



# An Adaptation Plan for Water Barossa RDA Region

Produced for Regional Development Australia (RDA), Barossa  
By Advanced Viticulture and Management (AV&M)  
&  
Seed Consulting Services Pty Ltd

28 July 2014

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Final



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## Document Control

### Document Information

Information	
Document Owner	Advanced Viticulture and Management (AV&M)
Project ID	RDA Barossa Water Adaptation Plan
Issue Date	29 July 2014
Last Saved Date	12/10/2014 3:35 PM
File Name	Water Adaptation Plan_Barossa RDA Final.docx

### Document History

Version	Issue Date	Changes
Final	29 July 2014	

### Document Approvals

Role	Name	Signature	Date
Project Director	Matt Alexander		29 July 2014
Written By	Andy Chambers		29 July 2014
Checked	Mark Siebentritt		

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## Executive Summary

Water management in the Barossa Region has a significant history with over 30 years of water resource investigations, allocation management policies and development of water reuse and reticulation schemes. Water is a key facet of the regions economic, environment and social fabric and in particular critical to the main regional industry – grape growing and winemaking.

In recent times research and investigations into the likely impacts of climate change have resulted in more detailed regional climate change vulnerability assessment and development of adaptation strategies intended to consider the longer-term sustainability of the region. The systems relationship between environmental, economic and social factors is critical to this understanding. This climate change adaptation planning process along with documents such as Vision 2045 (1996) and Revision 2045 (2010) has highlighted the strong need for longer-term regional water security.

Regional Development Australia (RDA) Barossa supports long term planning on water issues and in particular the need for holistic consideration of regional water resources and their importance to sustainable regional development. Community resources and wellbeing, the health of the region's water dependent ecosystems, sustainable management of water resources and the efficient and flexible management of these aspects are also supported. These aspects are linked and need careful and effective management to ensure long-term regional viability and sustainability at all levels.

RDA Barossa commissioned this study into water adaptation for the Barossa Region to complement the climate change adaptation work being undertaken in the region and to consider aspects around water resource management and administration where water users were questioning the flexibility of policies. Climate change presents uncertainty to future regional development expectations and as such for the region to have a strong stake in management of its own future it must address water security.

This study reviews some of the key influencing factors such as:

- State and federal legislation,
- Historical regional water use activities and consumptive patterns,
- Opportunities for regulatory reform and greater local governance
- Supply and demand review
- A stepped approach to Revision 2045 recommendations

The study included a considerable amount of time consulting with a wide range of stakeholders across the region in order to develop a clear insight into what the region considered to be the challenges, gaps, possibilities and opportunities regarding current and future management of water resources. These views helped to shape the recommendations that form part of the intended outcomes – a stepped water adaptation plan for the region.



The stepped plan approach takes the recommendations of Revision 2045 and seeks to build these into an action plan focused on pathways for achieving greater long term regional water security and flexibility around water administrative processes. This regional initiative is viewed as an opportunity to stop, rethink and be creative for a future where resilient communities, governments and industry will need to have greater dialogue, flexibility and local input into management and protection of our valuable water resources.

# 1. Introduction

The Barossa Valley region<sup>1</sup> is a South Australian icon. It is a popular food, wine, tourism destination and rural living district, attracting international visitors and locals, seeking a relaxed space in which to visit and live. It is unique region where agriculture and urban areas mix to create a fusion of historic townships, rural living, agricultural production and manufacturing, scattered among farm land settings interconnected by rivers, creeks urban and national parks with beautiful valley and plains settings.

Anyone that spends time in the Barossa region comes to know that the diversity of food and wine is only eclipsed by the region's diversity of people - their social cohesion and the natural beauty of the area. This complexity of social, economic and environment features reflects the sustainability of the region – a complicated weave of soil, water, biodiversity, business and social activity.

The availability of water to sustain tourism, agriculture, township green space and water dependent ecosystems is key to each of these issues. The Barossa region has diverse agricultural landscape, interconnected water resources, scattered parks and river environments that add to the nature of the region. This diversity cannot be sustained without water. It is the wine industry however and in particular its reliance on water for vineyard irrigation and wine manufacturing that underpin the essence, social and economic diversity of the region - not withstanding the importance however of broad-acre cropping, irrigated horticulture and manufacturing industries that are also wide spread within the region.

This water, in its multiple forms, sustain the economic, social and environmental fabric of the region, so it's not unsurprising that water and its management has attracted substantial interest over a period. Water is the key aspect of sustainability, security and longevity of the region.

Regional water resources (groundwater, surfacewater dams and watercourses) have been managed through a prescription and water licensing process for nearly 25 years. With groundwater supplies exhibiting salinities marginal for viticulture and variable surface water flows, the advent of the Barossa Infrastructure Limited (BIL) scheme in 2000, delivered valuable water from the River Murray. This enabled expansion of the wine sector and reduced pressure on local water resources and allowed the region to consolidate and expand wine industry activity.

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<sup>1</sup> For the purposes of this report, the Barossa Valley region is defined as the Council areas of Barossa, Mallala, Light and Gawler.



The Millennium drought<sup>2</sup> (2000-2010) created restrictions on water supply from the River Murray, and raised some questions about the long-term water security of this source for the Barossa. In recent times the emergence of climate change has also raised questions about the future availability of local, regional and River Murray water resources and is leading to consideration for longer term water planning and security options.

Regional Development Australia (RDA) Barossa recognises the importance of water to the region. RDA Barossa (previously Barossa Regional Economic Development Authority and Barossa Regional Development Board) have been investigating and promoting a longer-term view of water security through previous investment in studies such as Vision 2045 (Rust PPK, 1996), Revision 2045 (AWE, 2010) and participation in regional climate change adaptation studies. The Central Government Region 2013 climate change adaptation plan flagged water as a key regional issue.

National & State water policy and administration has become increasingly complex. External and remote management regimes focus on necessary water allocation and water for the environment aspects, but at times struggle to integrate this with the social and economic needs of a region. By definition sustainability incorporates triple bottom line considerations, which must be balanced to ensure the three themes (social, economic and environment) receive the consideration, funding and respect required to result in true equity and sustainability. Increasingly sustainability seeks to balance the welfare needs of society which incorporate the three triple bottom line domains.

In recognition of the Barossa Region's complex nature of resource availability, competing needs and emerging climate change issues, RDA Barossa sought a regional study on water adaptation that considered a more focused and action based water sustainability approach. As with the emerging climate change planning approaches this includes a need to adapt to changing social, economic and environmental circumstances. The aim was for a future stepped plan, greater regional water resilience, integrated with aspects of climate change, water security and local social and economic needs. It was anticipated that outcomes might include a region with greater autonomy, flexibility and control over management of water but with integration with existing regimes and management processes.

Local company Advanced Viticulture and Management (AV&M) offered to partner with RDA Barossa (As AV&M had extensive experience, knowledge and management of local water issues) and support development of a water adaptation plan. AV&M included in their team Andy Chambers from Seed Consulting Services, a consultant with 25 years experience in working with the region on water issues.

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<sup>2</sup> <http://www.environment.gov.au/science/soe/2011-report/3-atmosphere/2-climate/2-1-state-and-trends>



The resulting report is a synopsis of the key drivers for water use, planning and future security for the Barossa Region. It includes consideration of:

- Key issues raised by local stakeholders
- Water regulation – National & State
- Water Supply and Demand Issues
- A Review of the Revision 2045 plan
- Barossa Sustainability Drivers
- Consideration for a framework for local governance
- Recommendations for a stepped plan approach to water adaptation **based around the Revision 2045 document.**

The insights, discussion and recommendation contained in this report are only a start.

There is need to continue the process of integration of regional management with government regulation and policy to ensure the region has access to available funding and a clear vision for water security that is consistent with Federal and State frameworks but includes greater local engagement and simplicity of water management and support for the sustainable benefit of the region.

# 1. Background & Context

## Background

In 2013 RDA Barossa sought to review the broader *central local government region integrated climate change vulnerability assessment*<sup>3</sup> (2011) and consider local issues in the context of this wider regional study. It sought to undertake a refined Barossa region Integrated climate change vulnerability assessment (IVA) and develop a regional climate change adaptation plan. At the time of writing Seed Consulting Services was progressing this study and due to complete it in mid 2014.

Previous regional water studies by RDA Barossa highlighted the critical nature of water and the need to consider adaptive planning processes for future water security of the region.

Consequently RDA Barossa sought to develop a parallel water adaptation plan (parallel to a general climate change adaptation plan), to more clearly align with likely planning and management regimes needed to create regional resilience and improve the long term regional security of water.

At a broad level these strategies are included in Federal and State regulatory frameworks that set a legislative direction. The South Australian governments centerpiece plan, "Water for Good" is a 40 year plan for water security. Specific actions within this plan are needed at a local level to achieve the long-term water security for the region.

By taking the learnings of the previous regional climate and water studies and developing a clear stepped approach to securing regional water resources it was considered that a more resilient and prepared Barossa region would result.

