

WATER ALLOCATION PLAN

Barossa Prescribed Water Resources Area

2009

YOUR GUIDE

TO UNDERSTANDING THE
BAROSSA PRESCRIBED WATER RESOURCES AREA
WATER ALLOCATION PLAN



Government of South Australia
Adelaide and Mount Lofty Ranges
Natural Resources Management Board

Disclaimer

This Guide has been prepared as an information source to accompany the Water Allocation Plan for the Barossa Prescribed Water Resources Area. The Guide does not form part of the Water Allocation Plan, or any other plan developed under the *Natural Resources Management Act 2004*. This document does not constitute legal advice on the application or construction of the *Natural Resources Management Act 2004* and no liability will be accepted for any such reliance on its contents. The Adelaide and Mount Lofty Ranges Natural Resources Management Board and the Government of South Australia, their employees and their servants do not warrant or make any representation regarding the use or results of use of the information contained herein as to its correctness, accuracy, currency or otherwise. The Adelaide and Mount Lofty Ranges Natural Resources Management Board and the Government of South Australia, their employees and their servants expressly disclaim all liability or responsibility to any person using the information or advice contained herein.

General enquiries

Department of Water, Land and Biodiversity Conservation
(DWLBC)
GPO Box 2834
Adelaide SA 5001
Phone: 08 8463 6800

Water licensing, allocation and transfers, stock and domestic water requirements, water metering, annual water reporting

DWLBC Licensing Section
GPO Box 2834
Adelaide SA 5001
Phone 08 8463 6800

Natural resources management, irrigation training, land management, pest plant and animal control

Adelaide and Mount Lofty Ranges NRM Board
205 Greenhill Road
Eastwood SA 5063
Phone 08 8273 9100

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1. Introduction

1.1. Purpose of the guide

This guide (the Guide) is a non-legal document, and is designed to accompany the Barossa Prescribed Water Resources Area Water Allocation Plan (the Plan). The Guide provides information on the following:

- background to the development of the policies in the Plan;
- explanation of the policies contained within the Plan; and
- answers to many commonly asked questions about the Plan

1.2. The Barossa Prescribed Water Resources Area

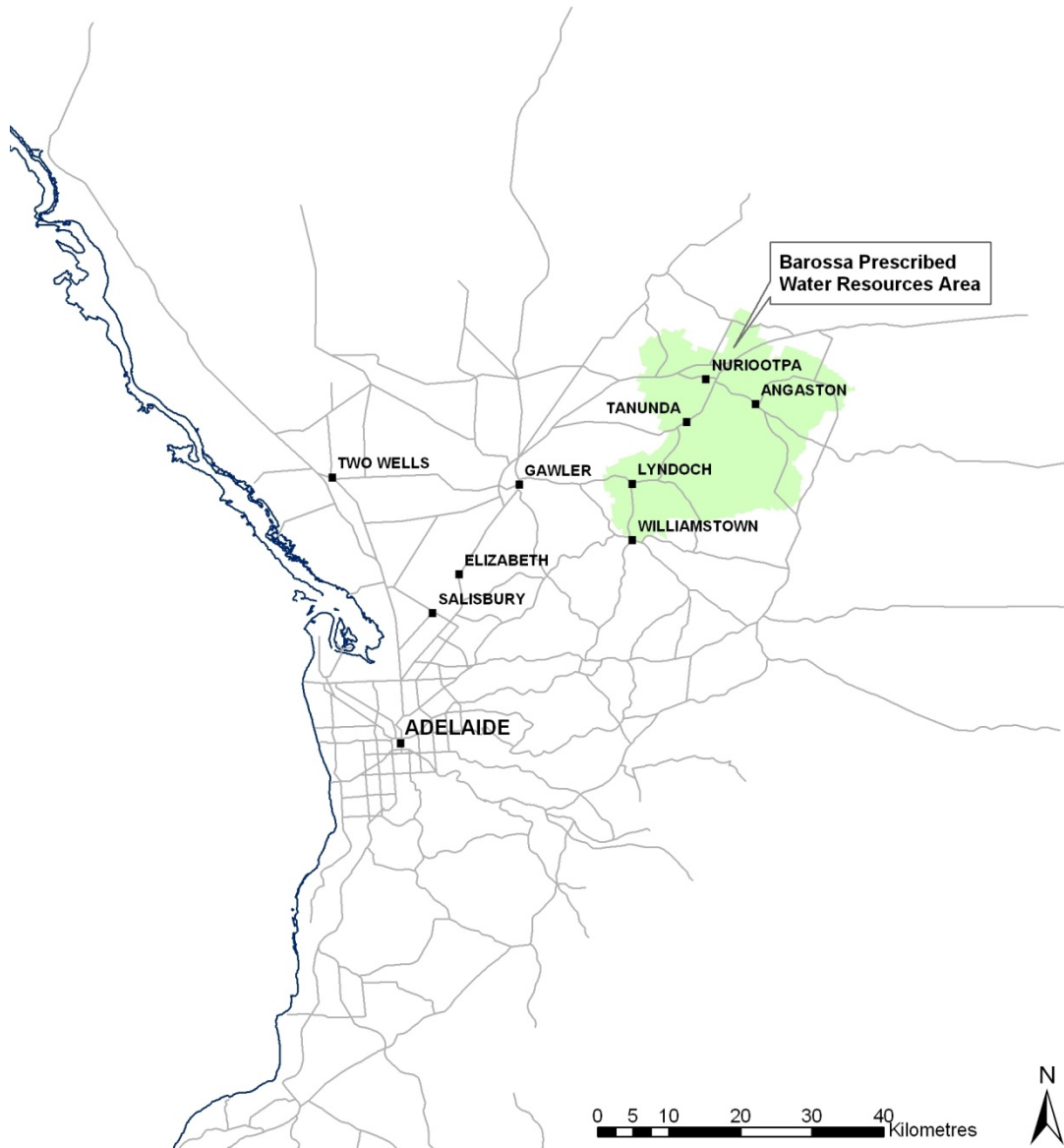
The Barossa Prescribed Water Resources Area (PWRA) is centred approximately 60 km north-east of Adelaide and covers an area of approximately 520 km². It abuts the Western Mount Lofty Ranges PWRA to the south and the Marne Saunders PWRA to the east. In the north it abuts the Northern and Yorke Natural Resources Management Board boundary (Figure 1). The Barossa PWRA incorporates the North Para River and tributaries, the Greenock Creek catchment, and aquifers contained in the sediments within the valley floor and the surrounding fractured bedrock.

Under the *Natural Resources Management Act 2004* (the Act) the three types of water resources covered by prescription in the Barossa PWRA are the:

- **Surface water** (water which flows over the ground);
- **Watercourse water** (which flows in rivers, streams or creeks or other natural watercourses); and
- **Underground water** (which is contained and flows through aquifers).

The Barossa PWRA water resources are defined by:

- GRO Plan no 327/1992. Underground water resources and North Para River and its tributaries within the area bounded by the broken line 'the defined area', and
- GRO Plan no. 128/2004. Underground water resources and all watercourse and surface water in the Greenock Creek Catchment Area.



■ **Figure 1 Location Plan (AMLRNRMB, 2009)**

Additional to the surface, watercourse and underground water covered by the prescription a number of alternative water sources are used to support the irrigation industry which includes:

- **BIL water** - imported water delivered via the Barossa Infrastructure Limited (BIL) scheme;
- **SA Water mains water** (off peak and peak supply) – water delivered via SA Water mains pipeline;
- **Effluent water** - water provided through treated sewerage and treated winery wastewater schemes; and
- **River Murray water** - some irrigators who hold licences to take water from River Murray (other than BIL) where water is delivered via SA Water pipelines.

A number of irrigators in the Barossa PWRA would use one or more of these various water sources on their properties.

The total volume of water allocated during the 2004/05 water use year from all reported sources was 10,884 ML as volumetric allocation and 1,972 Ha as area based allocations. The total volume of water extracted from reported sources during the 2004/05 water use year was 6,245 ML.

Table 1.1 details the volumes of water used from each source. The table shows that during 2004/05 the majority of water allocations held in the Barossa PWRA were for the taking of underground water; however the majority of water used was BIL water.

■ **Table 1.1 Allocation and extraction of water in the Barossa PWRA during 2004/05.**

| | Underground water | Surface/watercourse water | BIL | SA Water Mains | Effluent | TOTAL (ML) |
|-----------------------|-------------------|---------------------------|-------|----------------|----------|------------|
| Total Allocation (ML) | 5,518 | 1,378 | 2,961 | 956 | 72 | 10,884 |
| Total Allocation (Ha) | 765 | 1,172 | 10 | 13 | 12 | 1,972 |
| Total Extraction (ML) | 1,803 | 1,268 | 2,281 | 710 | 183 | 6,245 |

Source: AMLRNRMB, 2005

1.3. The Prescribed Water Resources

1.3.1. Surface water and watercourse resources

Surface water is the water that flows over land after falling as rain or other precipitation. This does not include the water that flows in a watercourse. 'Land' includes structures attached to land, such as buildings and sheds.

Water that flows in a watercourse is watercourse water. The Act defines a watercourse as '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) a dam or reservoir that collects water flowing in a watercourse;
- b) a lake through which water flows;
- c) 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;
- d) part of a watercourse;
- e) an estuary through which water flows; and
- f) any other natural resource, or class of natural resource, designated as a watercourse for the purposes of the Act.'

Watercourse water is commonly captured by diverting flow from the watercourse via a weir, pipe or pump into a water storage facility (e.g. a dam, tank or recharged into an aquifer). It is sometimes applied directly onto the crop.

There are obviously close links between surface water and watercourse water. The Plan generally manages these resources together.

The Barossa PWRA watercourses and surface water are contained within in the following sub-catchments:

- Angaston Creek;
- Barossa Valley Floor;
- Duck Ponds Creek;
- Greenock Creek;
- Jacob Creek;
- Light River;
- Lower Flaxman Valley;
- Lyndoch Creek;
- Tanunda Creek ; and
- Upper Flaxman Valley.

Various devices are used to capture surface and watercourse water, including dams, weirs and pumps. Water-capturing infrastructure is collectively referred to as 'diversion structures' in this Guide and the Plan. Surface water is commonly captured by intercepting runoff in a dam or by directing roof-runoff into a tank or other storage facility.

1.3.2. Underground water resources

The valley of the Barossa PWRA has been in-filled with sediments to depth of 140 m. The sediments of the Barossa Valley are composed of a series of overlapping alluvial fan deposits originating at the northern end of the valley. Alluvial fans characteristically comprise coarse-grained material grading to fine-grained material at the edges of the valley.

Two aquifer systems have been defined in these sediments separated by a confining layer.

