SA Water Drinking Water Quality Report 2010-11

Government of South Australia

SA Water

A Message from our Chief Executive

Flooding across large parts of the Murray-Darling Basin posed significant water quality challenges in 2010-11. After years of drought and low flows, significant floodwaters entered the River Murray, presenting us with challenges in managing the water quality from one of our critical sources of drinking water. In light of this, we pro-actively initiated strategies and operational responses to ensure high drinking water quality was maintained.

Despite these challenges, I am proud to say that we have once again performed well and the quality of drinking water continued to meet and exceed national targets for public health in both metropolitan and country supplies.

This year we transitioned to a new contract to oversee the operations of our metropolitan water and wastewater networks for more than two thirds of our customers. The new alliance contract, with Allwater Joint Venture, is designed to deliver the best value to the community through high standards of customer service, including water quality.

In 2010-11, we have also started a review of our current strategic plan. Our new strategic plan will promote continued high standards in the management of existing and new water sources, in particular the water from our new Adelaide desalination plant and the recycled water from the projects in which we are engaged. The strategic plan will also support SA Water's increasingly significant role in designing and planning water and wastewater services for our future urban environment, particularly as the Government's 30-Year Plan for Greater Adelaide includes growth in outer urban regions.

This report provides details of our commitment to continuous improvement in water quality, compares our water quality performance with previous years and can be used to assess our water quality improvements.

The 2010-11 Drinking Water Quality Report is designed to help you to better understand South Australia's drinking water quality as well as the related operational and research activities undertaken by SA Water. Through increased community awareness of water quality issues and the systematic approach to continuous improvement, we hope to achieve greater confidence in the quality of drinking water provided by SA Water.

I hope you enjoy reading the report and welcome your feedback. Please email customerservice@sawater.com.au or phone us on 1300 650 950.

John Ringham
Chief Executive

SA Health Statement

SA Health and SA Water maintained a strong working relationship throughout 2010-11. A high level of communication and interagency reporting continued throughout the reporting period and both agencies worked collaboratively to achieve safe drinking water supplies in South Australia.

In the 2010-11 reporting period, SA Water collected approximately 45 670 samples for health related compliance from drinking water supplies throughout the state. Samples were analysed for microbiological and chemical parameters and results reported to SA Health in line with agreed reporting protocols. Microbiological quality was assessed in over 2300 samples from customer taps in metropolitan Adelaide and over 8400 samples from country water supplies. Compliance with the Australian Drinking Water Guidelines for *E. coli* was achieved in 99.96% of samples from metropolitan Adelaide and 99.94% of samples from country supplies. Chemical quality was assessed from the analysis of 8300 samples taken from metropolitan supplies and 26 630 samples from country water supplies. For metropolitan systems 99.97% compliance was achieved with the Australian Drinking Water Guidelines health related parameters, with 99.41% of results complying in country areas.

A number of challenges including drought recovery and the wettest spring and third wettest summer on record were experienced during the reporting period. Variable River Murray water quality persisted through the reporting period, including higher than usual levels of organic material. This resulted in an increase in the number of incidents, including difficulties maintaining residuals in systems due to increased chlorine demands and increases in the number of disinfection by-product detections. Higher than usual rainfalls also resulted in increased detections of protozoa particularly through the lower reaches of the River Murray. A number of successful strategies have been put in place by SA Water to address challenges associated with varying source water quality including initiatives to maintain chlorine residuals and reduce disinfection by-product formation. Risk management strategies for *Cryptosporidium* and *Giardia* continue to be implemented by SA Water.

Operation of the interagency *Water/Wastewater Incident Notification and Communication Protocol* was maintained throughout the reporting period. Water quality incidents were notified in a timely manner and appropriate remedial action ensured that protection of public health was maintained at all times. No incidents during this reporting period required public notification.

Economic Regulation

Through *Water for Good*, the South Australian Government communicated its commitment to introducing economic regulation for the water industry in South Australia. In response, the Minister for Water tabled a draft *Water Industry Bill* in November 2010 for public comment.

The *Water Industry Bill* includes provision for independent regulation of water and sewerage pricing by the Essential Services Commission of South Australia (ESCOSA), ensuring the safety and quality of services, ongoing technical regulation and for a report on third party access. When passed, the new legislation will replace the current *Waterworks Act 1932*, *Sewerage Act 1929* and *Water Conservation Act 1936*.

To ensure it is prepared for the introduction of economic regulation, SA Water has commenced evaluating its internal processes to ensure they will be compliant with future regulatory obligations.