In parallel to the legal and administrative process for water management, it was evident that at a local level a disconnect was occurring where the administrative and water planning processes were less obvious and not well understood by the local community and in particular water users (licensees) in the Prescribed Area. This may be a consequence of lack of understanding by water users or lack of clarity and convincing reason for aspects of these processes. There was a need to consider how this "connect" could be re-invigorated and if there was a need for greater partnerships between water planners, local and state government, business and regional development creating wider management involvement by local stakeholders, and better support mechanisms for water management

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<sup>3</sup> Balston, J.M., Billington, K., Cowan, H., Hayman, P., Kosturjak, A., Milne, T., Rebbeck, M., Roughan, S., Townsend, M. (2011). Central local government region integrated climate change vulnerability assessment. Central Local Government Region of South Australia, Crystal Brook, SA.

at the local level. The Water Allocation and Planning process in its original concept sought to ensure a balance between the sometimes competing needs for environmental, social and economic requirements. It has in recent years evolved to be a process for defending environmental water allocations. Water dependent environmental assets have been and are being lost continuously as a consequence of development impacts in peri-urban catchments like the Barossa. Historically Water Allocation processes have failed to prevent the loss of these assets.

Identifying and prioritizing the key individual water dependent ecological assets of the Barossa has not occurred to date (although work is currently underway) and as such the region is managed as a catchment where water is allocated to environmental flows in a general sense - as a percentage of the available resource. Consequently important zones where there may be ecologically high value pools, sensitive species or remnant vegetation or important groundwater/surfacewater interactions are allocated water similarly to low value township "stormwater" discharge or highly modified urban or agricultural zones.

A key strategy of the South Australian government through the Department of Environment, Water & Natural Resources (DEWNR) "*Science Directions 2010-2015*" is to ensure that science is strong in underpinning protection of healthy ecosystems and that capacity is built to support environmental sustainability as a economic driver of South Australia.

Without an allocation of substantial financial resources (and driving buy in from local land holders and resource managers) the following quotes become aspirational rather than achievable. Flexibility in approach will be needed to achieve truly sustainable resource management.

*Science Directions 2010–2015 supports our responsibilities for protecting and restoring biodiversity and healthy ecological systems for future generations. Our policy directions and Corporate Plan<sup>7</sup> are underpinned by our six core scientific capabilities, five of which are highlighted in our synopsis of our scientific strengths and interests, Realising Knowledge<sup>8</sup>. The sixth, in the social and economic disciplines, is a capability that DENR is building to support environmental sustainability as an economic driver for South Australia.*

**Extract from DEWNR "Science Directions 2010-2015.**

**These scientific capabilities span terrestrial, freshwater and marine environments.**

- **Socio-economic drivers:**

Humans shape the outcomes that DENR is delivering for South Australia. The outcomes will be better if we have a better understanding of the community's aspirations and what motivates the community and key stakeholders to make environmentally sustainable choices. South Australia can secure the health of the natural infrastructure that underlies the state's prosperity through strong community involvement in sustainable land management. DENR is focusing effort to building core capability in the social, economic and human behaviour disciplines to this end.

**Extract from DEWNR "Science Directions 2010-2015.**

This approach requires a strong partnership approach. Local community, business and government need to recognize the benefit and value of the interaction between land use and development, key environmental assets such as remnant biodiversity hot spots and the economic and environmental value of these assets. Balancing these aspects is fundamental to sustainable development. Recognition that future economic diversity for a region like the Barossa will underpin the capacity to protect its environmental assets is fundamental to creating better community and business sustainability "buy in".

### **Preparing the brief**

RDA Barossa recognized the significance of water in the climate change adaptation process and decided to run a parallel water adaptation study. RDA Barossa developed guidelines for an appropriate water adaptation study that considered not only the sources of water but also water management mechanisms, sustainability issues (seeking better balance of environmental, economic and social aspects) and a mechanism to capture the water "aspirations" of the region.

RDA Barossa developed a brief and sought input from external specialists to assist with implementing the study, aligning with the parallel climate change IVA and adaptation planning work.



Local firm Advanced Viticulture and Management (AV&M) were engaged as a project partner and contracted elements of the project to Andy Chambers from Seed Consulting Services Pty Ltd (Seed). Both companies have directors with substantial knowledge and experience in water management within the region. In responding to the brief AV&M and Seed sought to capture this experience but with input from a wider range of regional stakeholders.

## 1.1 Our Approach

A review of relevant literature was conducted. This included:

- Vision 2045 (Rust PPK, 1996)
- Revision 2045 (AWE, 2010)
- Central Local Government Region Integrated Climate Change Vulnerability Assessment (Balston et al, 2011)
- Barossa Valley Water Allocation Plans (1990, 1995, 2000, 2009) AMLRNRM Board, DEWNR
- *Water for Good (2010)* the South Australian state government's 40 year plan for water security.
- National Water Initiative (NWI)
- Natural Resources Management Act, 2004
- Relevant local environmental scientific studies

These are important documents for setting the scene regarding;

- a) The considerable work that has already been done on water resources, availability, management and future options
- b) National and State water allocation planning policy and legislation
- c) Applicable regional water allocation planning policy
- d) Regional climate change context and future scenarios
- e) Future protection and enhancement of sensitive ecological sites

It was not the intent of this study to repeat the findings or discussion contained within these works, but they do influence discussion and recommendations contained herein. Key initiatives are summarised. In the case of Revision 2045 recommendations are considered in more depth, as they are a pathway to and a water adaptation plan with achievable local actions.

Following this literature review the study team developed a range of broad water related questions for consultation with the region. The team sought to engage with a wide cross section of the region, including;

- Local landholders and water users

- Local government
- Industry associations and representative groups
- Dairy and graziers
- Broad acre producers
- Wine industry – viticulturists and winemakers
- Experienced water managers – including regional and departmental

This included people from the Council regions of Barossa, Mallala, Light and Gawler, which form the boundary of the RDA Barossa region.

During the early phase of the project Barossa Grape and Wine sought to review water allocation policy, particularly regarding conjunctive use of groundwater and surfacewater in the prescribed area. This was an approach by the region to SA government seeking a higher-level review of allocation policy prior to the commencement of the next Barossa Water Allocation Plan (WAP). There was particular concern that a licence holder needed to appeal allocation policy to the extent that this matter is in the Supreme Court. A water allocation discussion group emerged from this early discussion (see box next page).

The water allocation discussion group consists of local people with water experience (including BGWA and RDA Barossa), seasoned water allocation and management policy professionals and industry experts. This group converges with this Adaptation Plan for Water as it represents a chance to stop and reflect on existing planning and policy mechanisms and set early goals for change – if change is considered necessary. The intent is that this group will continue to meet and consider Barossa water allocation aspects and themes for further discussion as the period for redraft of a future water allocation plan for the region approaches. The intended outcome is to create a more user friendly WAP, to enable a platform for greater regional dialogue, water allocation planning and regional water project in-put. There is a desire for simplicity of water management and support within the region to achieve greater water resilience and security.

Key supply and demand economic drivers of local water use and reuse were also analysed in the context of existing practices and regulatory requirements. This analysis considered published regional data on water use and reuse and author experience in consultative work on these aspects. It also seeks to capture other work being undertaken by RDA Barossa on reviewing regional recycled water use (Currently being undertaken by RDA Barossa as a separate study).

This water adaptation report seeks to combine previous water studies and recommendations with those specifically related to water in the climate change adaptation plan such that the community and specialist groups can respond to a range of recommendations intended to assist the region in attaining greater resilience and security of water for the future in the context of a stepped plan approach. Accordingly this plan is intended to be a living plan and will evolve as related works are completed and discussions evolve.

### **Background on the Barossa Water Allocation Discussion Group**

The Barossa Water Allocation Planning Discussion Group initial attendees include:

Mr. Kym Good, DEWNR

Mr. Stephen Smith, DEWNR

Mr. Grant Lomman, DEWNR

Ms. Rebecca Jenkinson DEWNR

Ms. Anne Maroney, RDA Barossa

Ms. Linda Bowes, BGWA

Mr. Ian Baldwin, Barossa Council

Mr. Matt Alexander, AV&M

Mr. Andy Chambers, Seed Consulting Services

The intent is that this Group consider all reasonable options for alternative water allocation planning methods within the existing legislative frameworks with the intent of developing flexible and sustainable approaches to future water allocation processes within the Barossa region. This approach is supported by DENWR and the AMLR NRM Board.

It is not intended that this group be a replacement for the regional WAPAC, but an opportunity for open discussion, removed from the constraints of policy and legislative requirements, with the intent of raising flexible and proactive future management options that support good governance and sustainable approaches to water allocation planning.

## 2. Review of Water Regulation

Management of water in the Barossa region cannot be considered without understanding regulatory and management issues that, over a period of 25 years have both set the framework for water allocation planning and influenced the direction and development of water allocation plans (WAP's).