- Upper Aquifer, contained within the shallow Quaternary and Tertiary sands of the Upper Roland Flat Sand; and
- Lower Aquifer, contained within the Tertiary sands of the Lower Roland Flat Sand.

The valley sediments are surrounded by basement rocks which contain the Fractured Rock Aquifer. **Table 1.2** summarises the hydrogeological framework of the aquifers and provides a description of the underground water salinity.

■ **Table 1.2 Summary of current hydrogeological framework for the Barossa PWRA**

| Era | Epoch | Geological Formation | Lithology | Unit | Description |
|-------------|----------------------|--------------------------------|--|------------------------|--|
| Quaternary | Holocene | Undifferentiated Quaternary | Sands gravels and silts of modern drainage channels | Upper Aquifer | Unconfined – confined aquifer, salinities from 500 to over 10,000 mg/L TDS, used for irrigation and stock supplies |
| | Pleistocene | Pooraka Formation (Qpap) | Red-brown sandy clays with minor gravel lenses near ranges | | |
| Tertiary | Miocene (early-late) | Rowland Flat Sand (Tomr Upper) | Non-carbonaceous clays, gravels, sands and silts | | |
| | Miocene (early) | Rowland Flat Sand (Tomr Lower) | Carbonaceous (lignitic) clays, brown | | |
| | Oligocene (early) | | Carbonaceous clays, gravels, sands and silt | Lower Aquifer | Confined aquifer, salinities 500-2,500 mg/L TDS, used extensively for irrigation. |
| Cambrian | | Kanmantoo – Normanville Groups | Metamorphosed greywacke, schist, marble | Fractured Rock Aquifer | Confined-unconfined aquifer, low yielding with highly variable salinity from 500 to over 3,000 mg/L TDS. |
| Proterozoic | | Adelaide System | Siltstones, shales, sandstones, quartzites | | |

(Source: Brown, 2002)

Fractured Rock Aquifer

In the Fractured Rock Aquifer, underground water is stored and flows through the fractures and fissures in the rock (generally sandstones and siltstones). The amount of water available for extraction in the Fractured Rock Aquifer is very low and as a result, extraction can cause significant changes in water level. However this aquifer can provide high yields and good quality underground water where fracture networks are well developed. Seasonal water level changes can also occur as a result of natural recharge both from rainfall and lateral flow of underground water through the aquifer. Generally flow through the Fractured Rock Aquifer follows topographic contours. Recharge and movement through the aquifer can occur quickly or slowly depending on the preferential flow paths that dominate the system in the region.

Lower Aquifer

The Lower Aquifer consists of a complex system of interconnected sub-aquifers held within a range of clays and sands managed as one system. The Lower Aquifer behaves as a confined aquifer in response to pumping, showing large seasonal variations in water level as a result of

extraction. Underground water flow is generally westward from the Barossa Ranges, moving to a more southwesterly direction beneath the valley floor. It is likely that there is a connection between the Fractured Rock and the Lower Aquifer, with recharge from the Fractured Rock flowing laterally through to the Lower Aquifer.

Upper Aquifer

The Upper Aquifer, like the Lower Aquifer, is made up of a series of interconnected sub-aquifers generally consist of sands and gravels that sit above the Lower Aquifer. The Upper Aquifer is generally unconfined and referred to as the water table aquifer. However, on the eastern side of the valley clay covers most of the aquifer making it confined in this region. Generally underground water flows in a westward direction changing to a more south westerly direct beneath the valley floor.

1.3.3. Underground water - Surface water interaction

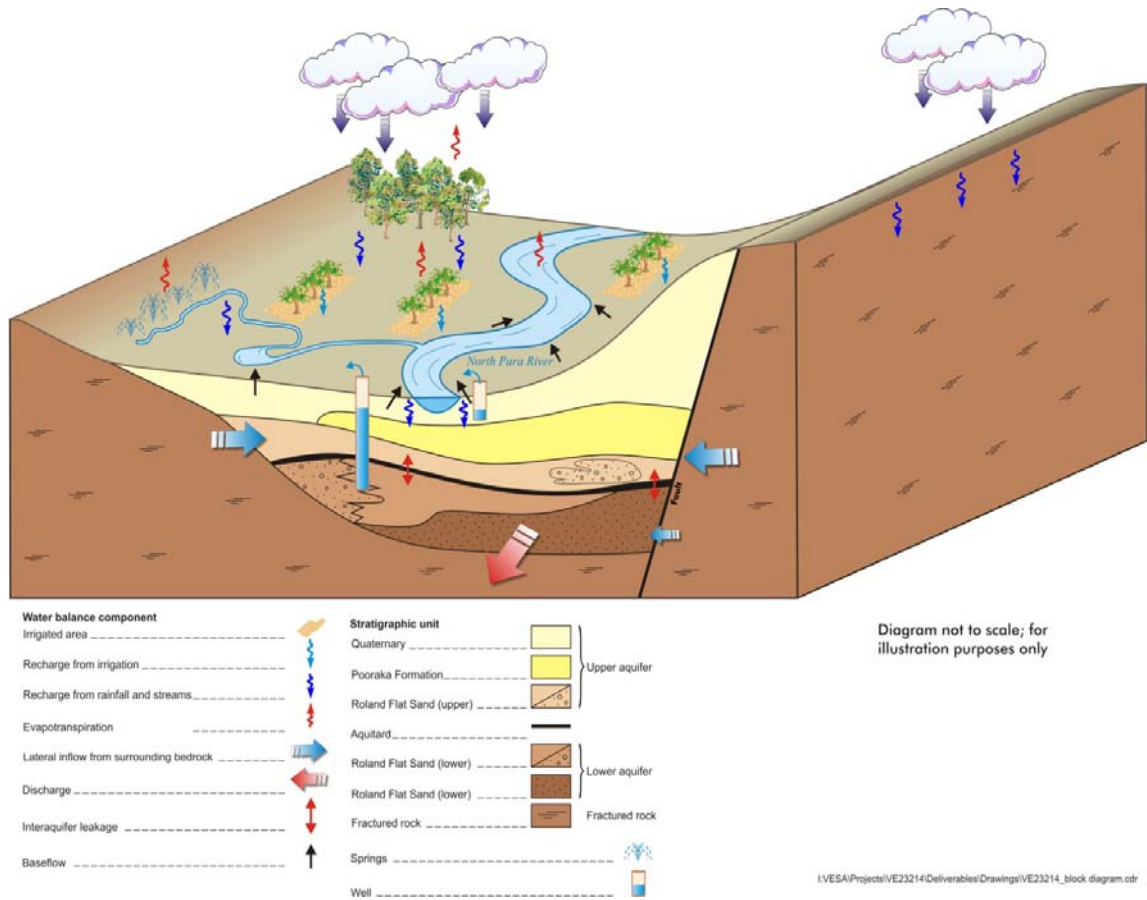
A strong connection exists between the underground water and surface water resources across the Barossa PWRA.

The Plan identifies that interactions occur between four major water bodies:

- the Fractured Rock Aquifer underlying the Barossa PWRA and the surrounding area;
- the watercourses of the North Para River and its tributaries;
- the Upper Aquifer (water table) of the valley floor; and
- the Lower Aquifer (confined) of the valley floor.

The surface water running over the land, if not caught by an off-stream diversion structures, finds its way into watercourses, thus becoming watercourse water. Watercourse and surface water can recharge the aquifer, and underground water can become surface water via springs and seeps and by discharging directly into the watercourses as baseflow. This interaction means that extraction of underground water can impact on surface water and vice versa.

Figure 1.3 schematically shows the prescribed water resources, the water balance components and how they interact.



■ **Figure 1.3** The prescribed water resources, the water balance components and their interaction

1.4. Prescription of water resources

Prescription is a means by which water resources, within the prescribed boundaries, can be sustainably managed to provide security for all water users now and into the future. The Act prescribes certain water resource uses to require a licensed allocation which is guided by the Plan. This protects the resources from over-use, shares water between users, minimises adverse effects from new water resource development on existing water users, and ensures water is available to sustain the water dependent ecosystems.

1.5. The water allocation plan

A water allocation plan is a legal document prepared under the Act that outlines the rules through policy for allocation, transfer and use of available water from prescribed resources.

The Plan covers the following themes:

- Understanding water resource supply and demand;
- A policy framework that aims to balance social, economic and environmental demands for water within the capacity of the water resources; and
- A monitoring and evaluation framework to facilitate adaptive management.

Studies and investigations have been carried out to understand the behaviour and supply of different water resources in the Barossa PWRA and to determine water demands for consumptive and environmental uses. This work determines the amount of water that can be sustainably extracted from the water resources. The review for this Plan began in 2000 and the Concept Statement was released in July 2005. The assessment of the capacity of the water resources have been based on the 2004/05 water use year data (AMLRNRMB, 2005). The findings from investigations have been used to assist the development of the water management framework implemented by the policy section of the Plan.

1.5.1. Supply and demand

Sections 2 to 4 of the Plan describe the supply and demand of the water in the Barossa PWRA. **Table 1.3** provides a description of these sections.

■ **Table 1.3 Description of the supply and demand sections of the Plan**

| Plan section number | Plan section name | Description of section content |
|---------------------|--|---|
| Section 2 | Needs of Water Dependent Ecosystems | Modelling of the surface water budget and dam storage and the impacts of this on the ecosystems. Establishing the environmental water requirements. |
| Section 3 | Effects on Other Water Resources | Assessment of the impact of water taking and use on other water resources. Description of the characteristics of the different water resources. The potential impacts of climate change on water resources. |
| Section 4 | Capacity of the Resource to Meet Demands | Assessment of the impact of current demand on resources and water dependent ecosystems. Future demand of water for licensed and non-licensed purposes. |

1.5.2. Policy framework

The policy expresses the intent of a specific principle, or group of principles, based on the objectives in the Plan. The Plan's 'policy framework' is the entire set of these principles. The policy framework is important to consider because many principles are interrelated and their meaning can only be fully understood as a whole.

The Act provides two main mechanisms for management of water resources in water allocation plans; licensed allocations and transfers, and water affecting activity permits. **Table 1.4** provides a description of the policy sections of the Plan.

■ **Table 1.4 Description of the policy sections of the Plan**

| Plan section number | Plan section name | Description of section content |
|---------------------|--|---|
| Section 5 & 6 | Water Allocation and Transfer Criteria | Allocation and licensing of the taking and use of prescribed water resources for licensed purposes and the transfer and trading of allocations. |
| Section 7 | Permits for Water Affecting Activities | Permitting of water affecting activities such as dam and well construction, use of imported water and effluent, draining or discharging water into a well |

To ensure that the policy framework is providing adequate protection of the water resources the Act requires that the Plan be reviewed at least once every five years.