New Safe Drinking Water Legislation

The *Safe Drinking Water Act 2011* was passed by State Parliament in May 2011. The Act provides a regulatory framework for drinking water providers in South Australia and will be administered primarily by SA Health with assistance from local government. Provisions in the Act are underpinned by the *Australian Drinking Water Guidelines* (ADWG 2004) and stipulate requirements for drinking water providers, including:

- Registration
- Risk management plans
- Drinking water quality monitoring programs
- Notification of incidents
- Audits/inspections
- Reporting of results and providing consumers with drinking water quality information.

SA Water's approach to managing drinking water quality through our Drinking Water Quality Management System (DWQMS), based on the ADWG *Framework for Management of Drinking Water Quality*, means that we already satisfy most of the requirements outlined in the new Safe Drinking Water legislation prior to implementation. Details of key components are outlined in the Drinking Water Quality Report, which in itself addresses one of the requirements of the Act – the requirement for reporting results and providing consumers with drinking water quality information.

An implementation plan has been developed by SA Health to enable the Act to become operational. Implementation involves the development of regulations and supporting guidance and resources. Consultation will continue with SA Water throughout this process.

Drinking Water Quality Management

SA Water manages drinking water quality from catchment to tap in line with our Drinking Water Quality Management System (DWQMS) to ensure a consistent and reliable supply of high quality safe drinking water to our customers. This management system is based on the *Australian Drinking Water Guidelines Framework for Management of Drinking Water Quality* (ADWG 2004), endorsed by the National Health and Medical Research Council. The framework provides benchmark water quality guidelines and values for the design of a structured and systematic approach to drinking water quality management, ensuring a safe and reliable water supply.

There are 12 elements within the framework which are considered best practice. These elements are divided into four sections as shown in the figure on page 5:

- → Commitment to drinking water quality management
- → System analysis and management
- → Supporting requirements
- → Review.

To regularly assess our progress against implementation of the 12 elements of the ADWG framework, SA Water uses 'Aquality', a measurement and evaluation tool developed by the Water Services Association of Australia as a Key Performance Indicator (KPI). The 2010-11 target of 86% for this KPI was achieved as outlined on page 5.

During 2010-11 we also achieved:

- → Regular audits across our day-to-day operational processes to assess levels of awareness, training and implementation of the DWQMS
- → Internal review of the implementation of the ADWG framework across United Water – SA Water's contractor that managed and operated the metropolitan water supply systems and its interface with SA Water until 30th of June 2011
- → Ongoing commitment to the Water Quality Network Forum established across water utilities in South Australia, Western Australia and the Northern Territory to address water quality issues specific to our geography and state-wide water supply systems in a collaborative manner
- → Continuation of the two year review cycle for our Water Quality Management Plans.

Future strategies:

- → In 2011-12 we will continue to use the 'Aquality' tool to determine strategies to meet our ADWG framework implementation targets. We will continue to roll out the framework across systems managed by our contractors and seek continuous improvement to documentation, processes, procedures and practices across the organisation relating to the management of drinking water supplies.
- → In line with the *Safe Drinking Water Act 2011* SA Water will establish strategies to address and enhance initiatives required to meet regulatory requirements including risk processes, system auditing and reporting.
- → The North South Interconnection System Project (NSISP), part of the South Australian Government's *Water for Good* strategy, will connect the northern and southern metropolitan water supply systems, thus optimising use of our water resources. SA Water will adopt strategies to monitor and control network water quality once the systems are linked.
- → In conjunction with the NSISP Project, the commissioning of the Adelaide Desalination Plant will provide challenges in blending desalinated water with water from other sources. SA Water will introduce operational strategies and monitoring programs to ensure water quality is optimised and prevent any water quality issues.

The 12 elements included in the *Framework for Management of Drinking Water Quality*