At a national level, the provisions of the National Water Initiative (NWI) set the agenda for state based legislative direction.

Under the NWI, governments have made commitments to:

- prepare comprehensive water plans
- achieve sustainable water use in over-allocated or stressed water systems
- introduce registers of water rights and standards for water accounting
- expand trade in water rights
- improve pricing for water storage and delivery
- better manage urban water demands

These agreements have implications for regions such as the Barossa (and Clare Valley and Mt Lofty Ranges) with regulatory expectations of water trading and allocation transfers and balancing the needs of urban, environmental and business uses of water resources. Transferability of resources for instance becomes exceedingly difficult and almost physically impossible in small complex sub-catchments with conjunctive groundwater and surfacewater use.

A study of the Marne Saunders catchment, as part of the NWI case study series (2010), had the following objective:

Set sustainable extraction limits and water taking rules for newly prescribed water resources (surface water, watercourses and groundwater), with consideration of:

- balancing social, economic and environmental water needs, including existing user rights
- surface water-groundwater interactions and sharing water between users of linked resources
- accounting for interception and use of water for stock and domestic purposes
- protecting users, including the environment, from impacts of new or transferred water use.

Whilst these are similar objectives in the Barossa region, the catchments are fundamentally different. The Marne Saunders is predominantly a rural catchment - the Barossa is a peri-urban catchment with greater areas of urban hard surfaces, a large

unsealed road network and point sources of pollution resulting in highly variable flows in local watercourses and significant impacts on water quality. In the urban-like localities and townships there are closer parallels to water management in the Gawler and Northern Adelaide metropolitan regions than the rural catchments of the Marne Saunders and the vast majority of the Mount Lofty Ranges.

A key restriction for the Barossa region, certainly the North Para Catchment, is its inability to plan for creative solutions to stormwater in townships due to the prescribed nature of surface and watercourse water. Yet less than 15 kms down-stream in the same river network, advanced management techniques of Managed Aquifer Recharge (MAR) and Aquifer Storage and Recovery (ASR) are being implemented in the urban expansion zones surrounding Gawler, Roseworthy and the northern suburbs of Adelaide.

At a State level the Natural Resources Management Act 2004 and the state governments "Water for Good" (SA Government, June 2010) is a *"plan that ensures there will always be enough water in South Australia. Most importantly, it will enable us to diversify our supplies to reduce our reliance on the River Murray and other rain dependent water sources"*.

These are themes the Barossa region is keen to engage in, but prescription prevents.

Water reuse requirements are currently managed through a variety of administrative processes, which appear to create complex administrative requirements for proponents. Where water is derived from human use, such as through Community Wastewater Management Schemes, permitting requirements and assessments are managed by the SA Department of Health (DoH) with input from the Environment Protection Agency (EPA) SA who developed the Wastewater Irrigation Management Plan (WIMP) guidelines. There are also permitting requirements for reuse of wastewater (i.e. winery wastewater) issued under licence by the EPA, but where wastewater is reused by a grower, a permit is required to be issued by the NRM Board (DEWNR). Understandably this process is not well understood by users and demonstrates how difficult it can be for water user to understand water administrative processes.

The Australian Government has a National Water Quality Management Strategy. As part of this strategy, the government has produced a draft document entitled; The **"Australian Guidelines for Water Recycling – Managing Health and Environmental Risk"** (NRM Ministerial Council, 2006). This national guideline is a reference document for organizations managing or developing recycled water reuse systems. In South Australia the national framework is used by the state government (EPA and DoH) when reviewing applications to operate reclaimed water schemes.

This process was used by BIL when using its infrastructure along Gomersal Road (west of Tanunda) to connect into Barossa Council's CWMA and distribute wastewater to irrigators on the western side of the Barossa. Annual environmental reviews are implemented to ensure there are no adverse affects of this water reuse.

## Conjunctive Use

This is a key issue for the Barossa region, particularly in the catchment areas of the Flaxmans Valley (Eden Valley) where higher rainfall has resulted in use of dams for irrigation with bores used as supplementary sources. Irrigators have developed complex systems to sustainably utilize the best water first (dams) and supplement with bore water as either seasonal or irrigation events demand. The move to volumetric allocations over a long period of time has led to a complex arrangement of policy regarding when surface water can be used in preference to groundwater and in which proportions. Conjunctive use of water resources is likely to increase in the future as water users seek to establish the most readily available sources of water, at the best price, and implement their own adaptation plans in response to climate change. It is likely that in the future the greatest risk to a water user will be to be reliant on a single water source.

Future water allocation plans will need to consider how best conjunctive use of resources protects and sustains those resources but provides flexibility for users whose needs may be highly variable from one year to the next, bearing in mind that supplementary sources of water such as BIL and SA Water do not exist in these areas.

## Water Transfers

Transfer of water on large river networks like the Murray-Darling are relatively simple as a commercial market mechanism is in place to assist. Shifting the point of extraction from one point to another is essentially extracting from the same source (River Murray), give or take environmental flow provisions and local extraction rules.

In a small sub-catchment with a variety of on-stream, off-stream, and direct watercourse extraction methods, allocations and transfers become extremely complicated. Particularly when this might involve the introduction of low flow by-pass requirements, de-construction of dams, reduction in extractable volumes compared to storage size and prior use patterns and behaviours.

The recent adoption (2013) of the Western Mount Lofty Ranges Water Allocation Plan is indicative of how the complex nature of water allocation and transfers has progressed, with several hundred sub-catchments identified and subject to sub-regional water transfer and allocation criteria. Future criteria in the Barossa region may adopt a similar approach.

The Minister is currently considering access to flows above environmental water provisions in the Gawler River as a further stage of the Greater Gawler Water Reuse project, where it is proposed to inject and store winter flows (above threshold flows) in the aquifers of the northern Adelaide plains. (Initial stages of the project deal with Gawler stormwater flows). Depending on price this may be attractive for users in the western Barossa to access this water and pipe it back. In the context of the whole Gawler River

catchment this potential activity needs to consider the effectiveness, cost, energy and efficacy of the process as a whole and where the most efficient extraction point may be. It would appear efficient and cost effective to facilitate the capture of some of this stormwater in the Barossa urbanized areas. The broader Gawler Water Reuse Scheme incorporates the Northern Adelaide Irrigation Scheme and this provides for connection with Bolivar water, adding an additional source into the mix. This is likely to be a critical supplementary source of water in a future constrained by climate change.

### **The Definition of Water Assets**

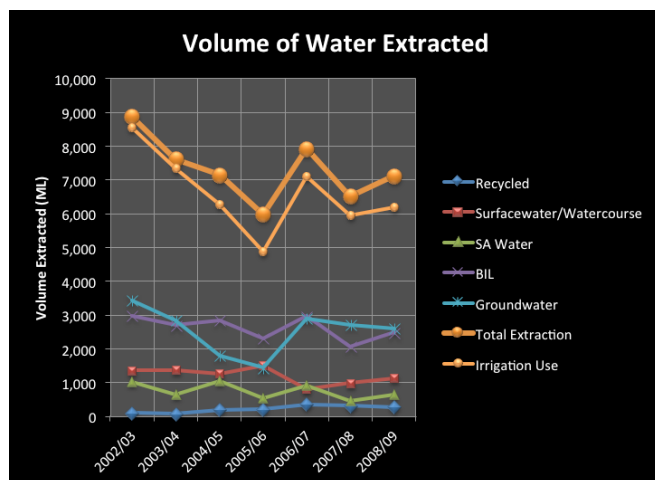
There is a need to more precisely define groundwater (that is water held in the below ground strata underneath the root zone), soil water i.e. water in the root zone of trees and plants and surface water. These waters are continually exchanged and some of them (typically not root zone water) are prescribed. Allocation of these waters to support environmental assets is at present confusing. At present, groundwater welling to the surface is defined under the NRM Act as surface water. This is in conflict with the national standard for groundwater dependent ecologies.

### **Stormwater**

Surface and watercourse water prescription in the Barossa prevents capture and reuse of stormwater. Population predictions for the Barossa region suggest that the future regional population will increase and inevitably so will hard surface areas such as roads, roofs, footpaths etc. creating more stormwater. It was evident in discussions with regional stakeholders that funding opportunities for stormwater management had been lost. A key feature of future regional water security is likely to be better management and use of stormwater that can only be achieved through changes to the current water prescription arrangements.

## 4. Supply & Demand Analysis

Past and present water resources of the Barossa region have been well documented within DEWNR's Barossa Valley irrigational annual reports, summarised in Revision 2045 (March 2010) and highlighted in BIL annual reports (2010-13). Figure 1 is an extract from a DEWNR (2000) report summarising irrigation annual reports for the period 2002-2009. Whilst there are known inaccuracies in the data provided by irrigators, it is indicative of the percentage of volume of water used within the Barossa Prescribed region from the various sources.