1.5.3. Monitoring and evaluation

Section 8 of the Plan outlines a monitoring and evaluation framework that considers the condition of the resources, water dependent ecosystems and consumptive demand in order to trigger action if objectives are not met. This information will also establish a better understanding of supply and demand which will inform policy development when the Plan is reviewed.

1.6. Those affected by the Plan

The Plan applies to anyone who, within the Barossa PWRA:

- has a water licence and allocation to take and use the prescribed water resources for licensed purposes; or
- wishes to undertake a water affecting activity such as dam and well construction, construction and excavation in and around watercourses, and use of imported and effluent water.

1.7. Responsibility of the preparation of the Plan

The Minister for Environment and Conservation is responsible for administering the Act and adopting the Plan. The Mount Lofty Ranges Natural Resources Management Board (Board) has responsibility to prepare the Plan in accordance with the Act; to implement the Plan, and to keep the Plan under review to ensure that the objects of this Act are being achieved.

1.8. Connection with other plans

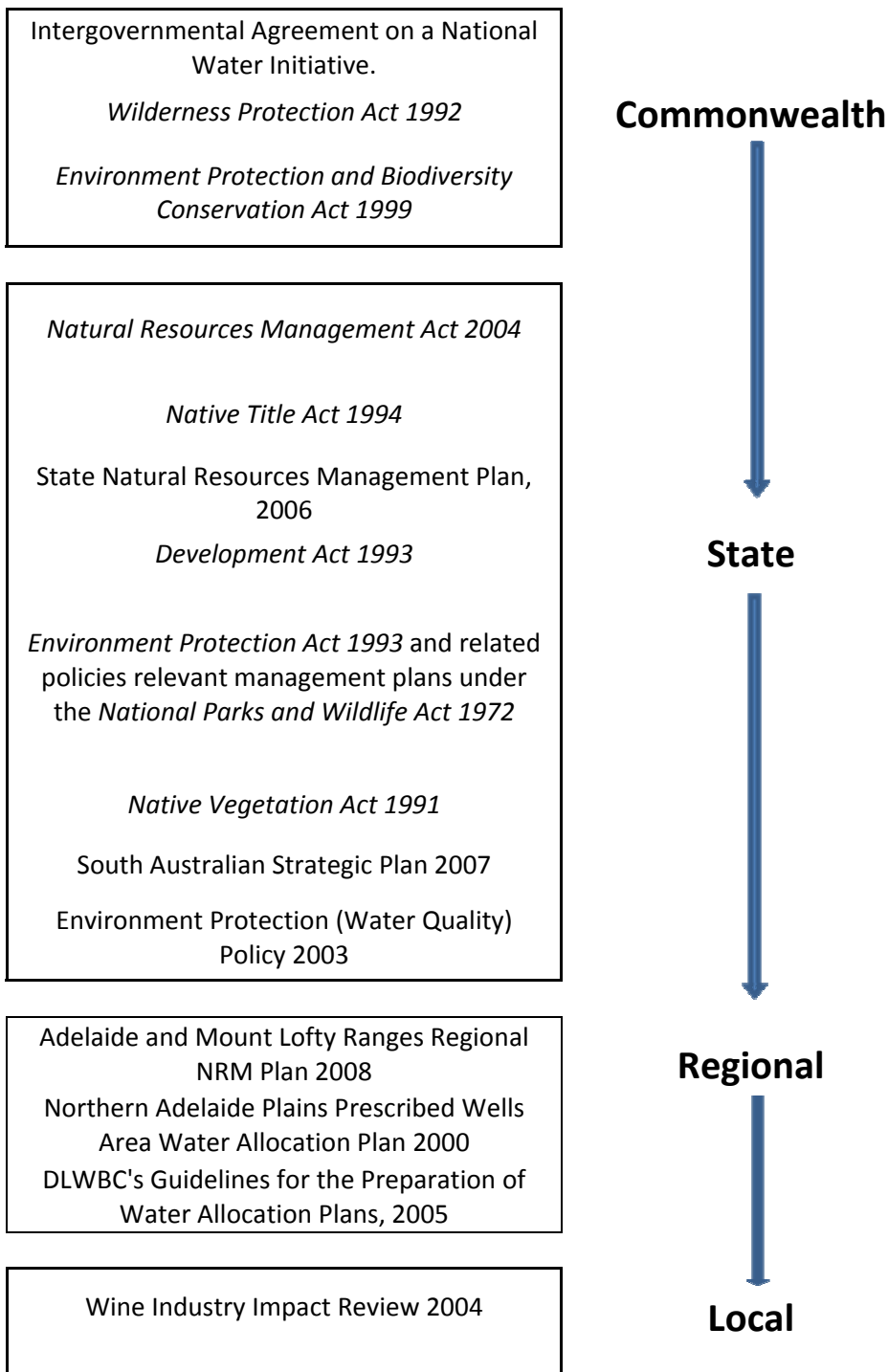
Water management is guided and shaped by policy and legislation developed at the Commonwealth, State, regional and local level. **Table 1.5** provides a hierarchy of legislation, plans and strategies considered during the preparation of the Plan.

In particular the Commonwealth water reform, detailed in an Intergovernmental Agreement known as the National Water Initiative (NWI), has great significance for the Plan. The NWI represents a shared commitment by the Commonwealth and State Governments to increase the efficiency of Australia's water use leading to greater certainty for investment and productivity for rural and urban communities and for the environment.

One of the key elements is Integrated Management of Water for Environmental and Other Public Benefit Outcomes. The outcome for integrated management under the NWI is to identify the environmental and other public benefit outcomes being sought for water systems and to develop and implement management practices and institutional arrangements that will achieve those outcomes.

Importantly, this incorporates adopting and implementing the principles developed under the NWI for recovery of water in over allocated and overused systems and a return to sustainable levels of extraction.

■ **Table 1.5 Legislation and other plans that guided the development of the Plan**



2. Development of the Plan

A brief history of the development of the Plan for the Barossa PWRA is listed in the **Table 2.1**.

■ **Table 2.1 History of the Plan development**

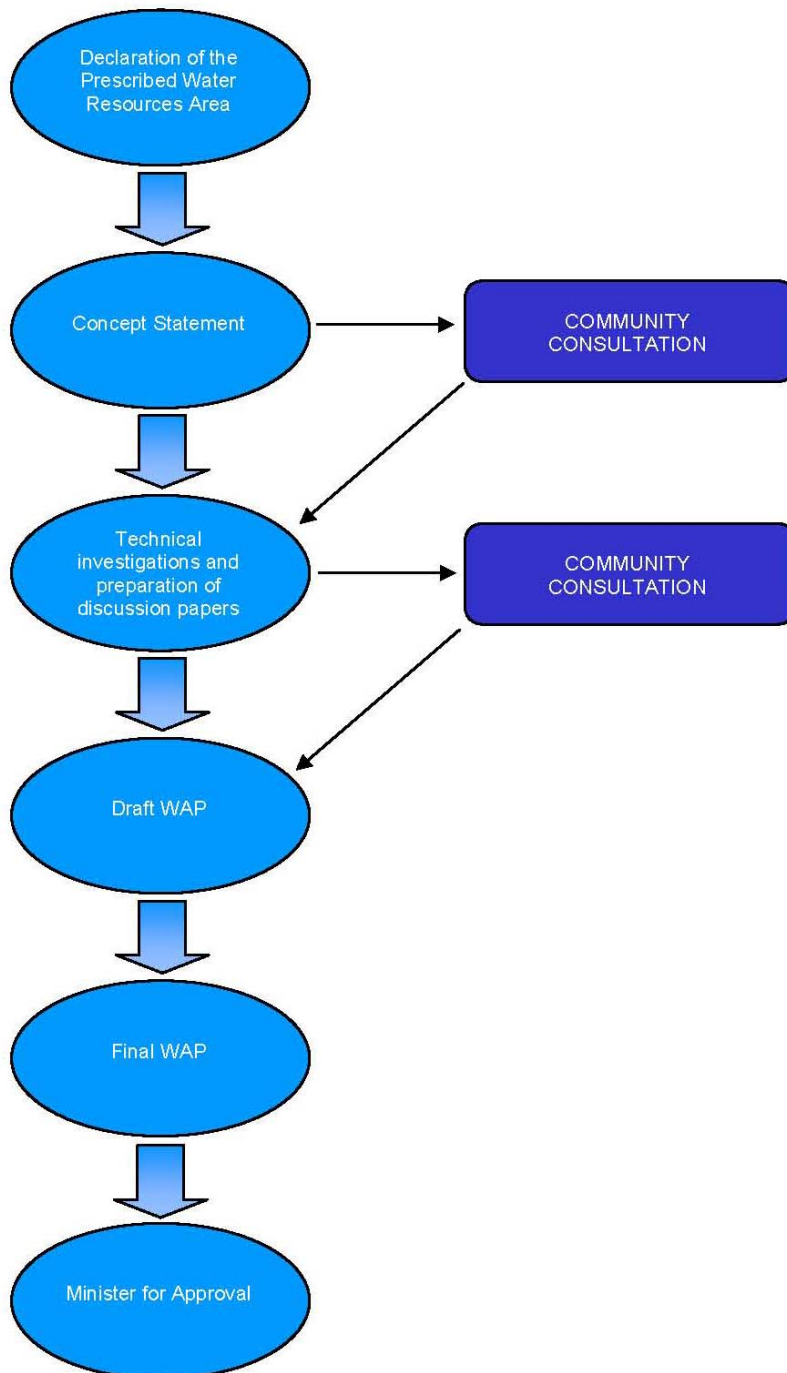
| Event | Date | Details |
|--|------------------------------------|---|
| Prescription Barossa Prescribed Wells Area | 1 July 1989 | Underground water was proclaimed under the then Water Resources Act 1990 Gazetted: 19 January 1989; Effective from: 01 July 1989 |
| Notice of Restriction #1 Barossa Prescribed Wells Area and Watercourse | 21 November 1990 | Gazetted: 28 November 1991, page 1474 |
| Notice of Restriction #2 Barossa Prescribed Wells Area and Watercourse | 21 November 1990 | Gazetted: 28 November 1991, page 1474 |
| Establishment Period | 5 December 1991 | |
| Prescription Barossa Prescribed Wells Area and Watercourse | 1 July 1992 | North Para River and its tributaries inclusive of existing and any future water bores to be drilled were proclaimed under the then Water Resources Act 1990. Gazetted: 14 May 1992, page 1389; Effective from: 01 July 1992 |
| Notice of Intent to Prescribe the Barossa PWRA | 18 December 1997 | Gazetted: 18 December 1997, pages 1673-1674 |
| Prescribed Period | 18 December 1997 -31 December 1999 | |
| Notice of Restriction | 18 December 1997 | Gazetted: 18 December 1997 |
| Prescription Barossa PWRA | 17 December 1998 | The surface water within the defined area were proclaimed. Incorporates Barossa Prescribed Wells Area and Barossa Prescribed Wells Area and Watercourse |
| Establishment Period | 18 February 1999 – 19 May 2004 | Water Resources (Barossa PWRA) Regulations 2005, Gazetted 19 May 2005, pages 1295-1297 |
| Notice of Restriction #1 | 18 February 1999 | Includes the Grennock Creek water course and surface water. Gazetted: 11 February 1999, page 897; Effective from: 18 February 1999 |
| Variation to Notice of Restriction #1 | 4 March 1999 | Gazetted: 4 March 1999, page 1254 |
| Revocation of Notice of Restriction #1 | 8 September 2000 | Gazetted: 31 August 2000, page 961; Effective from: 8 September 2000 |

