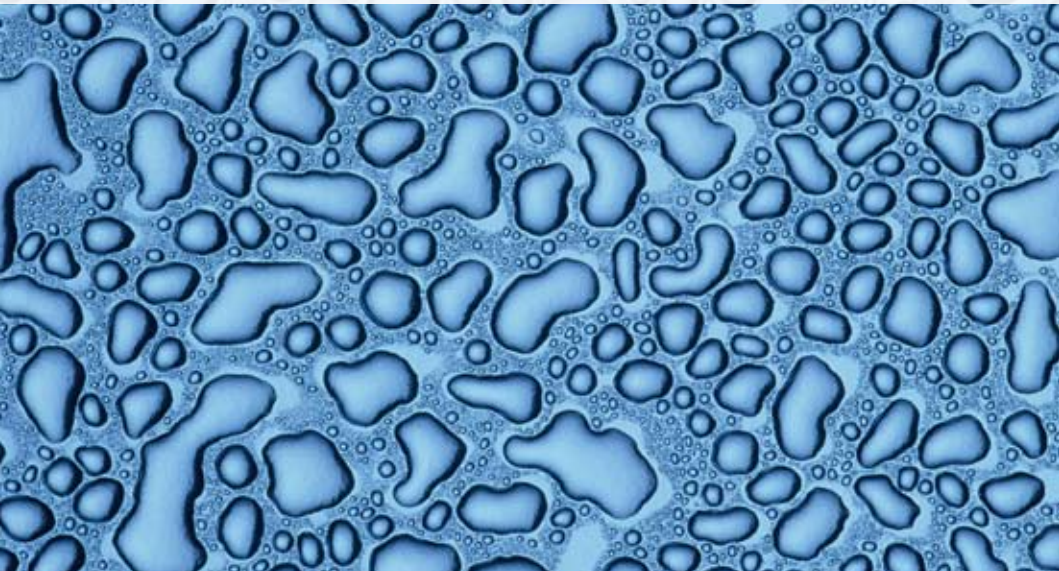


WaterWise Adelaide

The Stormwater Resource

An Executive Summary of the Submission to
the South Australian Water Security Council

November 2008



Vision

To protect, re-use and sustain our most vital resource through city-wide harvesting, aquifer storage and reticulation of stormwater and waste water.

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“Waterproofing Adelaide is a South Australian Government initiative that seeks to establish a blueprint for the management, conservation and development of Adelaide’s precious water resources to 2025.

Meeting the challenges will depend on tackling two significant issues – escalating environmental risks facing our rivers and catchments and Adelaide’s increasing thirst for water (as its population continues to grow).”



Foreword - Water Wisdom

This discussion paper, entitled *WaterWise Adelaide*, responds to these challenges. It proposes greater use of recycled stormwater and waste water across Adelaide.

This submission, at the invitation of the Water Security Council, is not proposed as an implementation solution. Rather, it is a model of what may be possible to maximise water retention across Adelaide. It is based on the experience in stormwater management that has been developed over two decades in the City of Salisbury which is now being successfully applied more extensively in the Waterproofing Northern Adelaide scheme.

The Waterproofing Northern Adelaide Regional Subsidiary has an obligation, under the deed of agreement with the Commonwealth, to demonstrate to others what is being achieved. There is also a tradition in Local Government to exchange information and share best practice knowledge.

WaterWise Adelaide is presented in this spirit to assist the Water Security Council in formulating its important water security plan.

Peter Fairlie-Jones
Chairman
Waterproofing Northern Adelaide (WNA)

The Opportunity

In the driest State and in the face of climate change, Adelaide can sustain much of the water it needs to preserve a cool green city, through innovation, cooperation and shared commitment to city-wide recycling of stormwater and waste water.

WaterWise Adelaide is presented for discussion as a practical response to the water crisis. It proposes that much of the solution to our future water needs can be achieved by better “harvesting” the rain that falls over Adelaide.

The **WaterWise Adelaide** plan is based on a firm foundation of experience, practical knowledge and leading technology that has been developed over more than two decades in the northern City of Salisbury and more recently in other metropolitan Councils.

Over this extended period Salisbury has progressively learnt more about the opportunities and challenges of achieving sustainable water conservation through stormwater harvesting and aquifer storage in a built up environment.

The authors present this proposal to the Water Security Council in the hope that its recommendations will be included in the SA Water Security Plan.