1 Commitment to Drinking Water Quality Management

System Analysis and Management

2 Assessment of the drinking water supply system

3 Preventive measures for drinking water quality management

4 Operational procedures and process control

5 Verification of drinking water quality

6 Management of incidents and emergencies

Supporting Requirements

7 Employee awareness and training

8 Community involvement and awareness

9 Research and development

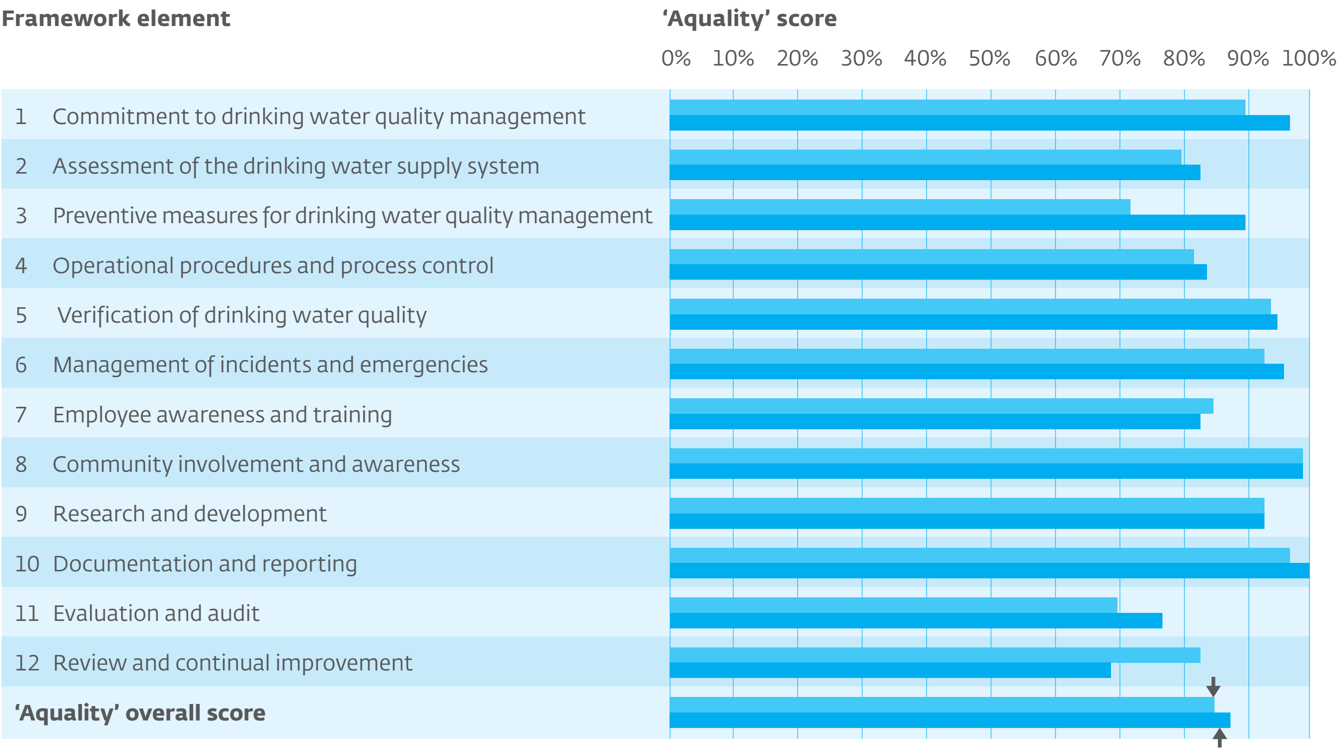
10 Documentation and reporting

Review

11 Evaluation and audit

12 Review and continual improvement

SA Water's progress against implementation of the *Framework for Management of Drinking Water Quality*



'Aquality' score across all elements

	Target	Achieved
2010-11	86%	87.7%
2009-10	85%	85.2%
2008-09	80%	80.6%
2007-08	70%	72.0%
2006-07	65%	67.0%

end of June 2011

end of June 2010

'Aquality' implementation targets

Examples of SA Water's application of the *Framework for Management of Drinking Water Quality*

1	**Commitment to drinking water quality management**	→ Robust Drinking Water Quality policy → Responsibility matrix that defines roles, accountabilities and responsibilities for quality processes → Communication and notification protocols with SA Health → Environmental and Drinking Water Compliance Manual reviewed in consultation with the Crown Solicitor.
2	**Assessment of the drinking water supply system**	→ Water Quality Management Plans (WQMP) documenting key characteristics of the water supply system developed and reviewed every two years → Document review cycle process developed and implemented → Development and improvement of WQMP format → Advanced system analysis tools used to better understand our water supply systems (e.g. hydrological, catchment, reservoir and distribution system water quality models) → Tools developed to identify trends and relationships in water quality data that may indicate potential water quality risks.
3	**Preventive measures for drinking water quality management**	→ Water Quality Improvement Plans (WQIP) developed to identify supply system improvements to assist the planning process for upgrades of water supply systems → Continued development of improved Water Quality Operating Plans (WQOP) including water quality targets, remedial actions and procedures to ensure water supply systems are operated to a high standard. This includes identification of system Critical Control Points.
4	**Operational procedures and process control**	→ Water quality procedures available to support reliable achievement of the target criteria, critical limits and water quality objectives → Additional online instrumentation connected to our Supervisory Control and Data Acquisition System (SCADA) → All materials in contact with drinking water are compliant with Australian Standard 4020.
5	**Verification of drinking water quality**	→ Drinking Water Quality Monitoring Handbook outlines the philosophy for water quality monitoring in SA Water systems and provides guidelines for reviewing monitoring performed against the Australian Drinking Water Guidelines (ADWG) and SA Water philosophy. Following an external review of the handbook in 2009, recommendations were addressed and the handbook updated. → Event-based monitoring in place to improve management and system understanding → Continuation of an Analytical Quality Control Program for field data → National Association of Testing Authorities (NATA) accredited laboratory for analysis of samples → Process to capture customer feedback and reports developed to analyse feedback → Processes in place to flag results which are out of specification.
6	**Management of incidents and emergencies**	→ *Water/Wastewater Incident Notification and Communication Protocol* updated and in place → Emergency Management Manual and Emergency Management Plan for Communication Protocols define criteria for communications with the media → Incident Management System (IMS) to record and generate notification of water quality incidents to a defined list of personnel → Root Cause Analysis conducted for every Priority Type 1 and Type 1 Water Quality Incident Notification → Incident Notification and Emergency Response Training included as part of Water Quality Training Plan → Training sessions provided to incident managers and other staff involved in the management of water quality incidents.