| Event | Date | Details |
|---|-------------------|--|
| Notice of Restriction #2 | 8 September 2000 | Gazetted: 31 August 2000, page 961; Effective from: 8 September 2000 |
| Adoption date of Water Allocation Plan for the Barossa PWRA | 22 December 2000 | Approved by the Minister for Water Resources |
| Notice of Restriction #3 | 19 September 2002 | Gazetted: 12 September 2002, page 3413; Effective from: 19 September 2002 |
| Completion of the review of the Plan | | In accordance with the Water Resources Act 1997 and polices contained in the State Water Plan, a review of the Plans is required every 5 years. |
| Notice of Intent to Prescribe | 20 May 2004 | Notice of Intent to Prescribe The Greenock Creek Gazetted: 20 May 2004, page 1310. 28 August 2004 - closing date for comments |
| Prescribed Period | 20 May 2004 | Prescribed Period of Greenock Creek. Water Resources (Barossa PWRA) Regulations 2005, Gov Gazette 19 May 2005, pages 1295-1297 |
| Prescription Barossa PWRA | 19 May 2005 | Date of Prescription to include the surface water and watercourse water of the Greenock Creek catchment area. Regulations 2005, Gov Gazette 19 May 2005, pages 1295-1297 |
| Concept statement released for community and key stakeholder consultation | 6 July 2005 | Consultation on the draft concept statement for the Barossa Water Allocation Plan commenced on 6 July 2005 with advertisements in local papers and The Advertiser. |
| Final concept statement approved for released by Minister | August 2005 | The Board endorsed the Concept Statement at the Board meeting on 23 August 2005, and recommended forwarding the Concept Statement to the Minister for Environment and Conservation advising the Minister that no changes were recommended. |
| The relevant provision of the <i>Water Resources Act 1997</i> was replaced by the Act | 27 October 2005 | |
| Draft Plan released for community and key stakeholder consultation | October 2006 | Notices in the Advertiser, the Barossa and Light Herald and the Angaston Leader published on 22 November 2006 inviting interested persons to comment on the draft Water Allocation Plan and attend public open house forums |
| Consultation of the Draft Plan – invite public submission and public meetings. | 22 November 2006 | Notices in the Advertiser, the Barossa and Light Herald and the Angaston Leader published on 10 January 2007 inviting attendance to a public meeting at the Nuriootpa Vine Inn 7:30 to 9:30 pm. |
| Adoption of Plan by Minister of Environment and Conservation | 15 June 2009 | |

2.1.1. Process for development of the Plan

The development of the Plan was undertaken in accordance with the Act and in close consultation with key stakeholders including the Barossa PWRA community and the North

Para Water Allocation Planning Advisory Committee and the DWLBC. A flow chart of the major milestones of the development of the Plan is represented schematically in **Figure 2.1**



■ **Figure 2.1. Flow chart representing the process for development of the Plan**

2.1.2. Concept Statement

The Concept Statement was prepared by the Board in July 2005.

The Concept Statement:

- set out in general terms the proposed content of the Plan;
- specified matters to be investigated before preparation of the draft Plan; and
- presented proposals for community consultation for the Plans' development.

The Concept Statement was released for community and key stakeholder consultation. The consultation occurred from 6 July to 17 August 2005. A brief history of the preparation of the Concept Statement is listed in **Table 2.2**. Feedback on the Concept Statement from the community and other stakeholders was taken into account during the development of the Plan.

■ **Table 2.2 Table of events for the preparation of the Concept Statement**

| Date | Activity |
|----------------|---|
| 6 July 2005 | Consultation on the draft concept statement for the Barossa PWRA Water Allocation Plan commenced on 6 July 2005 with advertisements in local papers and <i>The Advertiser</i> . |
| | Copies of the concept statement was sent to key stakeholders, and a summary brochure of the concept statement was sent to all licensed, permitted water users in the Barossa PWRA and all authorised water users in the Greenock Creek Catchment area. In addition both the proposal statement and the summary brochure were made available on the Board's website. |
| 17 August 2005 | The consultation period closed on 17 August 2005. |
| | Three submissions were received. Having reviewed the comments received, it is considered that all comments are adequately addressed by the Concept Statement, and therefore there was no need to revise the Concept Statement. |
| 23 August 2005 | The Board endorsed the Concept Statement at the Board meeting on 23 August 2005, and recommended forwarding the Concept Statement to the Minister for Environment and Conservation advising the Minister that no changes were recommended. |

2.1.3. Communication and consultation strategy

In addition to the statutory community consultation, a communication and consultation strategy was developed to ensure that the relevant people and organisations were involved in the development, review and consideration of, and provision of advice on, policy options. A brief history of the consultation undertaken in the preparation of the Plan is listed in **Table 2.3**.

■ **Table 2.3 Table of events of the consultation for the preparation of the Plan**

| Plan Status | Date | Activity |
|---------------|--------------|---|
| Draft Plan | 22 Nov 2006 | Notices in the Advertiser, the Barossa and Light Herald and the Angaston Leader published on 22 November 2006 inviting interested persons to comment on the draft Water Allocation Plan and attend public open house forums |
| | 30 Nov 2006 | Stakeholders or interested persons forum at Greenock Institute. 4-8 pm |
| | 6 Dec 2006 | Stakeholders or interested persons forum at Eden Valley institute. 4-8 pm |
| | 7 Dec 2006 | Stakeholders or interested persons forum at Nuriootpa Vine Inn. 4-8 pm |
| | 17 Jan 2007 | Notices in the Advertiser, the Barossa and Light Herald and the Angaston Leader published on 10 January 2007 inviting attendance to a public meeting at the Nuriootpa Vine Inn 7:30 to 9:30 pm. |
| | 30 Jan 2007 | Closing date for submissions |
| Plan approved | 15 June 2009 | Plan approved by the Minister for Environment and Conservation. |

3. Protection of the ecosystem

Section 2 of the Plan; provides an assessment of the needs of water dependent ecosystems in the Barossa PWRA

The Barossa PWRA supports a range of water dependent ecosystems (WDE's). WDE's have been defined as "those parts of the environment, the species composition and natural ecological processes which are determined by the permanent or temporary presence of flowing or standing water" (ARMCANZ & ANZECC, 1996). WDE's include watercourses, riparian zones, wetlands, and floodplains, and may depend on surface, watercourse and/or underground water.

To provide adequate water for the environment we need to understand how underground water, rivers, wetlands, catchments and floodplains interact. WDE's depend on a pattern or regime of water flow or level. This regime can be described in terms of seasonality, timing, frequency, duration, magnitude, depth and rate of change. Appropriate water quality is also important to sustain WDE's. Changes in important elements of the water regime are likely to lead to changes in condition and composition of WDE's.

The water regime needed to sustain the ecological values of aquatic ecosystems, including their processes and biological diversity, at a low level of risk is termed the environmental water requirements (DWLBC, 2006). Those parts of environmental water requirements that can be provided at any time with consideration of existing users' rights, social and economic impacts is termed the environmental water provisions:

A number of studies have been undertaken that have provided an understanding of the environmental water requirements in the Barossa PWRA. Two important studies have contributed to the development of policies to manage surface and watercourse water diversions:

- Determination of Environmental Water Requirements for the Gawler River System (EPA, 1999); and
- The Barossa Prescribed Water Resources Area Surface Water Budget (Pikusa, 2002).

The following summarises the main outcomes of the studies. Section 2 of the Plan; provides a more comprehensive description on these studies.

To determine the environmental water requirements the Barossa PWRA has been divided into process zones based on geomorphology (**Figure 3.1**). Environmental water requirements were determined for a range of flow bands for each zone. In addition a catchment water balance model was developed to help understand water movement through the catchment and simulate the current level of dam development.

Based on information from both the Determination of Environmental Water Requirements for the Gawler River System report and the Barossa Prescribed Area Surface Water Budget, the major changes in flow as a result of dam development in the Barossa PWRA were identified.

The majority of impacts in all zones relates to the baseflows and pool connection flows.

The impacts of altered flow regimes in the Barossa PWRA, and the development of frequencies and seasonality that more closely resemble what would have occurred naturally, can be addressed by increasing the duration of baseflow and pool connection flow.

This can be achieved in several ways, including:

- Limiting the total volume of water captured and stored in dams to provide water for environmental flow; and
- Allowing low flows to bypass dam storage.

In addition, the maintenance of baseflows in the third, fourth and fifth order watercourse can be achieved through minimising underground water extraction near these high order watercourses.

Section 7.2 of the Plan; provides policy on the capacity limit and low flow bypass provision on dams.



■ **Figure 3.1 Gawler River Process Zones within the Barossa Pwra**

4. Assessment of capacity

A number of factors were taken into account in providing for the allocation of water for the Barossa PWRA, including the present and anticipated future water needs of occupiers of land, and the environmental water requirements.

Surface water and watercourse water

Surface water modelling of the Barossa PWRA showed that approximately 8,725 ML of water is held in dams in the Barossa PWRA; of this total volume approximately 4,980 ML (57%) is held in dams where there are allocations to extract water for licensed purposes. The remainder (43%) is held within dams that are used for stock and/or domestic purposes. As detailed in **Table 1.1** the extraction of total surface and watercourse water is estimated to be 1,268 ML for the 2004/05 water use year (AMLRNRMB, 2005). The total extraction is estimated using reported volumes and area based allocations.

Modelling indicates that dam development has reduced average stream flow in the North Para River system at Yaldara by an estimated 20%. During years of low flow the reduction can be as much as 60%. As discussed in section 3 of this Guide, modelling has indicated that the majority of impacts or reduced flow occurs at the low flows where there is a reduction of baseflow and pool connection flows.