The Promise

Adelaide need no longer be dependent on the River Murray by using the urban water resources and developing additional aquifer storage.

The proposed vision has been conceived and developed by the City of Salisbury and its partners in the Waterproofing Northern Adelaide Regional Subsidiary (WNA), in consultation with the LGA, the Stormwater Management Authority (SMA), the Adelaide Mount Lofty Natural Resource Management Board (NRM) and the Office of Water Security.

Much of the data contained and the model proposed is based on evaluation by a scientific reference group and input from the water industry.



The Proposal

A commitment to a ten year program that will provide 40% of Adelaide's water needs from recycled stormwater and waste water.

The plan presented is ambitious, bold and on a scale of national significance.

WaterWise Adelaide proposes that all three levels of Government commit to a ten year program of construction that will provide one third of Adelaide's water needs from recycled stormwater and re-use of waste water.

The result will be that Adelaide will no longer be solely dependent on the River Murray and Adelaide Hills catchments. An extensive network of wetlands across Adelaide, together with massive aquifer reserves, will reduce the reliance on the river and our reservoirs.

The Risk

*The long-term predictions are dire.
By 2050, the situation will deteriorate rapidly.*

- The River Murray may not be able to supply any of Adelaide's needs.*
- Ground water will be further depleted and may only sustain 60Gl.*
- Mount Lofty catchments are predicted to reduce average yields to 85Gl as a result of climate change.*
- Adelaide will become brown, dry with continuing harsh water restrictions.*
- Over 150Gl of stormwater will continue to flow towards the sea.*
- Meanwhile Up to 50Gl of waste water will be discharged, some of which will make its way into marine environments.*
- Adelaide is predicted to grow rapidly to over 2 million.*

South Australia's prosperity, possibly more than any other State, is critically linked to the provision of a sustainable water supply. That prosperity and future growth is now at risk with little time left to resolve the threat.

The driest State in the driest continent now faces the very real prospect of not having enough water to sustain the city's basic needs within 25 years. The River Murray is no longer a dependable source of drinking water, climate change is resulting in unpredictable rainfalls and Adelaide catchments are under pressure from urban growth.



The Solution

The solution is relatively simple.

- *Adelaide stormwater is captured in wetlands across the city.*
- *Harvested stormwater provides flood protection and improves estuarine flows.*
- *Wetlands cleanse stormwater through natural processes and create biodiverse habitats.*
- *Cleansed water free of metals and contaminants is stored in aquifers.*
- *Water recovered from aquifers, substitutes for non-potable needs or can be supplied to SA Water for treatment and use.*
- *Recycled wastewater is used where appropriate.*

This proposal is based on the recent success of Waterproofing Northern Adelaide and the knowledge gained in establishing Salisbury's network of wetlands. This experience has shown that if all parties work together, the community can be assured that their future water needs will be met.

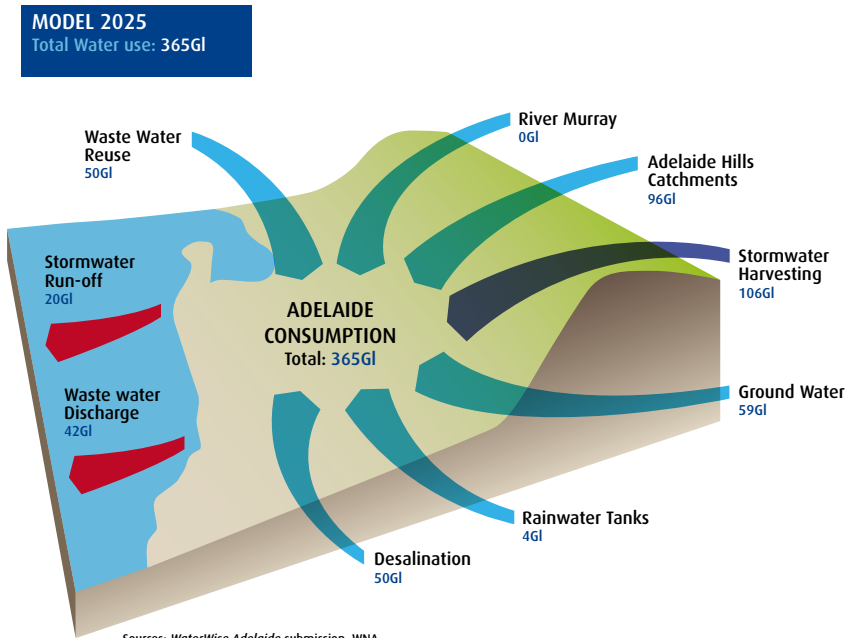
The authors recommend that a comprehensive feasibility study should urgently be undertaken to assess the feasibility of implementing the WaterWise Adelaide plan. This report would provide the critical technical and engineering data required to prepare an implementation plan and funding proposal for consideration by the Commonwealth and State Governments.