**Figure 1:** Volume of water extracted in the Barossa Valley Prescribed Area as reported by Green Ochre in a 2010 report to the Adelaide and Mount Lofty Ranges NRM Board, summarising 7 years of irrigation annual reporting.

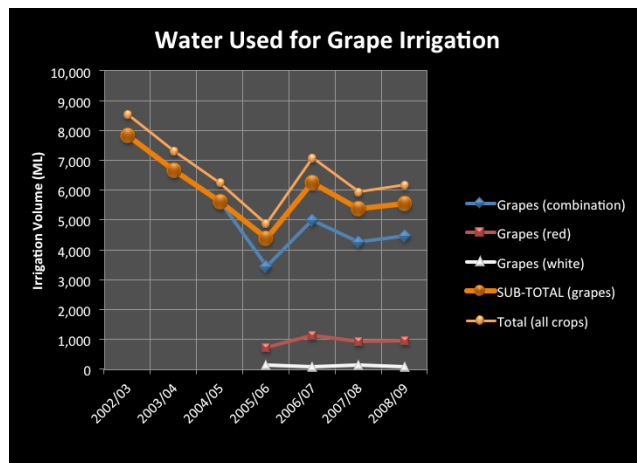
Barossa Infrastructure Limited delivered 7717 ML of River Murray water to the Barossa in the 12 months to June 2013 (BIL Annual Report, 2013) which included 254 ML from the Nuriootpa Community Wastewater Management Scheme (CWMS). This was higher than the budget of 5000 ML. The scheme is expected to increase to 6000 ML allocation following recent approvals by SA Water and the SA Government.



Recycled water usage is relatively low in comparison, about 10% of consumptive use across the Prescribed Area. Additional data on recycled water use is currently being collected in a parallel survey by RDA Barossa.

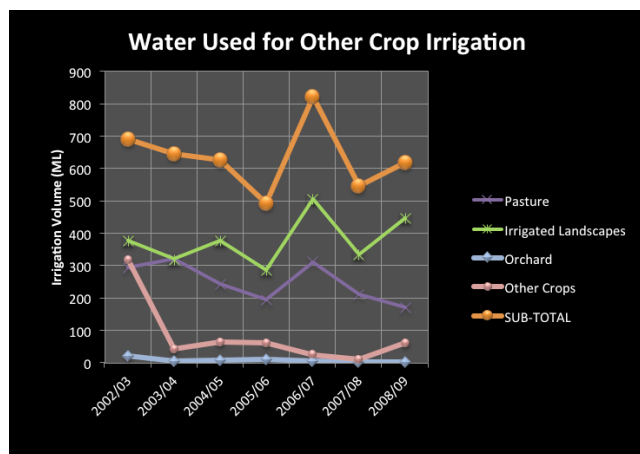
In 2011 DEWNR produced a ground water review report for the Barossa Valley which reported that "Metered extractions totalled 1109ML for 2010–11, well below the current allocation of 7147ML, with 69% being supplied from the Fractured Rock Aquifer, 20% from the Lower Aquifer and 11% from the Upper Aquifer. Water imported from the River Murray via the Barossa Infrastructure Limited (BIL) scheme and SA Water provides an alternative water source to groundwater."

The demand for water resources is predominantly driven by the wine industry. This is reflected in Figure 2 & 3 taken from Green Ochre's 2010 report to the AMLR NRM Board which indicates that around 95% of all water use is by the wine industry. This is an indicator of the economic importance of the wine sector to the region. If in the future, water cannot be sustained then this would have a significant impact on the economic and subsequently social and wellbeing of the region.



**Figure 2:** Total volume of water used for irrigation of grapes compared to other crop types in the Barossa Prescribed Water Resources Area as reported by Green Ochre Pty Ltd for the period 2002-2009 collated from irrigator annual reports (Grapes combined is the total combined ML used for white and red grape varieties) (AMLNRM Board, 2010)

It is interesting to note the increasing trend of irrigated landscapes (includes drought period) suggesting the value placed socially on amenity areas and landscapes in the region.



**Figure 3:** Total volume of water used for other crop types in the Barossa Prescribed Water Resources Area as reported by Green Ochre Pty Ltd for the period 2002-2009 collated from irrigator annual reports (AMLNRM Board, 2010).

## 4.1 Legislative Drivers

It is evident that the process of water prescription has had economic impact on the region, both negatively and positively. The early days of prescription were an absolute necessity to ensure long-term protection and sustainability of supply. This restriction on locally available water lead however to the development of the BIL scheme which, at a time where there was rapid growth in the wine industry assisted with economic development and reduced pressure on local water resources. Effectively the industry sought other sources of viable water.

The millennium drought signaled the difficulty faced by irrigators when allocations are cut, a necessary response on the River Murray to sustain water for critical human needs and to sustain the health of the river.

The Phylloxera and Grape Industry Board reported (2007) that “the 2006-2007 growing season could be described as extreme in terms of climate averages for all parameters including rainfall, temperature and relative humidity and as a result it was very tough for vines to sustain optimal function”.

At this time (2007) water allocations from the River Murray were at 60% heading towards the low of 18% in 2009. Whilst this impacted to some degree on growers ability to respond with adequate irrigation schedules, it was not entirely the lack of availability of water through restriction that prevented better yield and production.

Extreme heat events of the 2014 summer stretched the ability of growers to respond and maintain adequate vine canopy for optimal growth and production. This lead one grower to state “I think the region is about 40-50% below optimal water availability and probably needs 2-3 GL more water available to respond to climatic events like those just experienced”. This in not a reflection of legislative restrictions but simply that even on current water projections and with existing allocation arrangements, the climatic conditions were simply too severe to respond effectively.

In a presentation to the SA Governments climate change adaptation showcase (2014) Bureau of Meteorology (BoM) scientist Dr. Karl Braganza commented that the extreme temperatures experienced in 2013 and 2014 are likely to be at the bottom range of what we may experience in 2070.

This suggests that adapting to these future scenarios will need a flexible approach to how we source, store and use water and the regulatory and planning processes that facilitate this will need to be equally as flexible.

## 4.2 Economic Drivers

The RDA Barossa region’s water resources use continues to be dominated by irrigation for the wine industry within the Barossa Prescribed Area (Figures 2 & 3). This is not unsurprising given the iconic status of the Valley and its significance to wine production in South Australia, combined with its premier destination for tourism and increasing local food production status. Without the wine industry the tourism and food industries would likely be less of a regional focus and support a lower regional economic and population base accordingly.

Cost of grape production (including water) and pricing for grapes have a significant impact on economic performance of the region.

Revision 2045 noted that:

“In the 10 year period 1997-2006, Barossa grape production grew 60% from 57,983 to 92,351 tonnes. This level of production accounted for 11% of total South Australian production and around 4% of total Australian production”.

The Phylloxera and Grape Industry Board’s 2013 vintage survey for the Barossa noted that:

“The harvest from the Barossa Valley (including Barossa zone – other) was 43,824 tonnes in 2013, down by 8,073 tonnes (15.6%) from the 2012 harvest. The estimated production

from the Barossa Valley region for 2014 is 72,500 tonnes, with the wineries' committed intake being 63,200 tonnes. In 2018, the estimated production increases slightly to 73,400 tonnes, of which 63,100 tonnes is already under contract or winery grown fruit. This leaves an estimated 10,300 tonnes (14%) yet to be contracted or is available on the open market."

**Commented [AC1]:** Andy to get final number from SAWIA

This suggests that production in the region may be relatively static at the moment and that the key drivers are market orientated rather than specifically due to water availability. Never the less water costs have an impact on grower profitability and are increasingly becoming a significant part of operational costs.

**Commented [AC2]:** AC checking this data – to discuss with AM

Evidence from the Clare Valley suggests that growers using only SA Water are having difficulty being profitable under that pricing regime.

The cost of water available to users in the region varies according to the source and volume used. Lower end pricing is in the realm of \$500 (or less) per ML ranging up to \$3500 per Megalitre for irrigators using SA Water mains. This is reflective of the variety of means of attaining water from bores (cheap) through to dams and watercourses (pumping), BIL and SA Water mains (expensive).

Revision 2045 also noted that:

"Future growth in the wine industry could be constrained by a number of factors including:

- access to good quality, reliable supplies of irrigation water;
- the availability of suitable land for viticulture; and
- domestic and export market considerations".

Economic diversity will be a driver for future prosperity within the Barossa region. Without diversity of business the region will always be at the threat from fluctuations in the domestic and export wine market. Availability of water to support other economic enterprises, healthy ecosystems and social amenity will be necessary. This economic diversity may include a variety of future industries that are not food or wine production related yet substantially support the future regional economy. This future economic diversity should be viewed as a regional resilience strategy.

In the Southern sections of the RDA Region this focus in diversity is very much around food growing. The Gawler Water Reuse Project will likely provide additional water for food growing in the Northern Adelaide Plains. It would be prudent for the remainder of the Barossa region to consider what opportunities this scheme also offers to create a wider range of water security options.