7	**Employee awareness and training**	→ Continuation of roll-out of new integrated Root Cause Analysis training course for key staff → Ongoing training program for water quality awareness, sampling, incident management and disinfection for operators reviewed and delivered to relevant staff → Regular updates provided to staff on progress against objectives and achievements → Regular knowledge sharing seminars conducted.
8	**Community involvement and awareness**	→ Community involvement policy and procedure available on corporate website → Annual Drinking Water Quality Report produced each year includes comparative statistics relating to water quality.
9	**Research and development**	→ Dedicated research and development group to support and promote innovative ideas with potential to improve operational activities, risk mitigation and sustainable growth of our business → Communication of latest technology and research → Regular research and development workshops to evaluate water quality needs for current operations projects → Actively embracing new technologies to improve water quality management (e.g. telemetry-linked water quality monitoring, vertical profiling system for monitoring reservoir water quality, rapid methods for testing blue-green algal by-products) → Annual Research, Development and Innovation Workshop to showcase research and operational outcomes → National and international links and partnerships to ensure optimum water quality solutions.
10	**Documentation and reporting**	→ All information associated with drinking water quality management available to staff online via organisation intranet → Document management system used by the Drinking Water Quality Management System (DWQMS).
11	**Evaluation and audit**	→ Long-term datasets interpreted to help improved water quality management → Waterscope database holds all analytical results for water quality monitoring conducted by SA Water and our contractors and is accessible by staff, our contractors and other authorised parties → Internal audits conducted on our operational based activities as per the review schedule → Audits of the implementation of our DWQMS have been conducted by independent reviewers.
12	**Review and continual improvement**	→ 'Aquality' used to report the progress of implementation of the ADWG framework → Water Quality Improvement Plan (WQIP) developed for each individual water supply system and captured improvement actions → System in place to track progress of actions from audits or agreed improvements → Comprehensive asset management plans maintained to meet short and long term needs → National and international links and partnerships to ensure optimal water quality solutions.

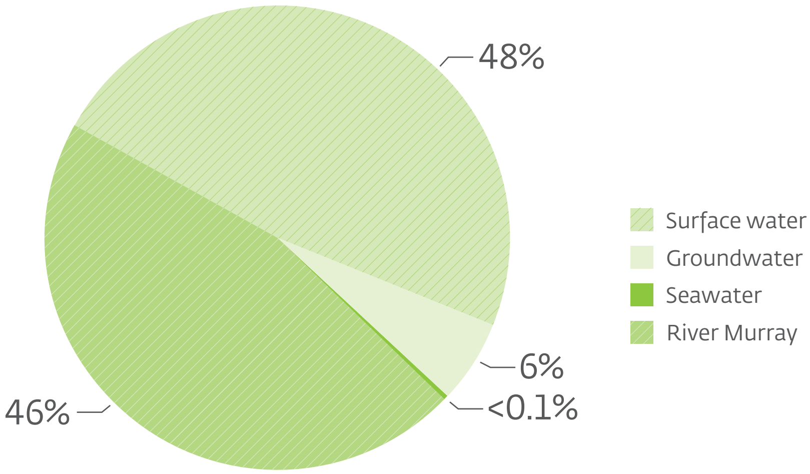
Our Water Supply Systems

Our water supply sources

SA Water has a diverse network of water supply systems extending across South Australia, from metropolitan Adelaide to numerous regional and remote communities. Raw water is collected from a number of sources including rivers, reservoirs, aquifers and the sea.