The Source of Adelaide's Water by 2025

A fully integrated solution.

The solution illustrated in this model is that by 2025 Adelaide can secure the water that is needed for the City's growth by substituting recycled water for current supplies from Mount Lofty catchments and the River Murray. The supply systems can be integrated to provide "fit for purpose" water to the whole city, whilst some water, having been naturally cleansed in wetlands and aquifers, can be delivered to water filtration plants at a comparable quality as that being extracted from the River Murray.

An analysis of Adelaide's surface water and ground water capacity, linked with a review of waste water opportunities, confirms that our future non-potable requirements for all of Adelaide can be met.



The Plan

This plan seeks to harvest these outfalls across the City from the far northern, central and southern catchments.

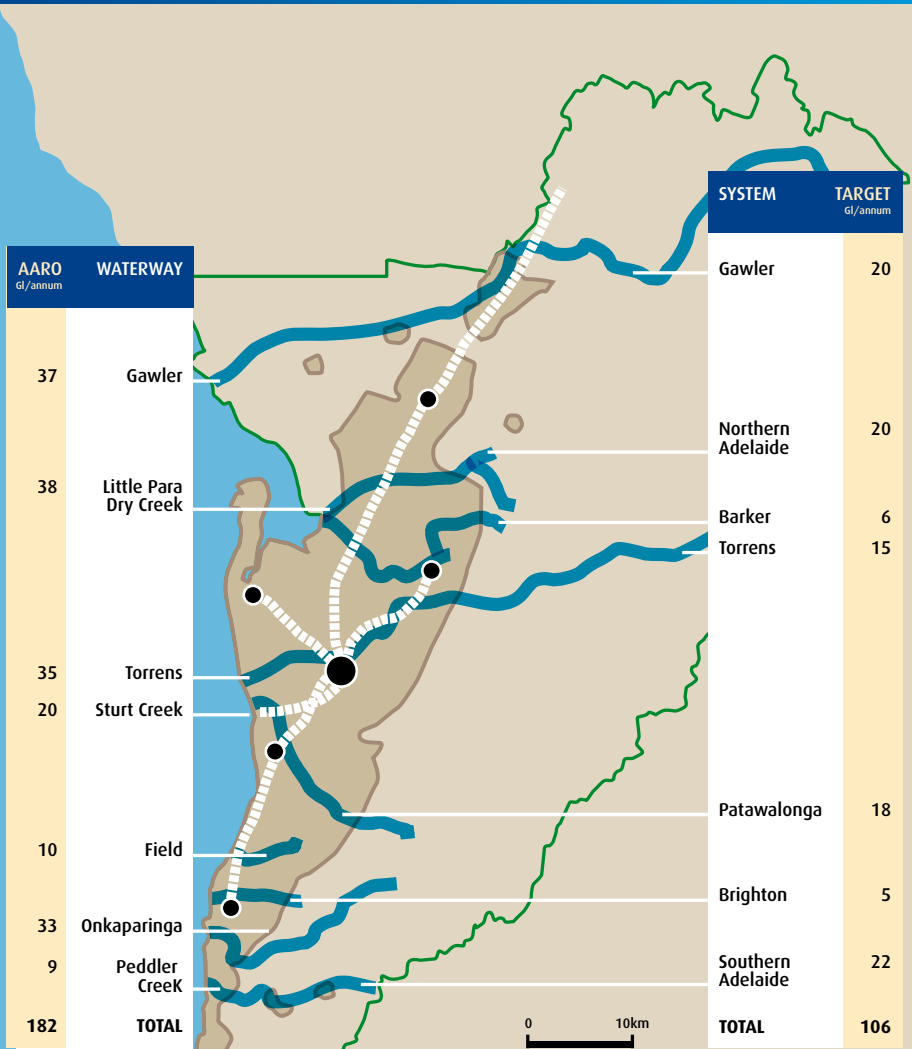
<i>Source</i>	<i>Volume Gl per annum</i>	<i>Sites</i>
<i>Gawler River</i>	<i>20</i>	<i>flood plain sites</i>
<i>Northern Adelaide</i>	<i>20</i>	<i>integrated system</i>
<i>Barker</i>	<i>6</i>	<i>selected sites</i>
<i>Torrens</i>	<i>15</i>	<i>flood plain sites</i>
<i>Patawolong</i>	<i>18</i>	<i>airport</i>
<i>South Central</i>	<i>5</i>	<i>selected sites</i>
<i>Southern Adelaide</i>	<i>22</i>	<i>extended system</i>
<i>TOTAL YIELD</i>	<i>106 Gl per annum</i>	