## 5. Talking to the Region

The diversity of interests and people within the Barossa region lead to a wide range of opinions, experiences and knowledge - particularly about water. Unbundling this to better understand the drivers, motivations and future aspirations can only be achieved through talking at length to people in the region and to those with an interest in its future.

As part of this study we consulted widely with business, organisations and individuals with an interest in water allocation planning and use.

Interest groups and individuals included:

- Local government (Barossa, Light and Mallala Councils)
- Broad acre groups
- Barossa Grape & Wine Association
- Wine Makers Federation
- Wine companies
- Dairy and pasture
- Industry (manufacturing)
- Barossa Infrastructure Limited
- South Australian Wine Industry Association
- RDA Barossa
- Community members

Consultation involved phone discussions, meetings and a questionnaire with a group of set questions. The questions were intended to broadly illicit information and opinions about water in the region, including its sources, availability, protection, management, pollution, impact on potential of the region and future opportunities.

### 5.1 What did we ask?

We interviewed a range of regional stakeholders from the groups above and asked a series of 8 questions, also provided the opportunity for provision of any additional relevant information. The questions were structured to seek the persons' opinion and experience on the following issues:

- What they consider to be the current and long tem water issues for the Barossa region?
- Whether water availability or water quality had impacted their organisation, business or industry?

Commented [AC3]: Still following up

Commented [AC4]: Still following up

- How they view protection of water resources and what they think that means?
- If there are any water projects that could increase water security of the region?
- If they thought water issues (availability, quality and security) restrict the potential of the region (including economic, social and environmental aspects)?
- What they view as the competing activities for water in the region?
- How they view water pollution in the region and are there any major impacts?
- What their opinion is on how these impacts may change under a future changing climate?
- Any other comments on water issues and how water is managed in the Barossa Region.

All the people interviewed were responsive and happy to provide their experiences and opinions.

## 5.2 What did we find?

The stakeholders interviewed are from wide cross section of regional business and community. Understandably their views and experiences were also wide. Never the less there were some similar themes, including:

- There was consensus that there is a need for protection and allocation of water resources.
- There was some frustration that legislative process and allocation planning is not overly flexible and restricts flexibility when it is needed most i.e. in drought
- There was general agreement that the region will need more water in the future to remain viable and that without this water the economic performance and social standing of the region may suffer.
- There was recognition that the wine industry was the predominant user of water but that socially there was growing demand for water for amenity and recreation purposes.
- Cropping and broadacre areas were less concerned with water resource availability and more concerned with long-term projections for reduced rainfall.
- There was concern about the long term cost and affordability of water.
- There was a view that surface water prescription has prevented the region potentially accessing \$2million in Federal storm water funding.
- Infrastructure connection should be firmly on the agenda – i.e. linking to Gawler and Bolivar Schemes as water security measures.
- Access recycled water where possible but some concerns on salinity.
- Consideration should be given to capturing large flows i.e. can storm water management and ASR/MAR be utilized to build buffers and provide back to the

environment over a longer period of time rather than large flash flows which exit the region rapidly.

- Future allocations from the Gawler River should be considered in a total catchment sense.
- Water delivery rates may be an issue in the future – intense heat periods will need faster delivery of water.
- Need better consideration and flexibility for how other sources of water are managed in on-stream dams – including imported and recycled water.
- Consider more demonstration sites for storm water wetlands and retention and ASR.
- Need to continue monitoring of sodicity and salinity and brand implications.
- Water quality – important to maintain the health of watercourses.
- Need mechanism to encourage greater participation in resource management by industry – more regional input required.
- Consider trade-offs – storm water damage (Dec 2010) \$25million – management to reduce events could have positive social, economic and environmental benefit.
- Diffuse pollution impacts watercourse water quality – need to consider better natural filter methods including roadside vegetation, lagoons, capture/storage and return mechanisms.

### 5.3 Regional Discussion Summary

The previous section is a snapshot of the experiences and opinions of a wide range of regional stakeholders who either have significant experience in day-to-day management of water resources or are involved directly in water planning or allocation.

A strong sentiment was that water protection is needed but that the region will be challenged in the future by lack of water and potentially water quality.

The stakeholders discussed the need for the region to have greater input in water planning and potentially greater involvement in local planning, allocation and management functions. Partially this discussion is driven by what is seen as a disconnect with the water administration process with remote regional management (water administration from DEWNR Berri office) or Adelaide resulting in little assistance locally on difficult allocation issues.

Secondly there also appears to be confidence in the fact that region has a track record of fixing the problem i.e. when water supply and quality issues arose in the late 1999's the region successfully implemented the BIL scheme – partially resolving its own issue and today still does so very effectively.

This sentiment appears to be principally driven by the regions' desire for greater input into self-management and to be clearly in control of its own destiny. As a region its urban population is growing, towns are extending and peripheral metropolitan Councils are actively engaging in water proofing activities such as, water sensitive urban design, recycled water management and storm water retention and ASR, but the region feels like the “brakes are on” with water issues through a prescription process that does not enable the flexibility seen in the nearby urban catchments. This is partially a peri-urban “complex” where the Barossa still strongly retains its rural heritage and character but seeks modern and sustainable townships.

These observations closely align with those of Revision 2045 and the recommendations found therein.

What is now needed is a clear stepped pathway forward where all stakeholders with a interest in regional water allocation can assist in creating long term water security for the region.

## **5.4 Barossa Water Allocation Discussion Group**

In late 2013 a meeting was held between Mr. Alan Holmes, Chief Executive Officer of the Department of Environment, Water and Natural Resources and Barossa Grape and Wine Association (BGWA), at the request of BGWA around concerns over conjunctive use policies. As described in Section 1.1 a discussion group subsequently formed with the intent to openly discuss options for flexible water allocation in the lead up to a new Water Allocation Plan. The group sought to discuss future administrative and allocation processes, flexibility and future changing environmental, social and economic needs of the region. This group met in April 2014 with a brief to:

- Clarify what work has already been done, including this report and any external influences i.e. WMLR
- Consider this report and any gaps in knowledge
- Record the aspirations of the group

## 6. Barossa Sustainability Drivers

### 6.1 Sustainability – Setting the Scene

Sustainability has many different meanings depending on the industry, community, institution or organisation the observer belongs too. Sustainability for a business is ensuring there is sufficient cash flow and profit to survive and be in business the next year. Sustainability for environment managers is ensuring biodiversity and ecosystems are protected and maintained. Sustainability for a community group is ensuring there are sufficient group members and facilities to service the community. It is therefore difficult to gain an agreed holistic view of sustainability, but the best alignment can be achieved by satisfying as much as possible the priority needs of each stakeholder.

It was apparent in our discussions with the region that there is a disconnect between what resource managers, water users and the community view as priorities for water management in the region and therefore the definition of sustainability varies greatly between these stakeholders.

Within systems approaches to sustainability there is usually no hierarchy of the elements of sustainability even though environment for instance may strongly underpin a particular economic activity. Without a robust economy there is no ability to manage the environment positively. In an agricultural setting for instance, ecosystems underpin the very productive nature of the industry but without a successful industry the landholder has little free cash to manage the land effectively and for the long term.

There is a natural tendency for one element of sustainability to be pushed above another, depending on the focus issue or background of the individual, group or organisation. The result of this can be a swing in focus to that element, potentially away from important aspects of the other elements. An imbalance can then occur. For instance total focus on an agricultural enterprise for maximum profit may see a critical natural resource collapse or conversely over protection of a resource may see collapse of an industry it supports leading to severe economic and social decline and the inability of that community and industry to support the ongoing management of the resource.

There is evidence of this imbalance occurring in the Barossa region in that there are not balanced opinions between the community and resource managers, relating to water allocation for environmental and economic purposes. This is a complex issue, multi faceted issue and can only be progressed through greater dialogue and a desire to change and create flexible approaches that may involve hard decisions both for the environment and for business and society in the region.

## 6.2 Sustainability and the Barossa Context

The economic performance of the Barossa region is significant at both a State and National level. This has previously been well described in documents such as Revision 2045. The Peri-urban nature of the region and its closeness to Adelaide is steadily resulting in a more urbanised catchment with water flows in the North Para River heavily influenced by run-off from the numerous roads (unsealed) and hard surfaces of townships. The catchment is however still predominantly rural, with a high proportion of modified farming landscapes. This highly modified agricultural setting has impacted on the way water is captured, stored and released within the catchment – both in a hydraulic sense through rain infiltration and run-off and then modified flows due to farm dams. It is important to recognise that the sub-surface and surface movement of water is very different from the mechanisms that the natural environment has adapted to over millennia. This is likely to continue to change in the future as a consequence of climate change and the ongoing impact of a highly modified catchment.