During the development of the Plan it was concluded that the level of development during 2004/05 water use year approximated the sustainable extraction level for surface water and watercourse allocations.

There will be no change to surface water and watercourse water allocations during the life of this Plan. Policies will be reviewed when both allocations and usage can be better quantified. This will be achieved following conversion of area based allocations to a volume and the implementation of a more comprehensive metering and monitoring program in the Barossa PWRA.

Underground water

Table 1.1 shows that the 2004/05 levels of underground water allocation were estimated to be approximately 5,500 ML. This was estimated using reported volumetric and area based allocations. Based on 2004/05 irrigation reporting data underground water use was estimated to be around 2,000 ML, which is significantly less than the allocation for the 2004/05 water use year (AMLRNRMB, 2005). This difference suggests that a number of irrigators maybe using alternative water sources, such as BIL water, in preference to their underground water allocations.

A number of underground water balances have been undertaken at various times for the Barossa PWRA. Due to the lack of information available on inter-relationships between the

aquifer systems, these water balances are indicative only. In addition, the water balances undertaken are also generally focussed on the sedimentary aquifers of the valley floor and do not include the Fractured Rock Aquifer.

A review of underground water trends during the 2004/05 water use year has shown that underground water levels are not generally showing signs of stress. There will be no change to underground water allocations during the life of this Plan, particularly as the exact volume of allocation is unknown, the water balance is uncertain, and in some cases it is still unclear from which aquifer some allocations are extracted.

Policies will be reviewed when all allocations and usage can be better quantified. This will be achieved following conversion of allocations to a volume, the implementation of a more comprehensive metering and monitoring program and better understanding of where the underground water is being sourced. This information will allow managers to develop and implement water management plans and practices that ensure the ongoing sustainable use of our water resources.

Future use

The demand for water is projected to increase. This anticipated future demand for water cannot be met by an increase beyond the 2004/05 water use year levels of water allocation for existing underground, surface or watercourse water resources. The demand may be met through increased use of imported water or reclaimed (effluent) water.

In addition, the influence that climate change will have on the availability of water from the prescribed resources of the Barossa PWRA is unclear at this stage. Ongoing monitoring and evaluation and further investigations during the life of the Plan will contribute to a review of the capacity of the resource including climate change impacts for the next Plan.

5. Licences and allocations

5.1. Water Licences

Water users, as described in the introduction of this Guide, require a licence to extract surface, watercourse and underground water from the Barossa PWRA. A licence identifies the volume of water that can be taken from these specific water resources and contains conditions on the use of that water.

A water licence is a property right that is tradeable and is separate from a land title or land ownership. Anyone who uses surface, watercourse or underground water for irrigation, intensive farming, recreational, industrial, mining and/or commercial use requires a water licence. All licensed water users have the responsibility to ensure their water use complies with the conditions on the licence and policies in the Plan.

5.2. Activities that do not require a water licence

Stock and domestic water users do not require a water licence.

'Stock' refers to animals not used for intensive farming, while 'intensive farming' refers to a method of keeping animals in the course of carrying on the business of primary production where the animals are usually confined to a small space or area and usually fed by hand or by mechanical means. 'Domestic use' is any water used for a domestic purpose, which includes taking water for the purpose of watering or irrigation up to 0.4 ha or 1 acre of land.

Other water activities that are exempted from the requirement of a water licence include:

- crop spraying;
- fire fighting; and
- public road making.

5.3. Water allocations

A water allocation is legally different from a water licence, although the terms 'licence' and 'allocation' are often used interchangeably during informal conversation. A licence authorises the taking and use of a nominated amount of water; the nominated amount of water is the 'allocation'. A licence describes conditions relating to the use of the water allocation.

The Plan has assessed the capacity of the resource to meet demand and has identified limited available water for further allocation within the Barossa PWRA. Policy within the Plan caps the granting of new allocations unless allocations are attained through the conversion of water (holding) allocation to water (taking) allocation and vice versa; or is a rollover allocation; roof run-off allocation or allocation as part of a managed aquifer recharge operation.

5.4. Allocation volumes to existing users

The process for allocating water to existing users of the recently prescribed area of Greenock Creek is separate from the Plan and is set out in Section 155 of the Act. Responsibility for determining allocations to existing users rests with the Minister for Environment and Conservation and is administered through DLWBC.

Though the Plan does not set out how allocations to existing users are determined, it does set out the sustainable limits for the water resources and provides a framework that can be used for setting licence conditions. Section 4 of the Plan has assessed the total amount available for allocation. This was balanced against the sustainable capacity of the resource, which was determined after taking into account the needs of the environment and stock and domestic water users.

5.5. Applying for a licence

All people who take water from that prescribed resource will need a licence or approval from the Minister to do so. The main exceptions are the taking water for stock (not including intensive stock keeping such as feedlots, piggeries, chicken farms etc) and domestic use. Taking water for fire fighting and road making are also exempt from licensing. Each licence will specify how much water is allocated and how the allocated water can be taken or used, as well as any other relevant conditions or controls.

Licences are issued by DWLBC on behalf of the Minister. To apply for a licence, first obtain an Application for a New Licence form from the DWLBC office or the website <http://www.dwlbc.sa.gov.au/licensing/forms/index.html> .

If a water licence and allocation is issued, it will be issued strictly on the basis of the information provided on the application form. It is therefore imperative that when filling out an application, all questions are answered indicating exactly where and how the water is going to be used. If the water is not used in the same manner or at the same location as specified in the application, a breach of the licence may occur. A breach of licence can result in fines or, in extreme cases, the licence being revoked. Licensees must comply with the policies in the Plan.

5.6. Water allocation criteria

For details on licensing and allocation policies refer to Section 5 of the Plan.

The Plan has been developed with an understanding that the availability of surface, watercourse and underground water in the Barossa PWRA has been reduced as a result of climate change, increased consumptive use and changes in land use practices.

Therefore, no further water allocations will be permitted, except for the conversion of water (holding) allocations to water (taking) allocations and vice versa, rollover allocations,

allocations of water artificially recharged into wells, and roof runoff. This cap on allocations is a result of a reduction in available water for allocation.

5.6.1. Volumetric allocation

Historically water allocated for irrigation in the Barossa PWRA has been issued on an area-based system. This means that an irrigator has a water taking licence which defines the maximum area which can be irrigated, according to the crop or plant type. It does not limit the volume of water that can be pumped.

It is now state policy for all allocations to be volumetric. Volumetric conversion is the conversion of all current area-based allocations to volumetric allocations. Licensees will be entitled to a limited annual volume of water.

The conversions will occur by and take effect on the 1st of July 2010, following the first full water use year after the date of adoption of the Plan. This allows time for the licensing team in DWLBC to convert and reissue all licences.

The Plan outlines the principles for the conversion of area based allocations to volumetric allocation in section 5.2.

5.6.2. Surface and watercourse water

Management zones

Creating management zones allows water resource managers to manage local impacts that may occur from water resource use. Surface and watercourse water allocations and transfers are managed within four surface water management zones within the Barossa PWRA. Within these zones the stream order of the tributaries has been mapped (**Figure 5.1**). Rules have been set around the stream orders to provide an adequate flow pattern and volume to support the water dependent ecosystems that are largely found in the main watercourse. Surface and watercourse water cannot be allocated where the water will be taken from a third, fourth or fifth order stream as shown in the Plan; Figure 5.

Rollover credit

The Plan allows unused parts of the 'base' allocation to be rolled over into later water use years (Principle 7), but limits the life and volume of rollover allocations to protect the surface water in dry years. The unused allocation volume from a water use year is called a 'rollover credit'. A surface water rollover credit has a life of three water use years. The maximum volume of a rollover allocation in a water use year is the sum of the licensee's rollover credits, capped at a maximum of 30% of their base allocation. The rollover credit must be used before the annual allocation.

Roof Runoff

Surface water is defined as water running off the surface of the land, which includes buildings and other structures attached to the land. Therefore using roof runoff for the purposes of commercial (but not irrigation), industrial, environmental or recreational use in a prescribed surface water resource area requires a licence. A state-wide authorisation has been gazetted in which the capture and use of roof runoff less than 500 kilolitres per year and is used for purposes other than irrigation does not require a licence.

A water licence is required for surface water collected from roof runoff greater than 500 kilolitres per annum and up to a maximum of 2000 kilolitres per annum. If the surface water collected from roof runoff is greater than 2000 kilolitres per year the additional water that is captured must be allowed to return to its natural flow path.

The annual roof runoff is based on the area of the roof connected to water storages multiplied by the mean annual rainfall for the site. **Figure 5.2** provides that mean annual rainfall as posted in the South Australian Government Gazette on 16 March 2006 (page 906).

5.6.3. Dams

Diversion structures such as dams interrupt the pattern and amount of downstream flow. These effects occur regardless of whether the diversion structure is used to capture water for licensed or non-licensed purposes. Therefore, it is important to consider the impact of all diversion structures when assessing the impact of current or planned water capture and use.

It is important to manage new catchment dam development, because this helps to control the total volume of what is diverted into the dam storage, and therefore the volume of water that remains in-stream to provide an environmental flow. The volume of water that is diverted into a dam depends on the location within the catchment and varies according to two factors:

- The size of the dam; and
- The use of water from that dam.

The higher the level of use, the lower the water level in the dam becomes, and therefore potentially more water is diverted to it. The Plan manages the use of water from the dam through the water allocation policy while the development of dams is managed through Water Affecting Activity permit. Water Affecting Activities and permits are discussed further in section 6 of this Guide.