The supply systems, both aquifer and pipe based, can be integrated to provide water to the whole city. The wetlands enhance the amenity, biodiversity and recreational use of the waterways and protect the coastal waters from contamination.

Some water, having been naturally cleansed in wetlands and aquifers, could be delivered to the water filtration plants at comparable quality to water extracted from the River Murray.

This model provides the necessary 230Gl per annum for metropolitan Adelaide, 125Gl per annum for rural use with insurance of 45Gl per annum and a bank of over 100Gl in the aquifers below the city.

Surface Water Opportunities



Sources: Surface Water Opportunities, WNA
 Richard Clarke & Associates
 W&G Study for Adelaide Airport

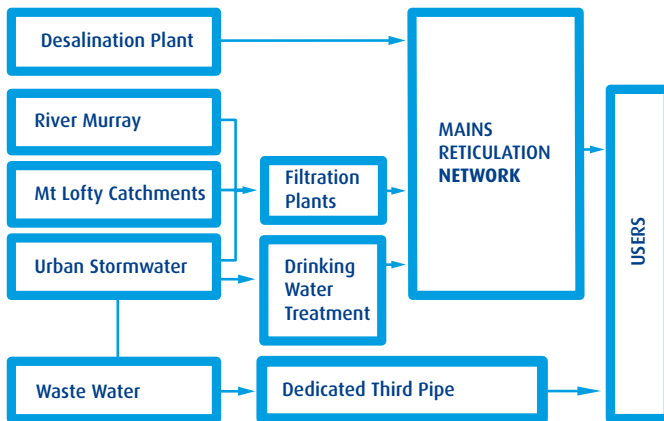
Resources

Water Distribution

There are many options for transporting recycled water from storage to users.

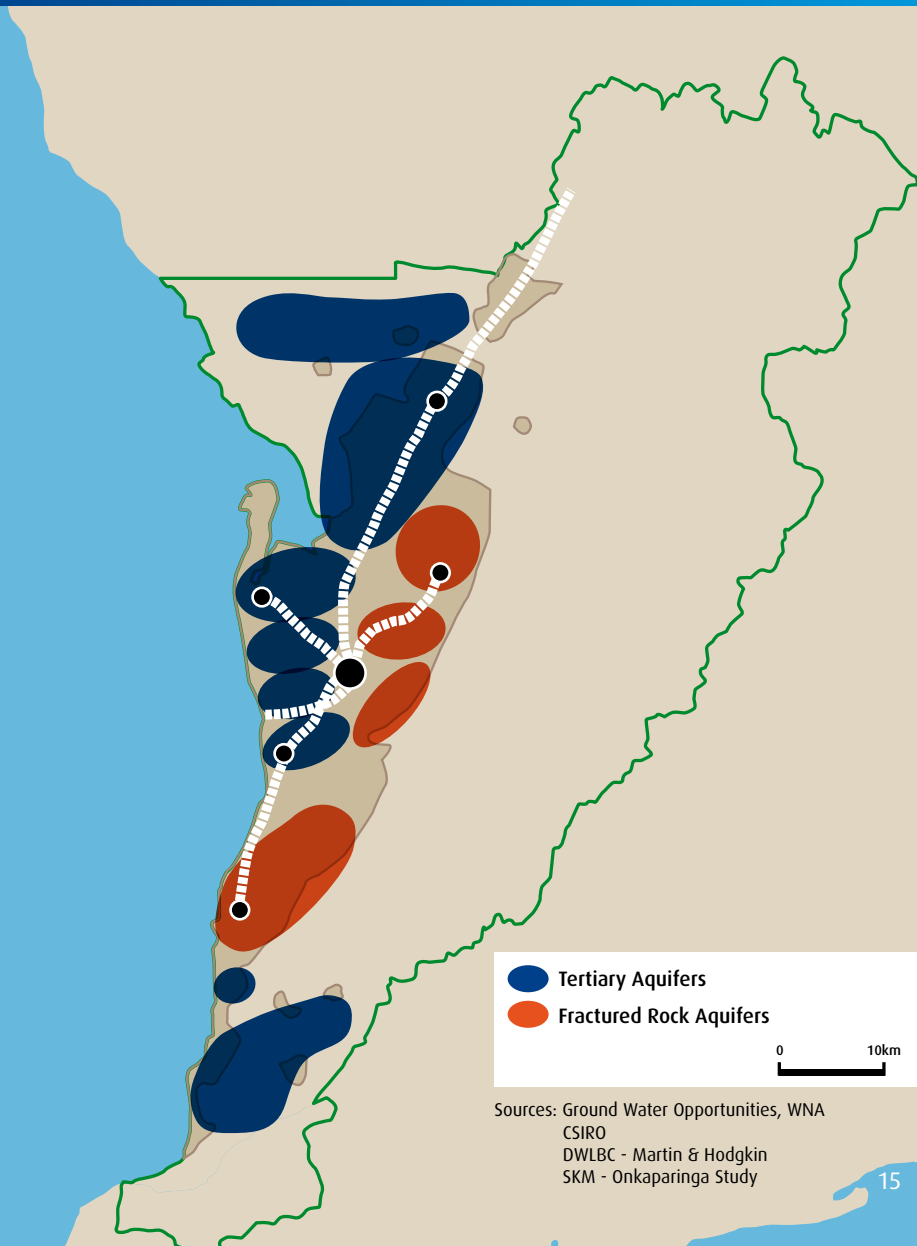
The distribution options for recycled stormwater are outlined below:

- Dedicated pipe, when users are close and their needs fit the supply quality.
- Transfer to SA Water as a drinking water resource, on the basis that stormwater would be naturally cleansed to a quality equivalent to the River Murray and delivered upstream of filtration plants.
- Access to the established reticulation network.



With the support of the broader community the strategy sets out to provide sufficient water to meet Adelaide’s needs well beyond 2025 and enable the community to face even major droughts without extensive imposition on the use of water for public irrigation, home gardening and other external purposes.

Aquifer Storage Opportunities



Sources: Ground Water Opportunities, WNA
CSIRO
DWLBC - Martin & Hodgkin
SKM - Onkaparinga Study



The Prospect

Completion of a bold, ambitious and visionary plan through Commonwealth, State and Local Government cooperation resulting in Australia's first truly integrated water management plan.

The reality is that enough rain falls over Adelaide even in a drought year to sustain the thirst of a modern city with a population forecast to reach 1.5 million by 2026.

Even with the real threat of a 30% decline in precipitation, as a result of climate change, nobody has yet suggested that it will stop raining. What is unknown is the exact extent to which rainfall may decline.

The challenge is to harvest every drop of stormwater run-off so that it is available for multiple uses.

The Benefits

Benefits will include:

- 106Gl per annum of harvested stormwater for metropolitan Adelaide by 2026;*
- 50Gl per annum sourced from re-use of waste water for non-potable use;*
- 80% reduction in stormwater discharge to the sensitive marine environment;*
- 200Gl target for reserves held in aquifers across Adelaide at the start of summer;*
- reduced reliance on the River Murray;*
- the preservation of city parklands and a cool green city.*

The solution is to turn our attention away from the River Murray to the local water resources of the Adelaide Hills and plains.

To support its growing population, Adelaide will need 230Gl of urban water annually and about 125Gl of rural irrigation water for near metropolitan use by 2026. A total of 350Gl will be acquired.

Recycled stormwater and re-use of waste water can deliver 40% of this requirement with no further reliance on the River Murray.

106 Gl PER ANNUM OF
HARVESTED STORMWATER ACROSS
ADELAIDE BY **2026**

Results

A sustainable source of water for Adelaide without dependence on the River Murray and with less reliance on Adelaide Hills reservoirs.

WaterWise Adelaide will create the following results:

- substitution of recycled water for Murray and Mt Lofty ranges water for many non-potable applications (156Gl);
- establishment of low loss storage in aquifers (200Gl) to drought proof Adelaide;
- greater protection of urban areas from flooding;
- improved water quality and riverine environments for all major waterways in metropolitan Adelaide;
- reduced ocean outfall, volume and contaminants, conserving the environmental values of Adelaide's coastal waters;
- insurance that the economy of Adelaide and hence of many associated regions, is buffered against reduced water availability;
- water saved in aquifers with reduced energy inputs, contributing to reductions in greenhouse gas emissions;
- opportunity to "cocktail" treated waste water with recycled stormwater in schemes similar to Mawson Lakes;
- preservation of city parklands and significant trees through greater use of stormwater irrigation;
- cool green city.