There are relatively few high value environmental assets in the region such as conservation parks, remnant vegetation and relatively intact riparian zones. Most are surrounded by agricultural land and are ecological islands. This requires a modified approach to management both in a terrestrial ecology and water resource sense. This highly modified “environment” requires a far more detailed approach to management. For instance a focus on the most sensitive water dependant ecosystems needs to better understand the interconnectedness at a social and economic level and adaptive management strategies specifically to manage these areas rather than, as occurs now, broad region wide policies for water for the environment. Investing further monies and time in ‘environmental’ improvement actions where the underlying development impacts have no hope of being modified, is a waste of time and money. ‘The Environment’ of the future in the Barossa will be ‘a highly modified environment’.

In a sustainability (triple bottom line) context key water related ecological assets in the region such as remnant pool refuges, riparian vegetation and certain plant and animal species are under pressure from social and economic activities. In a systems thinking and ecosystems services context the decline in ecological health may impact the long-term economic value of a regional or location in subtle or location specific ways. It does not mean that the balance is wrong. Fundamentally it requires decisions on what may be more important to support a region. It may in fact be impossible to maintain or improve some ecological settings or prevent certain species decline because the social and economic aspects of the region have developed beyond the capacity to deliver specific environmental outcomes. This is a tough but necessary realisation that whilst society does not want another extinct species or lost habitat, the physical expense (\$) in attempting to save some of these may be either too great or to the detriment of the balance of the social and economic aspects. These are hard decisions and beyond the scope of this study, but in a regional context we do need to recognise that the Barossa is a highly modified region where urban and economic development are important in a

societal context. Future management of the environment in this modified region may be more about specific actions for specific locations to manage the best of what remains and improve the connectivity between environment, social and economic aspects where currently a disconnect exists.

A different approach to managing the high value environmental remnant assets may be needed that is focused on their protection and where possible enhancement, but not by creating rules or policies applied across the region. i.e. lower value environmental assets do not necessarily need the same management principles as high value assets.

For instance threatened plant species will respond to fencing off and protection of this habitat, where as a relatively common plant species found regularly in paddocks and roadsides may happily survive and flourish enabling the landholder to continue to make a living and actively manage other issues such as pest plants and animals. Both of these strategies provide ecological benefit to the wider environment and economy and society, but have modified management approaches.

A similar approach of proactive management can be achieved with water. For instance at the moment prescription requires that no additional water can be taken from the North Para River – this includes stormwater. All water above licenced extraction is allocated for environmental flow provision. Yet much of this water during flow events contains diffuse pollution consisting of heavy metals from roads, suspended solids from unsealed roads, and urban pollution from the townships. Water usually flows out of the region at high speed due to the channel like state of many of the watercourses.

Adapting a regime of stormwater management through use of water sensitive urban design principles, stormwater retention lagoons and ASR techniques could have the environmental benefits of:

- Filtering and removing suspended solids and heavy metals
- Slowing down and extending the flow periods
- Freshening permanent pools
- Improving groundwater quality (salinity)
- Increasing residency time of beneficial macro and micro invertebrates
- Encouraging more diversity of riverine ecosystems

Notwithstanding the environmental benefits, the economic benefits in the region would likely include:

- Better quality of grape production from improved groundwater salinity



- Creation of buffers to drought and climate change by utilising the “elasticity” of the regions aquifers
- Demonstrating sustainable water management – regional leadership
- Potentially create some of the additional water needed in the future
- Sustaining ecosystem health that will have ecosystems services outcomes
- Likely creation of additional economic production from agriculture and provide a buffer to imported water through the BIL system

The significance of this analysis is that an approach as described requires flexibility in the current water administrative structures and more importantly input and management at a local level. These issues were highlighted in Revision 2045 and are raised again here, as they are sustainability and resilience themes raised during our consultation and also within the climate change adaptation study.

## 7. Regulatory Reform?

Consultation with a wide cross section of the Barossa region unanimously suggests that in its broadest aspect the regulatory approach for control and management of water resources is, on the whole, adequate and provides a framework for protection of an important resource.

Some sectors of the region (broadacre cropping) did not feel there are particular issues regarding regulation of water resources – it was a relatively low order of priority with the broader long-term consequences of climate change and rainfall patterns of greater concern.

Principally the irrigation community of the Barossa Valley, where water resources are prescribed, viewed the broader control of water resources as a necessary resource protection mechanism but expressed difficulties in understanding the intent and need for some of the local policies which, in their opinion, lead to inflexibility and barriers to effective business.

Weighing these community observations up across the region there appears to be some strong themes:

1. Protection of water resources in the region through regulatory processes over a 25 year period has helped to sustain the region
2. Local water allocation policies are at times inflexible and restrict flexibility in irrigation practice, particularly where more flexibility is needed as a consequence of emerging climate change trends
3. Remote administrative management of the region results in slow processes and little support on the ground in making critical water administration related decisions
4. There appears to be an imbalance in government support to environmental, social, and economic aspects of the region
5. The River Murray is now a strong support mechanism to the economy of the region – but this may not always be the case
6. Water allocation policy needs to consider the best use of available sources of water such as storm water and recycled water

These observations suggest that there is not a need for legislative change – the legal mechanism for control of water resources can be improved by providing better local responsibility/authority. The present process of management from metropolitan Adelaide and regional Riverland means there is no local ownership of processes and outcomes. There is a requirement for a more dynamic and progressive management approach to administration of water within the region. This may need a different interpretation or definition of specific allocation principles, or possibly the use of exemptions for trials of storm water use, or demonstration sites for high value ecosystems protection. This will



be necessary if the region is to achieve its aspirational volumes of water use, associated economic performance and the adaptation frameworks needed to provide for future water security.

## 8. Framework for Local Governance

Water use and reuse presently has a range of stakeholder managers across the State. These management regimes have been developed to protect the quantity of water extracted from local water resources and water quality aspects. Prescription of water resources and volumetric allocation has also to some degree become a protection mechanism for water dependent ecosystems, which in many cases are impacted more greatly by issues of diffuse pollution, rural land use and management and the peri-urban nature of the catchment.

The multiple agencies involved in water administration leads to some confusion for water users. Examples of the roles and responsibilities of agencies and who a water user must approach are contained in Table 1. It is an insight into the multi-layered nature of approvals processes for various water use activities.

**Table 1:** Examples of agency roles and responsibilities for various water sources and activities within and outside of prescribed water resources regions. This list is by no means complete.

Agency	Water Administrative role
DEWNR	Provisions of NRM Act 2004 Issue of Water Licences Permit for water affecting activity (use of effluent water) Water Industry Act 2012 Aquifer storage and recovery permits
DEWNR NRM Board	Development of Water Allocation Plans Permit for water affecting activity (work on a watercourse including dams under 5 ML capacity)
SA Health	Permit approval for use of wastewater
Environment Protection Authority (EPA) SA	Licenses for discharge to the environment (i.e. winery wastewater) Wastewater irrigation Management Plans
Local Government	Local Government Act – Application for construction of dams over 5 ML in capacity

## 9. Revision 2045

The Vision 2045 and Revision 2045 documents provide an excellent review of the available and projected water resources within the Barossa Region under a water constrained future.

This is particularly true in the context of the climate change vulnerability and adaptations plans being prepared in parallel to this water study. The uncertainty of water under future climate change scenarios, combined with variable predictions on urban growth in the Barossa, present challenges in both the water quantity and quality contexts.

The aim of Vision 2045 was to “determine the most appropriate ways to increase the availability of water in the Barossa region so that agricultural, industrial, tourism and urban development activities can expand whilst maintaining the character and environmental assets of the Barossa Region”.

ReVision 2045 builds on that aim whilst assessing the current and future realities – in particular drought and climate variability, reduced certainty of River Murray flow and allocations, combined with a faster than expected growth in the region – which point to a water-constrained future unless water resources are more effectively managed and utilised.

**Figure 4:** Extract from Revision 2045 revising the aims of both Vision 2045 (1996) and Revision 245 (2010).

The recommendations contained within Revision 2045 are presented in the next section with our additional recommendations leading to a planned approach outlined in Section 9.2.

## 9.1 Revision 2045 Recommendations

The following Sections are the numbered recommendations (1-15) contained within the Revision 2045 plan. In light of the investigations in this report we have made **additional recommendations (in bold)** that we have placed under each of the 15 recommendations made in Revision 2045. The key aspects are then summarized in table 2 (Plan).

### 1. Leadership

- *Barossa and Light Regional Development Board (BLD) take the leadership role in the competing demands facing water security for the region to 2045.*

**RDA Barossa has commenced this role, in part through commissioning this report. RDA Barossa should continue to pursue this approach on Barossa water security through the discussion group.**

- *Establishment of an alternative management body and an appropriately constituted management group. It is also recommended that BLD continues to provide leadership in water security in the region once this management body is established.*

**An alternative approach to management incorporating key Barossa water stakeholders should be considered. There needs to be strong dialogue with DENWR, AMLR NRM Board, local government and key industry groups such as BGWA to ensure all needs are met. This process has commenced and should be formalized by way of discussion and recommendation within the current focus Group. An agenda should be set to discuss this direction within the Group such that DEWNR can take recommendations to the Minister as such an approach will require amendments to current administrative and financial arrangements. The timeframe for these discussions should occur before the concept statement and revision period for the next Barossa Water Allocation Plan.**

- *Financial management of the water cost is incorporated into forward planning for all landholders.*

**This is broad issue and needs much further regional discussion as to some extent landholders already do this through commercial investment and development of their properties. It is also contextual depending on the source of the water. Imported water (i.e. BIL or SA Water) it can be argued this is reflected in the**

market purchase price. For local resources (i.e. groundwater, surfacewater and watercourse water) this is far more complex and is in part influenced by aspects such as ecosystems services, resource availability, enterprise, water use activity (crop type/s, manufacturing use etc.) and individual and organizational approach to risk management.