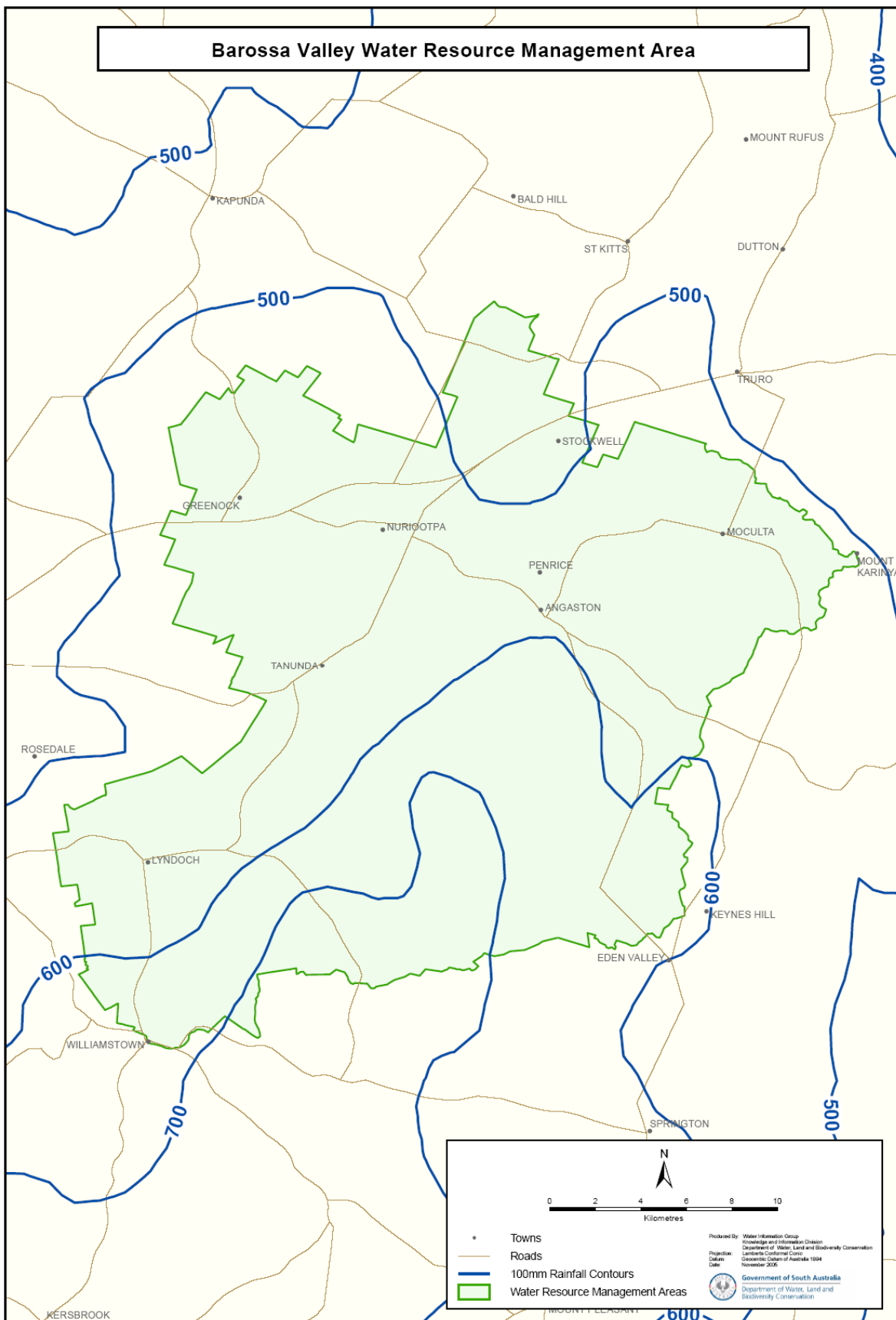
The Barossa PWRA has been divided into a number of sub-catchments for dam development (**Figure 5.3**). Dam capacity limits have been established for each sub-catchment for the development of new dams, or the enlargement of existing dams at several catchment management levels. The limits are the:

- Sub-catchment Capacity Limits; and
- Property Capacity Limits.

The limits can be found in principles 51 to 55 of the Plan.

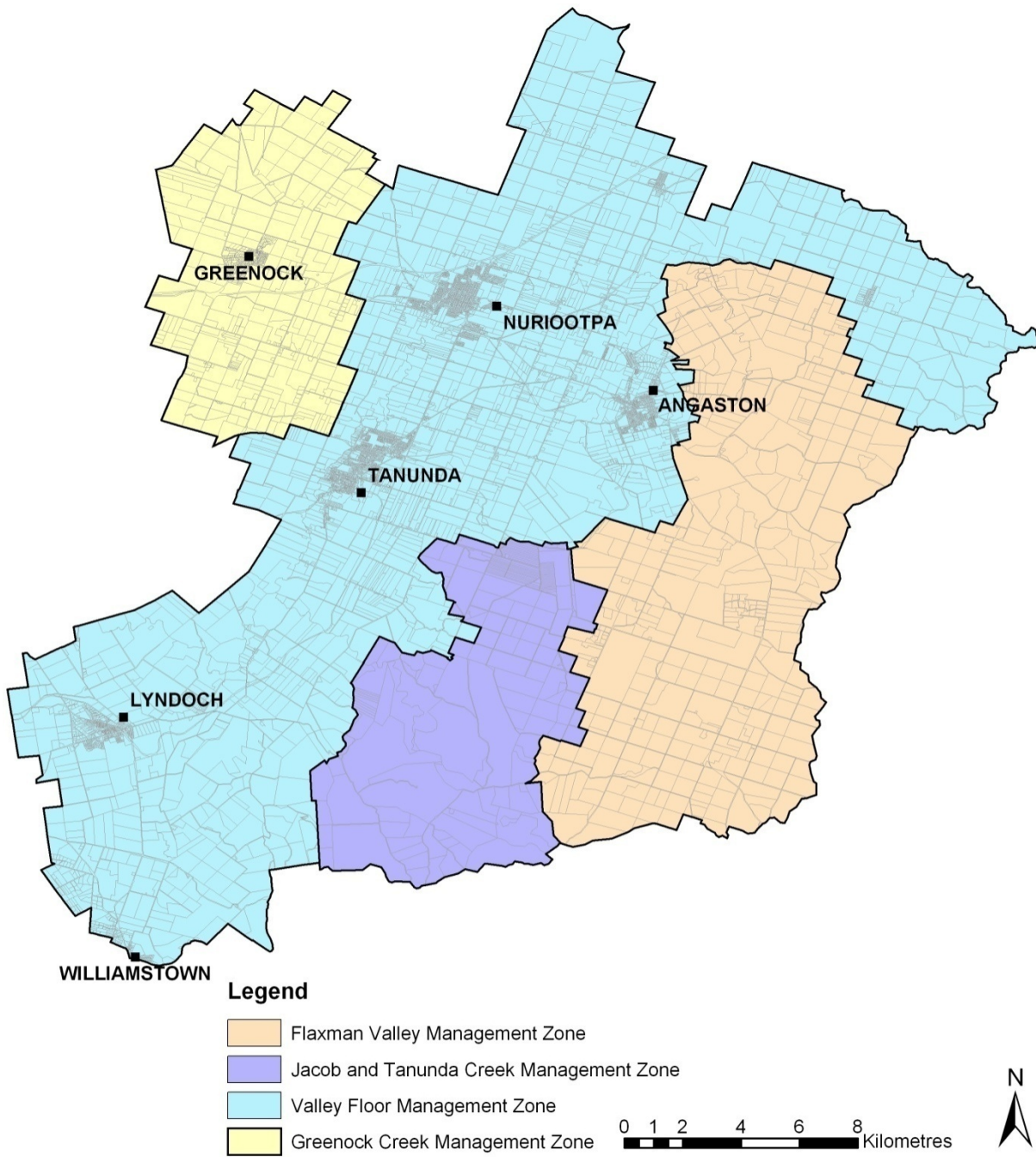


■ **Figure 5.1 Surface and watercourse water management zones and stream order in the Barossa PWRA**



■ **Figure 5.2 Mean Annual Rainfall of the Barossa PWRA**

(source South Government Gazette, 16 March 2006 (page 906))



■ **Figure 5.3 Sub-catchments for Dam Development**

5.6.4. Underground water

Rollover credit

The Plan allows unused parts of the underground water 'base' allocation to be rolled over into later water use years (principle 17-18 of the Plan), but limits the life and volume of rollover allocations to protect the underground water in dry years. A rollover credit must be used in the following water use year. The maximum volume of a rollover allocation in a water use year is the sum of the licensee's rollover credits, capped at a maximum of 10% of their base allocation. The rollover credit must be used before the annual allocation.

Buffering around streams

Third, fourth and fifth order streams are often maintained by underground water discharge or baseflow into the streams. Therefore underground water extraction, particularly nearby to these streams has the potential in impact on the baseflow to the streams. Principle 15 of the Plan; seeks to minimise impacts to these streams and the ecosystems that depend upon them with a policy that underground water cannot be allocated where it will be extracted from within 100 metres from third, fourth and fifth order streams.

5.6.5. Managed Aquifer Recharge

Managed Aquifer Recharge (MAR) is the process of intentionally injecting or infiltrating water into an aquifer and then extracting the water for use at a later date. The injected water displaces the water naturally present in the aquifer, creating a lens of injected water around the well (**Figure 5.4**) where it is stored for later use.

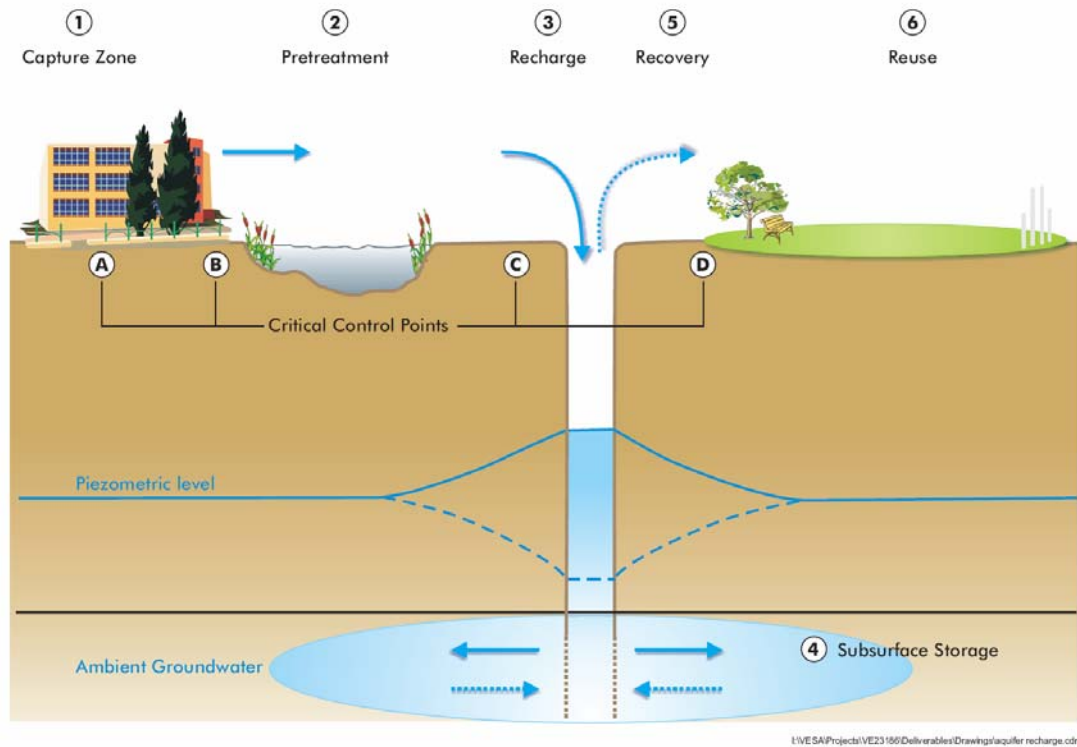
The storage of water underground can reduce or eliminate the need to construct above ground storages, where water may evaporate. A variety of different sources of water can be used for MAR, for example stormwater, reclaimed or imported water.