Surface water	The Adelaide metropolitan area is supplied with water collected in reservoirs from streams within the Mount Lofty Ranges catchment and supplemented with water from the River Murray. Once soils in the catchment are saturated as a result of rainfall, water runs off the land and into streams. The streams flow into reservoirs, where this water, together with any water pumped from the River Murray, is stored and pumped or gravity fed to water treatment plants to be filtered, disinfected and sent into the distribution network. Ten reservoirs with a combined storage volume of almost 200 gigalitres at full capacity and six water treatment plants supply metropolitan Adelaide's water supply systems and beyond. Outside of the metropolitan area, Middle River Reservoir on Kangaroo Island supplies a water treatment plant providing filtered and disinfected water to Kingscote and smaller communities along the transfer pipeline. In 2010-11, 48% of the water supplied by SA Water was provided by surface water.
River Murray	South Australia's water supply is heavily reliant on the River Murray. Of SA Water's drinking water supply systems, 30 source water either directly or indirectly from the River Murray, including 20 water treatment plants in the River Murray region. The River Murray also supplements metropolitan Adelaide's water supplies via the Murray Bridge-Onkaparinga and the Mannum-Adelaide raw water pipelines. The Morgan-Whyalla pipeline is used to transfer treated River Murray water from the Morgan water treatment plant to the Iron Triangle cities, significant areas of the mid-north, the Yorke Peninsula, and as far as the Eyre Peninsula. The percentage of water supplied to Adelaide from the River Murray varies from year to year, with the river providing about 40% of the city's water in an average year. During 2010-11, 46% of water supplied by SA Water was sourced from the River Murray.
Groundwater	Groundwater is contained in underground water bodies known as aquifers. SA Water has 31 drinking water supply systems reliant on groundwater as their primary source of domestic water. Most of these are located in the South East, Eyre Peninsula and northern region of South Australia. The Blue Lake which supplies the city of Mount Gambier is included in this as it is a volcanic crater containing groundwater from local aquifer systems. The quality and volume of water that can be extracted from an aquifer varies from region to region. During 2010-11, 6% of water supplied by SA Water was provided by groundwater.
Seawater	A desalination plant with an output of approximately 300 kilolitres of drinking water per day has been in operation on Kangaroo Island since 1999 supplying the community of Penneshaw. In 2010-11, this accounted for less than 0.1% of South Australia's total water supply.

Water sources (% of total water usage) during 2010-11
(Total water usage: 196 665 ML)



During 2010-11, we continued with improvements to source water quality management strategies, including:

- Extending the strategy of managing cyanobacterial blooms without the need to dose copper sulphate to Little Para Reservoir
- Further enhancements to our state-of-the art, solar powered, water quality profiling system installed in Myponga Reservoir
- Use of water quality probes with data loggers in reservoirs and the River Murray to provide real-time, in-situ data on cyanobacterial numbers and other key water quality parameters as part of field investigations
- 3D modelling of the River Murray to provide water quality forecasting ability during River Murray flow recovery in 2010
- Initiation of an enhanced monitoring program for key water quality parameters at our River Murray off-takes as a response to the River Murray blackwater event
- An aerial survey of the South Australian reaches of the River Murray in early 2011 using high resolution digital imagery to enable a better understanding of the extent of the floodwaters, connectivity of wetlands and potential associated water quality issues.

Water treatment

Raw water entering one of our water treatment plants undergoes an extensive multiple stage treatment process. Conventional water treatment processes are widely used to improve the quality of water in South Australia. However, treatment methods such as Magnetic Ion Exchange (MIEX®), membrane filtration, iron removal plants and ultraviolet disinfection have also been introduced.

Conventional water treatment plants

SA Water's conventional water treatment plants use a seven step process to deliver safe drinking water to our customers.

Step 1: Coagulation – a chemical (coagulant) is added to the untreated raw water and reacts with impurities such as small particles and dissolved organic matter. The coagulant traps the suspended particles and most of the dissolved organic material. This process is also known as 'flash-mixing' – a description of the high mixing energy required where the coagulant is added.

Step 2: Flocculation – the coagulant combined with the captured particles is called 'floc'. Flocculation is a gentle mixing process to bring together the flocs formed in the coagulation step to form larger floc that settles more easily. Water remains in the flocculation tanks for a minimum of approximately 20-30 minutes.

Step 3: Sedimentation – water and suspended floc particles pass through to sedimentation basins where after several hours most of the floc settles to the bottom of the basins and forms a sludge. The water (now containing only a small amount of very fine floc particles) continues on to the filters. The sludge is removed from the basins for further treatment and disposal. Another technique called Dissolved-Air Flotation (DAF) uses the addition of pressurised air causing the floc to float to the surface for removal by overflow or skimming.

Step 4: Filtration – any remaining solids are separated from the water flow by passing them through a filter. The most common filters are deep beds of sand or a sand/anthracite combination. As water passes through the filter bed, any particles remaining from the sedimentation process are trapped, resulting in clear water. More modern filter types include membranes (microfiltration or ultrafiltration).