## **2. Managed Aquifer Recharge**

- *Undertake detailed investigation for the implementation of Managed Aquifer Recharge (MAR) in the region.*

**There is potential for MAR in the Barossa region but the extent of storage potential is not fully understood, hence there is a need for additional hydrogeological modeling to fully understand the storage potential. This issue is linked to Action Item 3 – stormwater recycling.**

- *Managed Aquifer Recharge initiatives to be incorporated into all major residential developments in the region where feasible while accounting for the requirements of the relevant water allocation plan.*

**As above, further investigations are required to determine MAR capacity in locations where residential developments are proposed. Regional WAP policies will need to reflect supply, demand and resource requirements and be incorporated in development of the next WAP for the Prescribed Area. This should be a priority feature of the WAP redraft.**

## **3. Stormwater Recycling**

- *Develop Urban Storm water Management Plans for each township within the region, while accounting for the requirements of the relevant water allocation plan.*

**Prior to this step a better understanding of the hydrology resulting from modeled urban expansion and climate change is required. This should be catchment wide assessment incorporating all inflows to the Gawler River system.**

- *All new large scale developments (residential and industrial) to capture and recycle storm water within the region whilst accounting for the requirements of the relevant Water Allocation Plan.*

**This may require a change in classification of water sources in the Barossa Prescribed area enabling storm water sources (presently restricted) to be utilized either initially by way of trial or through changes to regulation or by use of exemptions (Minister). This matter needs further immediate discussion with DEWNR and probably requires legal and planning assessment.**

#### **4. Wastewater Recycling**

- *Establish a centralised wastewater management system, which accounts for the anticipated significant regional development around Roseworthy, and which collects, treats and re-uses the recycled water within the region.*

**Further feasibility studies would be required to ascertain the most efficient method for returning water to key demand locations in the region. An initial supply and demand study for each form of water and industry needs is required. There is close correlation on this issue with Point 8 as infrastructure requirements would need to be more clearly understood.**

- *All new large scale residential development to investigate the suitability of incorporating grey water recycling.*

**Regional Councils will need to consider development criteria for new residential areas and consider this in the context of the point above and also Point 8 (infrastructure sharing).**

- *All industries collect, treat and recycle their wastewater within the region where suitable recycle options exist.*

**NPEC and Councils are good examples of how this already occurs. A better understanding of the volume of industrial water involved is required to fully appreciate if there is a cost benefit in doing so. A cost benefit tool could easily be developed to assist industry in determining the ROI. Councils and DEWNR could seek grant money to assist this process.**

- *For each new wastewater recycling initiative, undertake detailed analysis of recycling consequences and develop and implement a management plan to mitigate against any risks.*

**This should be a mandatory requirement under the National Water Quality Initiative. EPA SA and Health SA both require such plans where reuse of CWMS water is reused.**

#### **5. Considered Developmental Planning**

- *Seek community and stakeholder input into current and future regional values and integrate within Council Development Plans ensuring development planning accounts for those values.*

**Should a new water management entity be developed, local government should be included as a stakeholder and should create development planning guidelines underpinned by sustainability planning principles.**

- *Incorporate Water Sensitive Urban Design principles into Council Development Plans and ensure all new residential developments comply with those principles.*

**As above.**

#### **6. Premium Wine Production**

- *Undertake a regional review on strategic directions for viticulture and wine industries with respect to water use and grape quality.*

**BGWA can drive this as a prospective key partner of a newly formed Barossa water management body. This is principally a wine industry direction but with a need for clearly identified communication protocols. Additional research will be required to consider water demand for viticulture in light of climate change and the potential for a greater frequency of extreme heat events.**

## **7. Inter Basin Transfers**

- *Undertake a detailed investigation on the social, economic and environmental consequences of each inter-basin transfer option. Where suitable, enter into a long term agreement for water to be supplied from that inter-basin transfer option (Certainty).*

**The Gawler Water Reuse (GWR) Scheme presents an opportunity for discussion on the merits of ensuring compatibility between systems in particular the BIL and GWR schemes. Stage 1 of the GWRS is in design phase. Discussions between BIL and GWRS should occur as soon as possible. This option potentially opens up large volumes of combined storm water and Bolivar water (access to 50GL).**

## **8. Shared Water Supply Infrastructure Network**

- *Review the water supply infrastructure network ownership arrangements, supply side capabilities, legislative consequences and commercial opportunities and liabilities associated with establishing a coordinated, regional third party access agreement for all water supply infrastructure.*

**Current BIL arrangements enable transfer of recycled water from the Nuriootpa CWMS. GWRS are also considering the options for future connection to the Bolivar scheme. Regional discussions with BIL & GWRS should be a priority to ensure future options are considered and researched further.**

## **9. Small Scale Desalinisation**

- *Consult extensively with the relevant community and stakeholder groups regarding proposed small scale desalinisation schemes.*

**Energy and brine disposal costs restrict the scale of desalination, although there is evidence of use in the Northern Adelaide Plains for high value glasshouse crops where cheaper sources of water are not readily available. For broadacre and larger vineyard irrigators costs are prohibitive. Developing business case studies will assist irrigation industries in considering the viability of desalination.**

- *Ensure any small scale desalinisation scheme satisfies the legislative requirements and does not diminish the social, economic and environmental values of the region.*

**The Barossa region should work with DEWNR and EPA SA to produce industry advice (including business case studies) on the merits and costs of desalination. Disposal of brine in acceptable ways is an increasing issue particularly in the NAP.**

## **10. Prescription**

- *The State Government ensures prescription extends across the entire region, thus allowing for sustainable use and recording of all water resources in the region. Urban storm water to be exempt from the prescription process to facilitate recycle (including via MAR).*

**Statewide prescription of water resources is unlikely in the near future. This process requires consideration and collaboration with DEWNR. It can be further facilitated by a regional management body that presents the Barossa region as a case study for changes to prescription and definition of storm water. This should be a priority for regional action.**

- *Investigate further the possibility of exempting urban storm water from prescription to allow development of innovation in water resource management in the region. Storm water is considered surface water under the NRM Act. The definition of storm water and options for its management are currently being considered by State Government agencies. The advantage of prescription of storm water is security of access to the storm water. Without that security, investors may not wish to take significant financial risks to invest in storm water projects.*

**As Above. A priority for the region to address within the next three months.**

## **11. Metering**

- *The State Government has made an undertaking under the National Water Initiative to meter non-stock and domestic applications in prescribed areas. This initiative, the installation of a meter, should be mandatory (a legislative mechanism is required) for all users accessing water resources within the Barossa and Light region.*

**All licensed water extractions within the Prescribed areas (Barossa and Northern Adelaide Plains) are metered. A move to meter water users outside of the prescribed areas would require legislative changes but may not necessarily add significantly to the knowledge base on volumes of water extraction. Further discussion on this as a mechanism would be required with DEWNR.**

## **12. Environmental Water Requirements**

- *The approach to determining EWR should shift towards focused assessments and resource allocations (both water and financial) to specific higher value sites, rather than adapting a broad generic management/allocation response.*

**A series of case study projects should be developed including a demonstration site for storm water harvesting and treatment and a demonstration site for protection of a remnant high value water ecosystem. In the first instance suitable case study/s needs to be considered and agreed to. This should be a function of a local management entity in collaboration with DEWNR SMK. Consideration needs to be given to funding opportunities.**

[From an effective and cost benefit point of view, attempting to maintain or re-establish pre-European development water dependent biological assets, through water allocation without considering the impact of development and ongoing human activity for legitimate economic and social needs has not proven to be effective. A new approach is required. If any remnant of the pre-development ecologies is to be preserved, it will be in an environment that is modified. How this environment is maintained amidst the present social and economic 'environment' should be the ongoing focus.]