Two approvals are required before an MAR project can go ahead:

- A Water Affecting Activity permit for draining or discharging water into a well. Water Affecting Activities and permits are discussed further in section 6 of this Guide; and
- A Water Licence is needed to take the water out again with the provision of an allocation based on policy principles 34 and 35 within the Plan.

Principles 34 and 35 of the Plan; state that the volume of water that can be extracted will be a percentage of the water that was injected in the previous water use year (1 July to 30 June) and cannot exceed 80% of the volume injected except where the water has been imported. In

the case of imported water, 100% of imported BIL or SA Water that has been injected in the previous water use year can be extracted.



■ **Figure 5.4 Schematic of Managed Aquifer Recharge**

6. Transfers

For more details on transfers refer to section 6 of the Plan.

In general water allocations and licences may be transferred between users, subject to the rules in the Plan and approval by the Minister. Transfers may be made on a temporary or a permanent basis.

Transfers of allocations are subject to the rules in the water allocation criteria section (section 5) as well as the rules in the transfer criteria section (section 6). A transfer can only occur if all the relevant principles can be met.

Payment between buyers and sellers of allocations and licences are not managed by the Plan.

6.1. Administration of the process

Although the Minister for Environment and Conservation is ultimately responsible for the licensing, allocation and transfer process, the Minister has delegated the administration of this role to the DWLBC. Therefore, the licensing section of the DWLBC administers the licensing and allocation process for the Barossa PWRA. For further details please refer to the organisations listed in the contact information table in the front of this Guide.

6.2. Applying for a transfer

To apply for a transfer, an appropriate application form must be lodged with DWLBC. The application form has two sections, one to be completed by the transferor (seller) and the other by the transferee (buyer).

Applications are assessed against the Act and the policies of the Plan and a range of information and documentation will need to be provided to support the application. An applicant is therefore advised to plan ahead when seeking to take an allocation because the application and assessment process can take some time.

The DWLBC as the Minister's delegate can refuse the application if the proposal to use water is not consistent with the Act or policies detailed in the Plan. The applicant has the right to appeal against this decision in the Environment, Resource and Development Court. Appeals must be lodged within six weeks of recovery notice or refusal.

The DWLBC processes applications and the licensing of water but DWLBC does not source water for potential purchasers. Water can be purchased privately or through a water-broker or land agent.

6.3. Factors affecting transfers

6.3.1. General factors

A water allocation can only be transferred within the same water resource granted on the licence. As a result of this policy condition water allocations cannot be transferred between water resources.

A rollover credit and roof runoff allocation can only be transferred if the point of taking granted on the licence remains the same.

6.3.2. Underground water

Intensity of use

If you wish to transfer an allocation the total of all allocations of licensed wells within a 1 km circular zone around the target well must be considered. The total allocation includes allocations from all aquifers within the zone. If the total allocation exceeds 300 ML/year the transfer will not be permitted.

Stressed areas

To protect areas that are already stressed by underground water extraction, allocations will not be allowed to be transferred to areas where there has been a declining underground water level trend of 1 metre or more, or an increase in water salinity of 50 mg/L TDS or more, over the last three water use years.

Salinity

Allocations from areas where underground water has a salinity of above 1,500 mg/L TDS cannot be transferred into areas where the underground water is less than 1,500 mg/L TDS.

6.3.3. Surface water and watercourse water

Management zones

The Barossa PWRA has four surface water management zones based around major tributaries (**Figure 5.1**). Principles are applied to allow transfers between management zones providing that an assessment has been undertaken that demonstrates that the taking of the surface water from the new point of taking will not impact on the timing and duration of flows at, or downstream from, the new location to cause detrimental harm to the ecosystem.

6.3.4. Dams

Allocations will only be transferred to off-stream dams and transfers will only be approved if the capacity of the dam that is transferring its allocation is reduced by a volume equal to or greater than the capacity of the new dam where the allocation is to be transferred.

The erection, construction or enlargement of a dam, wall or other structures that will collect or divert water flowing in a prescribed watercourse, or surface water flowing over land in a surface water prescribed area, is a water affecting activity. The criterion that needs to be considered with designing a new dam is outlined in section 7 of the Plan; 'Permits for Water Affecting Activities'. Transfers of allocations to new dams must be consistent with this criterion.

6.3.5. Discharging into the well

An allocation to recover water drained or discharged into the well may only be transferred where there is no change to the location of the point of taking or where the new point of taking is within the same property or site.

7. Water affecting activities

The Act sets out a number of activities known as water affecting activities that may require a permit. These activities include drilling a well, building a dam, draining or discharging water into a well and using effluent and imported water. The Board's Regional Natural Resources Management Plan (NRM Plan) (AMLRNRMB, 2008) or the Plan can set out the policies used to assess permit applications and to set conditions for successful applications. **Table 7.1** shows the range of water affecting activities set out in the Act that require a permit defined by the Regional NRM Plan and/or the Plan.

- Table 7.1 Water affecting activities and the permit requirement defined under the Regional NRM Plan and the Plan**

| Water Affecting Activity (paraphrased from the NRM Act) | Example of activity | Permit requirements defined under the AMLR NRM Plan? | Permit requirements defined under the Barossa PWRA WAP? | Relevant Authority |
|---|---|--|---|--------------------|
| Drilling, plugging, backfilling or sealing of a well | | No | Yes | Minister |
| Repairing, replacing or alternating the casing, lining or screen of a well* | | No | Yes | Minister |
| Draining or discharging water into a well* | Aquifer storage | Yes | Yes | Minister |
| Erection, construction, modification, enlargement or removal of a dam, well or other structure that will collect or divert surface water or watercourse** | Building a dam, weir, bank or pump-house that diverts water | Yes | Yes | Board |
| Erection, construction or placement of any building or structure in a watercourse, lake or floodplain | Building a culvert | Yes | No | Board |
| Draining or discharging water directly or indirectly into a watercourse or lake | | Yes | No | Board |
| Depositing or placing an object or solid material in a watercourse or lake | Placing a rock in a watercourse for erosion control | Yes | No | Board |
| Obstructing a watercourse or lake in any manner | | Yes | No | Board |
| Depositing or placing an object on the floodplain of a watercourse or near the bank or shore of a lake to control flooding from the watercourse or lake | Building a levee bank | Yes | No | Board |

| Water Affecting Activity (paraphrased from the NRM Act) | Example of activity | Permit requirements defined under the AMLR NRM Plan? | Permit requirements defined under the Barossa PWRA WAP? | Relevant Authority |
|---|---|--|---|--------------------|
| Destroying vegetation growing in a watercourse or lake or growing on the floodplain of a watercourse | Clearing reeds | Yes | No | Board |
| Excavating or removing rock, sand or soil from a watercourse lake or floodplain or near banks of a lake | Digging out a creek channel | Yes | No | Board |
| Imported Water at a rate greater than prescribed by the Plan | Using mains water for business purposes | Yes | Yes | Board |
| Using effluent at a rate greater than prescribed by the Plan | Effluent spreading | Yes | Yes | Board |

*Always requires a permit. ** Always requires a permit for prescribed surface water/watercourse water and/or in the Mount Lofty Ranges Watershed

This chapter outlines activities that will require a water affecting activity permit defined by the Plan, as well as policies for assessing and setting conditions for these permits.

7.1. When is a permit required

A water affecting activity permit authorises a person to undertake a certain activity and is required for each new development. The permit process is separate to the Plan, and is a 'one-off' requirement that generally is not issued retrospectively. Permit applications are assessed in accordance with the Act and the Plan. Specifying criteria under which permits are granted provides a means for controlling developments in order to minimise the potential impacts to current water users and the environment.

7.2. Activities that require a permit

7.2.1. Water storage and diversions (Dams)

A water effecting activity permit is required for all cases of constructing, enlarging, modifying or removing a dam or other structure that collects or diverts surface water or watercourse water. However dams that have a wall height greater than three metres or a volume greater than 5 ML require development approval, instead of a permit for a water affecting activity. A development approval is issued by local councils. Applications received by the Council are referred to the Board for direction. The Board will consider the policies within the Plan when providing direction to Council.

The water effecting activity permit requirement applies to all diversion structures, which includes a dam, weir, bank or fixed pump, whether they will be used for non-licensed

purposes, licensed purposes, or both. When a diversion structure is constructed or enlarged, the permit only relates to the construction and ongoing management of that structure.

Dam Development Sub-catchments have been defined (**Figure 5.3**) and each sub-catchment has a dam capacity limit that must not be exceeded.

This means a new dam can be constructed in a sub-catchment where the total capacity of all existing dams, including the capacity of the new dam, is less than the capacity limit for the sub-catchment. Or the capacity being retained by other existing dams, walls and other structures has been reduced by a volume equal to or greater than the capacity of the new dam. The total capacity includes all types of dams no matter what their purpose; licensed or non-licensed.

As specified in the Plan:

- principles 54 to 55 The combined capacity of all dams must not exceed 30% of the annual run-off of the dam is proposed to be constructed.
- principle 56 Restrictions apply to the construction of stock and domestic dams.
- principles 57 to 60 Restrictions and specifications apply to the location of dam construction. Consideration is given to ecologically sensitive areas; protection against erosion, location and to provide the freedom for movement of aquatic biota.

As outlined in section 3 of this Guide, the key impact of dams and other diversion structures on the environment is the interception of low-flows and break-of season flows. Therefore, new or enlarged dams and diversion structures will need to be constructed to provide for a component of environmental water needs by bypassing, releasing or not capturing flows at or below the threshold flow rate. The threshold flow rate is defined in principle 63 of the Plan.

7.2.2. Use of imported water and effluent

A permit is required for using more than 1 ML of imported water and effluent water per hectare per year in the course of carrying on a business. Imported water is water that has been brought into the catchment by means of a pipe or other channel. In the Barossa PWRA imported water includes the use of water supplied by BIL and SA Water. Effluent includes domestic and industrial wastewater provided through treated sewerage and treated winery wastewater schemes.

7.2.3. Draining or discharging water into a well (Artificial Recharge)

Water can be artificially recharged (drained or discharged) into a well for later recovery in a process known as MAR. Storing water underground can reduce the need to build above-ground storage facilities from which water can evaporate. Artificial recharge may also be used to freshen underground water or increase underground water levels drawn down by over extraction.

A water effecting activity permit is required to drain or discharge water into a well; also referred to as artificial recharge.

