848/26	368	20.00	Brinkley	CT6028/352 CT6028/352	D70716 Q52 D70716 Q53	20.00
Jervois	CT5810/421	847	1.00	Brinkley	CT6028/351	D47925 Q2	1.00
Jervois	CT5982/879	545	22.20	Brinkley	CT6070/369	H170200 S545	22.20
Jervois	CT5951/462	546	23.40	Brinkley	CT6163/800	H170200 S546	23.40
Jervois	CT5954/378	547	27.80	Brinkley	CT5954/378 CT5954/378 CT5954/378	F39829 Q1 F39829 Q2 F39829 Q3	27.80
Jervois	CT5983/678	551	11.60	Brinkley	CT5983/678 CT5983/678	D68200 Q205 D68200 Q206	11.60
Jervois	CT5931/910	550	24.70	Brinkley	CT5983/678 CT5983/678	D68200 Q203 D68200 Q202	24.70
Jervois	CT5976/633	548	28.20	Brinkley	CT5976/633 CT5976/633 CT5976/633	F39829 Q4 F39829 Q5 F39829 Q6	28.20
Jervois	CT5962/758	549	24.20	Brinkley	CT5962/758	H170200S549	24.20
Jervois	CT5906/473	553	27.0	Brinkley	CT5983/679	D68200 Q208	62.80
Jervois	CT5906/473	Pt 552	10.5		CT5983/679	D68200 Q209	

Irrigation Management Zone	Historic Title Reference	Historic Parcel	Historic Area (hectare)	Hundred	Certificate of Title (Volume/ Folio)	Deposited Plan / Allotment	Area (ha)
Jervois	CT5983/679	551 (was pt 552)	25.3				
Jervois	CL768/39	554	23.30	Brinkley	CT6028/3	H170200 S554	23.30
Jervois	CT5984/950	555	20.80	Brinkley	CT5984/950	D68556Q69 D68556Q70	20.80
Jervois	CT5984/951	556	21.70	Brinkley	CT5999/861	D68556Q73	21.70
Jervois	CT5972/429	557	20.30	Brinkley	CT5972/429	H170200 S557	20.30
Jervois	CT5972/429	558	19.00	Brinkley	CT5972/429	H170200 S558	19.00
Jervois	CL1208/18	559	23.10	Brinkley	CT5998/747	H170200 S559	23.10
Jervois	CL1140/35	560	22.10	Brinkley	CT5998/744	H170200 S560	22.10
Jervois	CT5980/155	561	21.40	Brinkley	CT6132/6	H170200 S561	21.40
Jervois	CT5962/909	835	16.90	Brinkley	CT5962/909 CT5962/909	D70209Q14 D70209Q13	16.90
Jervois	CL719/7	599	20.30	Brinkley	CT6054/541 CT6054/541	D81643Q193 D81643Q194	20.30
Jervois	CL1381/48	600	20.60	Brinkley	CT6054/542 CT6054/542	D81643Q195 D81643Q196	20.60
Jervois	CT5942/700	603	18.00	Brinkley	CT5942/700	H170200 S603	18.00
Jervois	CT5942/704	604	16.40	Brinkley	CT5942/704	H170200 S604	16.40
Jervois	CT5975/774	601	19.50	Brinkley	CT5975/774	H170200 S601	19.50
Jervois	CT5975/774	602	16.70	Brinkley	CT5975/774	H170200 S602	16.70
Jervois	CL1309/38	605	22.10	Brinkley	CT6021/592	H170200 S605	22.10
Jervois	CL1309/33	606	17.00	Brinkley	CT6021/592	H170200 S606	17.00

Irrigation Management Zone	Historic Title Reference	Historic Parcel	Historic Area (hectare)	Hundred	Certificate of Title (Volume/ Folio)	Deposited Plan / Allotment	Area (ha)
Seymour (Placid)	CT5852/326	1056	16.10	Seymour	CT5852/326	D56780 Q3	16.10
Seymour (Placid)	CT5852/327	Pt 1054 Pt 1055 1057	67.50	Seymour	CT6180/263	D113378 A4003	67.50
Seymour (McFarlane's)	CT5466/337 CT5466/337 CT5466/337 CT5556/861 CT5806/587	1069 1070 1073 1074 1067	141.60	Seymour	CT5466/337 CT5466/337 CT5466/337 CT5466/337 CT5466/337 CT5466/337 CT5466/337 CT5466/337 CT5556/861 CT5806/587	F207867 A91 F207867 A92 F207867 A93 F207867 A94 F207867 A95 F207867 A96 F207867 A97 H750700 S1074 F207777 A347	141.60
Seymour (Wellington)	nil	nil	0.00				0.00
Finniss	CT5977/64	2349	27.30	Nangkita	CT6079/674	D86785A201 ⁺	0.00
	CT5445/359	2351	25.30	Nangkita	CT6079/675	D86785A203 ⁺	0.00

[^] New Certificate of Title and Deposited Plan/Allotment since 2018-19 water-year.

[#] Historically a portion of the original block was flood irrigated and has since been subdivided – the newer parcel is no longer irrigated and is outside of the LMRIA management zone.

⁺ The ELMA for these parcels have been surrendered with the area reverting back to wetland.

More information

www.landscape.sa.gov.au/mr

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