Step 5: Disinfection – chlorine is generally added at a point between the filters and the filtered water storage tank, to destroy any microorganisms that may not have been removed in the earlier flocculation and filtration stages. The most common types of chemical disinfectant are chlorine compounds – chlorine, chlorine dioxide and chloramines. Chloramination (a combination of chlorine and ammonia) is used by SA Water for disinfection in longer water pipelines such as those in country areas, where it is longer lasting than chlorine alone. Another disinfection method is ultraviolet light (UV).

Step 6: Fluoridation – in major water supply systems, including metropolitan Adelaide's supplies and Mt Gambier, fluoride is added to the treated drinking water to help prevent tooth decay.

Step 7: Storage and distribution – after disinfection, the finished water is transferred to covered water storage tanks ready for distribution to SA Water's customers.

Iron removal plants

Eleven Iron Removal Plants (IRPs) have been constructed in towns mainly in the South East of South Australia. The presence of iron in water does not pose a risk to human health. However, it can lead to brown discolouration and possible staining. The general process to remove dissolved iron from the water includes oxidation of the iron with chlorine so that it forms a precipitate or solid particles which can then be removed through specially designed sand filters. For a listing of the IRPs please refer to the country drinking water supply system sources and treatment table on page 13.

Ultraviolet light disinfection

Exposure to adequate doses of ultraviolet (UV) light renders bacteria, viruses and protozoa non-pathogenic to humans. In the UV disinfection process the water passes through reactors which contain sufficient UV lamps to produce the required UV dose. The clarity, dissolved compounds and different organisms in the water affect the UV dose required in the disinfection process. For a listing of the water treatment plants that employ UV disinfection please refer to the country drinking water supply system sources and treatment table on page 13.

Desalination

A desalination plant at Penneshaw on Kangaroo Island uses conventional reverse osmosis technology to convert seawater into fresh drinking water. Seawater is drawn into the plant through an intake pipe and pre-screened. UV disinfection is used to minimise biological growth and filters remove most of the particulate matter. The filtered seawater is forced under high pressure through reverse osmosis membranes that allow fresh water to pass through, but very little salt. The desalinated water is re-mineralised with carbon dioxide (CO_2) and marble chips to reduce its corrosive properties and improve taste prior to chlorine disinfection and distribution to customers.

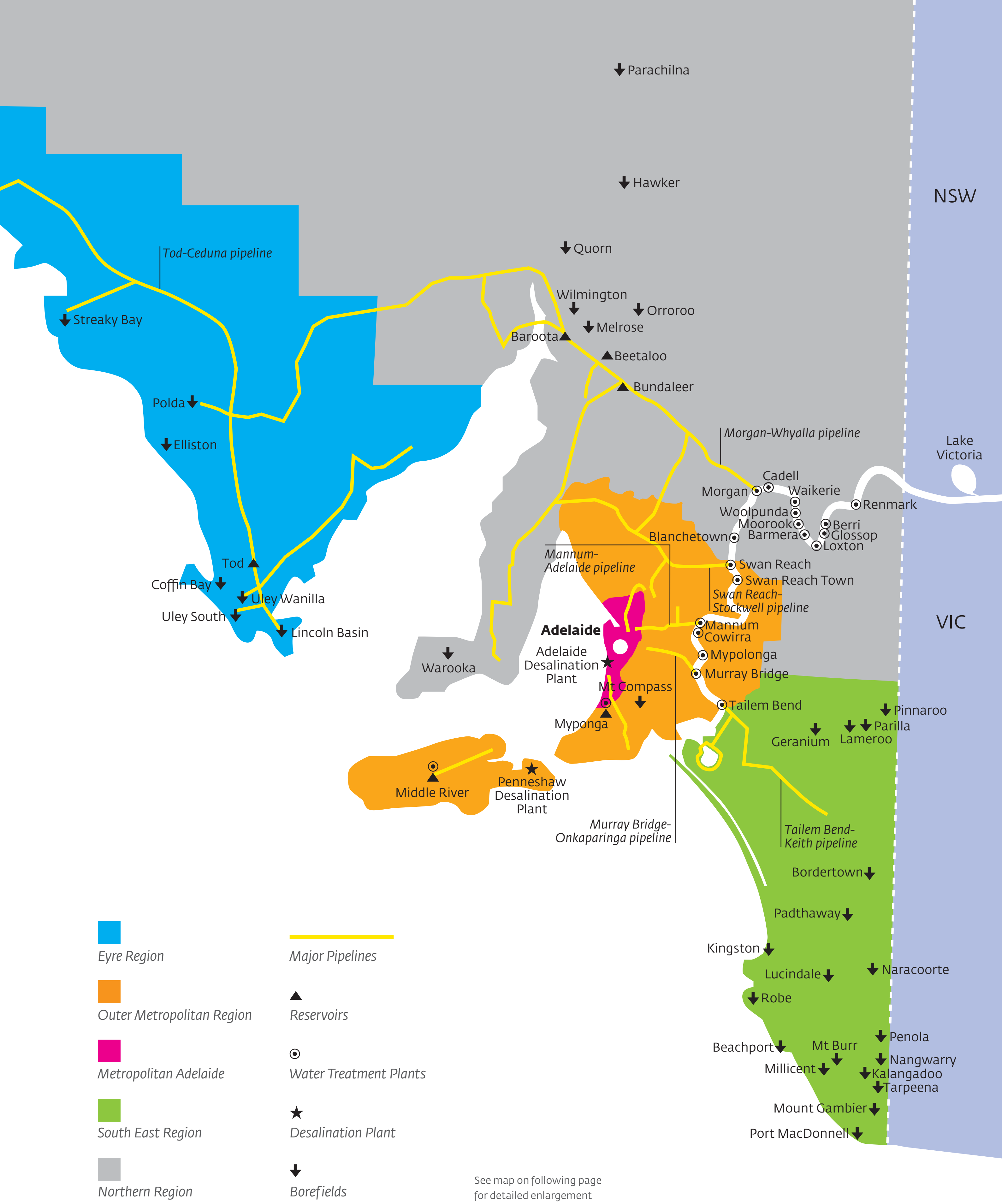
Approximately 40 litres of fresh water are produced from every 100 litres of seawater at the Penneshaw Desalination Plant as a result of an upgraded acid-dosing facility at this plant.