## **13. Low Flow Bypass**

- *All dams at a predetermined volumetric capture capacity or those which offer strategic environmental benefit be required to install a low flow bypass device.*

**It is recommended that this issue be further considered in the redraft of future WAP's and reviewed with DEWNR.**

## **14. Monitoring**

- *Long term - high quality monitoring sites measuring to a high resolution continuous level, flow, EC, temperature and possibly rainfall (or stand alone rainfall sites).*

**The region should raise this with DEWNR and AMLR NRM as part of the governments' commitment to ongoing monitoring and the need for regional input and participation in measurement and monitoring.**

- *Short Term (operating for a minimum of 5 years, subject to meeting their requirements) - lower quality monitoring sites measuring to a lower resolution continuous level, flow, EC, temperature and possibly rainfall (or stand alone rainfall sites).*

**As above**

- *Environmental Water Requirement (EWR) monitoring sites located at points of environmental interest or significance. They are simpler sites in that a control is not required to be constructed and interest is in level timing, duration and frequency. It is anticipated that within a five year time frame that a correlation between these sites and long term sites in the catchment can be made for the level timing duration and frequency to check various environmental water requirement hypotheses (as per Murdoch 2002).*

**As above**

#### **15. Catchment and Climate Change Modeling**

- *A catchment model be developed to more accurately predict the climate change impacts on the water resources in the region.*

**There is a strong correlation with points 2 and 3 above, This should be an immediate priority for the region. This is likely to be a climate change adaptation plan action outcome for regional water security. DEWNR should be consulted in setting a timeframe for action as this will be a similar requirement in most prescribed regions.**



## 9.2 A Stepped Plan

We have placed each of the recommended actions from within Revision 2045 into Table 2 and summarized the additional major actions we believe the region seeks to take. We have prioritized each action and suggested a recommended timeframe for action (which Quarter in each financial year). These actions have not been costed. Our priorities have been built principally on what we consider to be actions reliant on prior outcomes. In other words a later action cannot be taken until the preceding priority actions are complete.

It should be a priority of future regional water administrative arrangements to review, cost and reset these recommended actions. In doing so a clear stepped plan for future water security in the Barossa should be formed. In setting priorities a triple bottom line approach should be considered.

It may be useful to run this priority list through a Triple Bottom Line filter so that weightings for environmental, economic and social factors can be considered. This has not been done under the terms of this project, but there are a number of tools available that could achieve this outcome.

**Table 2:** A stepped approach to water security actions for the Barossa RDA region, based on recommended outcomes of Revision 2045 and additional actions proposed within this study.

Recommendation	Major Action	Priority (1- 26)	Timeframe (Q & FY)
1. Leadership	RDA Barossa leadership role	Happening	Q3 2012/14
	Create new collaborative regional water management pathways – a partnership between RDA, Councils, DEWNR and regional business stakeholders	1	Q1 14/15
	Discuss financial arrangements with stakeholders	2	Q2 14/15
2. Managed Aquifer Recharge (MAR)	Additional modelling to determine aquifer capacities and best locations	12	2017
	Consider MAR and ASR requirements in next WAP	13	2017
3. Stormwater Recycling	Additional modelling to determine stormwater generation in expanded urban areas under climate change scenarios	6	Q3 15/16
	Consider definition of stormwater and WAP requirements with DEWNR - may need legal opinion	7	Q3 15/16
4. Wastewater Recycling	Review in Section 8.1 first is this what we want?	19	2017
	As above	8	Q4 15/16
	As above	9	Q4 15/16
	As above	10	Q4 15/16
5. Development Planning	Local government be part of a new water management entity. LG to incorporate sustainability planning principles.	17	Q1 15/16

**Table 2:** Cont.

Recommendation	Major Action	Priority (1- 26)	Timeframe (Q & FY)
5. cont.	WSUD principles to be included in 5. above	18	Q1 15/16
6. Premium Wine Production	BGWA to drive research and climate change	11	Q4 13/14
7. Inter Basin Transfers	RDA Barossa or new management entity to create dialogue between GWRS and BIL	14	Q4 13/14
8. Shared Water Supply Infrastructure Network	Include this discussion between GWRS and BIL in 7. above	15	Q4 13/14
9. Small Scale Desalination	Need further research on cost benefit of brine disposal and energy costs. Develop business case study	25	2018
	Work with DEWNR and EPA to prepare industry advice paper	26	2018
10. Prescription	Create new management entity and raise issues prescription issues with DEWNR	4	Q4 14/15
	Exempting stormwater as with 10. above	5	Q1 15/16
11. Metering	Have dialogue with DEWNR on metering of resources outside PWA's.	24	2017
12. Environmental Water Requirements	Develop demonstration sites on SW and high value ecosystem assets	16	2017
13. Low Flow Bypass	Review policy in WAP redraft	23	Q2 14/15
14. Monitoring	Discuss with DEWNR	20	2017
	Discuss with DEWNR	22	2017
	Discuss with DEWNR	21	2017
15. Catchment and Climate Change Modelling	Incorporate with points 2 & 3. Linked to Barossa climate change adaptation plan	3	Q3 14/15

### 9.3 Priority Actions 1-5. What needs to happen next?

We considered the 5 priority actions outlined in Table 2 and sought to expand on detailed actions and timeframes needed to create momentum and the innovative change in approach to water allocation planning sought by the region. Table 3 lists these 5 priority actions and the additional detailed actions required at each step to facilitate progress. It is our opinion that progress to the next level is contingent on successful outcomes in the previous step.

**Table 3:** The key actions to creating secure future water resources for the Barossa region.

Priority (1- 5) Actions	Detailed Actions	Timeframe (Q & FY)
1.	Barossa Water Discussion Group meet to discuss this report	Q1 14/15
	Discussion Group prepare advice and recommendation to DEWNR CEO and Minister regarding proposed intent for regional collaborative approaches	Q1 14/15
	Meet with broader regional stakeholders	Q2 14/15
	Consult more widely with region	Q2 14/15
2.	Develop financial and operational framework	Q2 14/15
	Meet with DEWNR and Minister to present framework	Q2 14/15
3.	Engage consultant to model impacts	Q3 14/15
4.	Discuss with DEWNR appropriate steps for separation of sources from Prescription – how can this be achieved? Is a legal opinion necessary? Are there internal or Ministerial exemptions that can achieve the desired outcomes?	Q4 14/15
5.	As for 4 above	Q1 15/16

Priority action 1 is fully contingent in early agreement between key regional stakeholders and the South Australian government that the future management of water in the Barossa region is achievable through a collaborative local management framework for the future benefit of all – including social, economic and environmental stakeholders.

It is our opinion that only this fundamental change in approach will lead to the local innovation required to create sustained local water resources, supported remnant ecosystems and economic diversification built on a foundation of shared water for a resilient community and environment.

## 10. Recommendations

### **“Action to optimise water resources in the Barossa region for social, economic and environmental outcomes”**

A key objective of this study was to recommend approaches to coordinate and direct an action plan for water adaptation in the region. The following recommendations are on the basis of our review of the elements that influence sustainable water resource management and adaptive strategies for secure water in the Barossa RDA region; in particular actions associated with the recommendations found within Revision 2045.

A key to this is coordination at a local level.

This process has partially commenced with informal dialogue occurring between the DEWNR, AMLRNRMB, RDA Barossa, Barossa Council, BGWA and WAPAC members.

It is highly recommended that this dialogue continues as a precursor to the revision of the next WAP for the Barossa PWRA and be expanded to consider wider opportunities for integrated water management and administration across the region. Particular actions should include:

- Creating a wider discussion on water that includes major local stakeholders such as BIL, BGWA, Mallala, Light and Gawler Councils, key economic and social groups, researchers and interested community members
- Revision 2045 – A Stepped Plan – considering the recommendations for each element described in Section 8 of this report and the suggested stepped plan approach in Table 2 and in particular Action Items 1-5 (Table 3).

The region has signaled it would like to engage in innovative change that offers a different approach to water allocation planning and securing water for the future by seeking to:

- Modify the approach to water planning in peri-urban catchments where water resources and ecosystems are highly modified
- Support ecosystem improvement in a way that balances economic, social and environmental demands on water resources systems.

The stepped plan presented in this report is intended to present a mechanism for this change. It provides the Barossa RDA region with a way to increase engagement in water resources management and presents a method for future security of water in the region through focused enhancement of ecosystems and society wellbeing.



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## Acknowledgements

Advanced Viticulture and Management and Seed Consulting Services would like to acknowledge the following people who provided information, review and valuable insight into preparation of this report.

Ms. Anne Moroney, Regional Development Australia (RDA), Barossa.

Mr. Peter Wall

Mr. Kym Good, DEWNR

Mr. Stephen Smith, DEWNR

Mr. Grant Lomman, DEWNR

Ms. Linda Bowes, Barossa Grape and Wine Association

Mr. James March, Barossa Grape and Wine Association

Mr. Wes Seeliger, Dairy Farmer

Mr. Ian Baldwin, Barossa Council

Mr. Gary Mavrinac, District Council of Mallala

Mr. Andrew Philpott, District Council of Light

Mr. Tony Craddock, Rural Directions Pty Ltd

Mr. Robin Nettlebeck, Yalumba Wine Company

Mr. Mark Gishen, South Australian Wine Industry Association

Mr. Damian Griffante, Winemakers Federation of Australia

Mr. Paul Shanks, Barossa Infrastructure Limited (BIL)



## Appendix