The Next Step

*What is needed is the development of a detailed implementation plan covering all of Adelaide through the formation of the **WaterWise Adelaide Implementation Board**.*

The plan that is presented does not claim to resolve all the technical, financial management and integration issues. This will require the creation of the appropriate Government policies, management structures and more detailed planning for each catchment and waste water treatment plant.

This could be accelerated by the formation of a formal body to oversee the further development of the **WaterWise Adelaide** Plan, as an integral strategy of the new Water Security Plan for Adelaide.

The authors and all those who have contributed are committed to moving forward to demonstrate that **WaterWise Adelaide** will deliver secure, safe, cost effective water supplies for all of Adelaide's non-potable needs and in addition, supplement drinking water requirements for a rapidly growing city.

Conclusions – Security for Adelaide

Like Colonel Light, the WaterWise plan sets out a vision. The vision is about planning today for the changes we need to make over the next 20 years and beyond, to ensure healthy and reliable water resources are available to future generations.

WaterWise Adelaide advances the plans of the Water Security Council and the Water for the Future Commonwealth Plan.

- Making a significant contribution to sustainable and efficient management of precious water resources, by converting a waste stream comparable to one third of Adelaide's total water needs, into a sustainable resource.
- Producing significant public benefits, by providing cost effective water for broad unrestricted community use, enhancing the urban amenities and contributing to waterway biodiversity.
- Improving coastal water protection for marine habitats through an extensive reduction in outfalls and discharge of pollutants.
- Reducing energy requirements for water desalination as a buffer to the ongoing running of the plant during severe drought years.
- Showing confidence to the community through cooperation and coordination across all three tiers of Government.

The most important outcome is that Adelaide will no longer be dependent on the River Murray. The water saved can be left to improve environmental flows in the stressed lower river system.

Adelaide, both metropolitan and adjacent rural Councils, can again feel secure in their long-term water needs.

Recommendations

WaterWise Adelaide presents a model of what may be feasible to sustain Adelaide's future water requirements through a combination of greater use of stormwater recycling, re-use of waste water together with the output of potable water from desalination.

On the basis of this model WaterWise Adelaide recommends that the SA Water Security Plan should include the following, to be achieved by 2020:

- set a minimum of 106Gl per annum to be sourced from urban stormwater;
- increase re-use of waste water to a minimum of 50Gl per annum;
- remove reliance on the River Murray as a primary source of Adelaide's water with the aim of achieving nil dependence in average years;
- reduce stormwater and waste water discharge to the Gulf to under 150 Gl per annum;
- adopt open access rules for the water distribution network to allow for stormwater (at a quality comparable to Murray River water) to be included in the reticulation network.

The full submission to the Water Security Council further recommends funding models for consideration and suggests organisational arrangements that give authority to the Stormwater Management Authority, as the lead agency to secure the supply of urban stormwater for Adelaide.



Water Wisdom

WaterWise Adelaide advances the planning of the Water Security Council and the Commonwealth's Water for the Future Plan in the following ways.

- **Water:** 150GI per annum of recycled water without dependence on River Murray.
- **Environment:** improved protection of marine habitats through a reduction in outfalls and discharge of pollutants.
- **Climate Change:** enough water to preserve green city and parklands.
- **Social:** enhanced urban amenities and provision of low cost water.
- **Economic:** accelerated infrastructure projects creating employment.
- **Community:** renewed confidence in maintaining community lifestyles

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The following organisations contributed their expertise and knowledge:

Waterproofing Northern Adelaide Regional Subsidiary
Stormwater Management Authority
Office of Water Security
Local Government Association
Adelaide Mount Lofty Natural Resource Management Boards
Environmental Protection Authority
CSIRO
University of South Australia
University of Adelaide
City of Salisbury
City of Tea Tree Gully
City of Playford
City of Charles Sturt
City of Onkaparinga
City of Marion
City of West Torrens
Adelaide City Council
Water Industry Alliance
Land Management Corporation
Delfin Lend Lease

WaterWise Adelaide drafted by Richard Watson, Principal,
Thinking Strategically



WaterWise Adelaide