The 100GL $1.83b Adelaide Desalination Plant, south of Adelaide at Port Stanvac will also use reverse osmosis. In October 2011 a major milestone will be the delivery of desalinated water to customers served by the Happy Valley Water Treatment Plant. The project is scheduled for completion by the end of 2012.

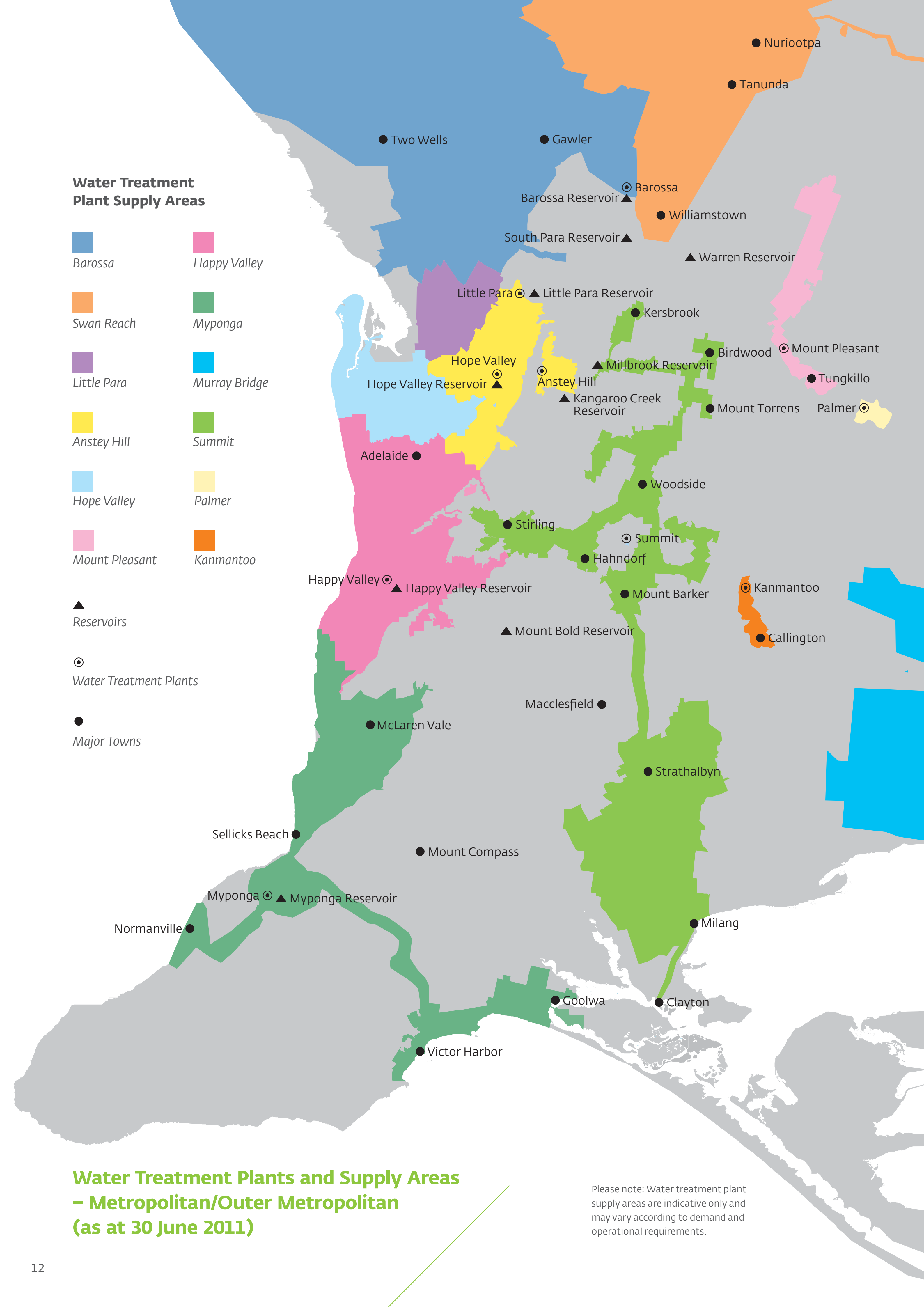
Magnetic Ion Exchange (MIEX®)