Recovering artificially recharged water for licensed purposes requires a water licence and allocation (section 5 of the Guide). Furthermore, a water licence and allocation is required to take the source water to be artificially recharged down the well, if the source water is a prescribed water resource.

Discharge of water into a well is also governed by the state-wide *Environmental Protection (Water Quality) Policy 2003*, which falls under the *Environmental Protection Act, 1993*. The policies in the Plan have been developed to be consistent with this legislation.

A proponent will need to arrange for a suitably qualified person to carry out a hydrogeological assessment of the suitability and capacity of the aquifer for artificial recharge, and the likely risk of adverse impacts as outlined in principle 71 of the Plan. The risk assessment must be consistent with the *National Water Quality Management Strategy – Australian Guidelines for Water Recycling: Managing Health and Environmental Risks, Phase 1 2006* (NRMMC, EP&HC and AHMC, 2006) and other related documents current at the time.

The quality of the underground water will need to be monitored and reported as outlined in principles 76 to 78 of the Plan.

7.2.4. Well construction

A water affecting activity permit is required for all cases of:

- Drilling, plugging, backfilling or sealing of a well
- Repairing, replacing or altering the casing, lining or screen of a well

This permit requirement includes replacement wells and deepening of existing wells, and applies to wells used for licensed and/or non-licensed purposes. The Plan principles apply to all of the aquifers in the Barossa PWRA.

When a new well is drilled, the permit only relates to the construction of the well. The volume of water able to be taken from a well for licensed purpose is regulated by the allocation process (section 5 of the Guide).

In order to prevent interference to existing assets, new wells cannot be drilled within a 20 m of an existing operational well or 100 m of a third, fourth or fifth order stream. In addition new wells must not be constructed within 300 metres of a well that is being used to drain or discharge water and/or is being used for MAR.

8. Monitoring evaluation and reporting

Monitoring, evaluating and reporting are important in ensuring the long-term sustainable use of water resources through well informed water allocation planning. Monitoring and evaluation serves a range of functions. The Plan sets out a range of triggers that indicate potential problems for the different water resources such as decline in monitored underground water level and an increase in salinity. Evaluation ensures that the Plan policies are effective at maintaining the water resources at sustainable levels and assists the implementation of the Plan policies. Monitoring and evaluation will improve our understanding of the nature and variability of water supply and demand over time. This work is carried out by agencies such as the Board, DWLBC and the Environment Protection Authority, in partnership with the community and local groups. Monitoring, evaluation and reporting are detailed in section 8 of the Plan.

8.1. Using monitoring data

Monitoring data provides the following information:

- Underground water level monitoring shows seasonal fluctuations. This provides an understanding of the impact extractions have on the underground water levels and the ability of underground water levels to recover after an irrigation season. Monitoring also provides an understanding on the impact fluctuations have on underground water dependant ecosystems.
- Salinity monitoring provides an understanding of overuse and an indication of dependent ecosystem health.
- Streamflow monitoring is important to achieve baseflow estimations, and to assess the water requirements for dependent ecosystems, and to determine environmental flows.
- Water usage, when compared to outcomes of underground water level, stream flow, and salinity monitoring can determine if the resource is being managed sustainably.

8.2. Annual water use reporting

An annual water use report is a report completed by the licensee and permit holders (imported water or effluent) regarding their on farm water use. Licensees with a water taking allocation must complete the annual water use report under section 8.2 of the Plan.

An annual water use report needs to be prepared at the end of each water use year. The completed annual water use report must be forwarded to the Board. The Board provides

the opportunity for the annual water use to be reported and submitted electronically at the Board's website - <http://www.amlnrm.sa.gov.au/>.

Annual water use data contained in annual water use reports will be held by the Board and DWLBC. Individual licence information will only be available to the licence holder or their nominate representative.

Information from the annual water use report is collated into a district annual report and provided to irrigators. It is also available on the Board's website.

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10. Glossary

Act – means *the Natural Resources Management Act 2004*.

Aquifer – a sand, gravel or rock formation capable of storing or conveying water below the surface of the land.

Aquifer, confined – An aquifer that is bound above and below by an impermeable confining bed. The pressure in a confined aquifer is usually greater than atmospheric pressure, resulting in water levels in wells rising above the top of the aquifer.

Aquifer, fractured rock – An aquifer where underground water is stored and moves through joints and fractures in the rocks.

Aquifer, sedimentary – An aquifer where underground water flows through the pore spaces within the sediments.

Aquifer, unconfined – An aquifer which has the watertable as its upper surface and which may be recharged directly by infiltration from the ground surface.

Area based water allocation – An allocation of water that entitles the licensee to irrigate a specified area of land for a specified period of time usually per water use year.

Artificially recharged water – Water that is drained or discharged into the aquifers.

Barossa Infrastructure Limited (BIL) – Water supply authority providing River Murray water via SA Water infrastructure to the Barossa.

Baseflow – The water in a stream that results from underground water discharge to the stream. (This discharge often maintains flows during seasonal dry periods and has important ecological functions.)

Biodiversity – The variety of life forms: the different life forms including plants, animals and micro-organisms, the genes they contain and the *ecosystems* (see *below*) they form. It is usually considered at three levels — genetic diversity, species diversity and ecosystem diversity.

Dam – A dam including, but not limited to, an off-stream dam and a turkey nest dam.

Diversion structure – A dam, water or other structure, object or device that will collect or divert water flowing in a watercourse or surface water flowing over land, including but not limited to, a dam, weir, levee or pump.

Ecosystem – Any system in which there is an interdependence upon and interaction between living organisms and their immediate physical, chemical and biological environment.

Effluent – Domestic wastewater and industrial wastewater.

Environmental water requirements – The water regime needed to sustain the ecological values of aquatic ecosystems, including their processes and biological diversity, at a low level or risk.

Fractured rock aquifers – occur where underground water is stored and moves through joints and fractures in the rocks.

Geomorphology – from Greek words for earth and form, is the study of landforms and landscapes, particularly from the standpoint of origin. Geomorphology seeks to relate specific landforms to the formative processes that operate in different environments.

Habitat – An area in which a specific plant or animal naturally lives, grows and reproduces; the area that provides a plant or animal with adequate food, water, shelter and living space.

Hydrogeology – The study of the underground water, which includes its occurrence, recharge and discharge processes and the properties of aquifers.

Imported water – Water that is not native to the area.

Irrigation annual reporting – Property level monitoring undertaken by licence and permit holders in the Prescribed Area.

Low flow bypass – a structure installed on a dam that acts to prevent low flows being removed from the stream and captured in the dam, helping to mimic a more natural flow regime.

Managed Aquifer Recharge (MAR) - The process of recharging water into an aquifer for the purpose of storage and subsequent withdrawal.

Natural resources management plan – a plan developed under Chapter 4 of the Act.

Off stream dam – a dam used to store water that is diverted or collected from a watercourse or surface water run-off, by a wall or other structure. Off-stream dams will normally capture a limited volume of surface water from the catchment above the dam.

On stream dam – a dam, wall or other structure placed on, or constructed across, a watercourse or drainage path for the purpose of holding back and storing the natural flow of that watercourse or the surface water run-off flowing along that drainage path.

Property/site – adjoining land where the owner or occupier of the land is the same and the land is used for the same purpose as defined by Revenue SA as Contiguous Land (for the purposes of the Emergency Services Levy).

PWRA – Prescribed Water Resources Area.

Roof runoff – surface water that flows off an elevated structure and is collected in a closed water storage facility.

SA mains water – River Murray water provided via SA Water infrastructure.

Salinity – A measure of the concentration of mineral salts, usually sodium chloride, dissolved in water. Salinity may be measured by weight (total dissolved solids), electrical conductivity, or osmotic pressure.

Sedimentary aquifers – occur in low lying points of the landscape where underground water flows through the pore spaces within the sediments.

Stream order – A method of classifying the size of a part of a watercourse, based on the hierarchy of connecting watercourse segments. The Strahler stream ordering system is used in the Plan. The most upstream part of the watercourse is the first order stream. Two first order watercourses join together to become a second order watercourse. Two second order watercourses join together to become a third order watercourse and so on. Arthur Strahler first proposed the approach in 1952 in an article in the Geological Society of American Bulletin.

Surface water – (a) water flowing over land (except in a watercourse) after (i) having fallen as rain or hail or having precipitated in any other manner; or (ii) after rising to the surface naturally from the underground, (b) water of the kind referred to in paragraph (a) that has been collected in a dam or reservoir.

To take water – to take water from a resource includes: to take water by pumping or siphoning 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 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.

Transfer – A transfer of a licence (including its water allocation) to another person, or the whole or part of the water allocation of a licence to another licensee or the Minister under Part 3, Division 3, Section 157 of the Act. The transfer may be absolute or for a limited period and requires the approval of the Minister.

Underground water – (more commonly referred to as groundwater) - (a) water occurring naturally below ground level, (b) water pumped, diverted or released into a well for storage underground.

Volumetric water allocation – An allocation of water expressed on a water licence as a volume (e.g. kilolitres) to be used over a specified period of time, usually per water use year (as distinct from any other sort of allocation).

Water affecting activity – Activities referred to in Part 2, Division 2, Section 127 of the Act.

Water allocation – (a) in respect of a water licence means the water (taking) allocation or the water (holding) allocation endorsed on the licence; (b) in respect of water taken pursuant to an authorisation under Section 128 of the Act means the maximum quantity of water that can be taken and used pursuant to the authorisation

Water Allocation Plan – a water allocation plan prepared by a regional NRM Board under Chapter 4 Part 2 of the Act.

Water Dependant Ecosystems – Those parts of the environment, the species composition and natural ecological processes, which 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.

Water licence – a licence granted under Chapter 7 Part 3 authorising the holder (subject to the taking of any step or steps required by the Act) to take (or to hold) water from a watercourse, lake or well or to take (or to hold) surface water from a

surface water prescribed area and includes a licence granted under that Part endorsed with a water (holding) allocation.

Water resource –a watercourse or lake, surface water, underground water, stormwater (to the extent that it is not within a preceding item) and effluent.

Water use year – Water use is measured for licence and permit holders from 1 July until 30 June every year.

Watercourse –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) a dam or reservoir that collects water flowing in a watercourse, (b) a lake through which water flows, (c) 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, (d) part of a watercourse, (e) an estuary through which water flows, (f) any other natural resource, or class of natural resource, designated as a watercourse for the purposes of the Act by an NRM Plan.

Well – (a) an opening in the ground excavated for the purpose of obtaining access to underground water; (b) an opening in the ground excavated for some other purpose but that gives access to underground water; (c) a natural opening in the ground that gives access to underground water.