MIEX® resin is a reusable ion exchange resin designed to remove dissolved organic carbon (DOC) from water supplies. DOC is found in all natural water sources and is the result of the decomposition of organic material causing colour, taste and odour in drinking water. The orange/brown colour of many surface waters is attributed to DOC compounds. The MIEX® resin works by attracting DOC from the water and attaching it to the resin, which can hold a large amount of DOC. The resin, taking with it the DOC, can then be easily removed from the water due to its magnetic properties. A small portion of the resin is diverted for regeneration to remove the attached DOC and create fresh space on the resin. However most of the resin is recirculated within the treatment process and the process is repeated, removing more DOC. Pre-treatment employing the MIEX® process results in a significant reduction in chemical usage, sludge generation and the amount of chlorine required for effective disinfection and public health protection. MIEX® was developed after years of research and team work by SA Water, Orica Watercare and the Commonwealth Scientific and Industrial Research Organisation (CSIRO) Division of Molecular Science. A number of utilities around the world are currently using this process.

Water Treatment Plants, Bore Fields, Major Pipelines and SA Water Regions – State (as at 30 June 2011)



See map on following page for detailed enlargement



Water Treatment Plants and Supply Areas – Metropolitan/Outer Metropolitan (as at 30 June 2011)

Please note: Water treatment plant supply areas are indicative only and may vary according to demand and operational requirements.

Country drinking water supply system sources and treatment (as at 30 June 2011)

The following table presents a listing of SA Water's country drinking water supply systems, their raw water sources and the type of water treatment/disinfection applied.

Water Supply System	Supply Source	Treatment					Disinfection			Fluoridation
		Conventional Water Treatment Plant	*Iron Removal Plant*	*Desalination Plant*	*Membrane Plant*	*MIEX® Pre-treatment*	Cl_2	NH_2Cl	UV	
Anstey Hill WTP[#]	Res / RM	✓ (UW)					✓			✓
Barmera WTP	RM	✓ (RW)					✓		✓	✓
Barossa WTP[#]	Res / RM	✓ (UW)					✓			✓
Beachport IRP	Bores		✓ (SAW)				✓			
Berri WTP	RM	✓ (RW)					✓		✓	✓
Blanchetown WTP	RM				✓ (UGI)		✓			
Bordertown	Bores						✓			
Cadell WTP	RM				✓ (UGI)		✓			
Coffin Bay	Bores						✓		✓ (backup only)	
Cowirra WTP	RM				✓ (UGI)		✓			
Elliston	Bores						✓			
Eyre South[1]	Bores						✓			
Eyre South / Morgan WTP[2]	Bores / RM	✓ (SAW) (Morgan WTP)					✓ (at Eyre South bores)	✓ (at Morgan WTP)		✓ (at Morgan WTP)
Geranium	Bores						✓			
Glossop WTP	RM				✓ (UGI)		✓			
Happy Valley WTP[#]	Res / RM	✓ (UW)					✓			✓
Hawker IRP	Bores		✓ (SAW)				✓			
Kalangadoo IRP	Bores		✓ (SAW)				✓			
Kanmantoo WTP	RM				✓ (UGI)		✓			
Kingston SE IRP	Bores		✓ (SAW)				✓			
Lameroo IRP	Bores		✓ (SAW)				✓			
Loxton WTP	RM	✓ (RW)						✓	✓	✓
Lucindale IRP	Bores		✓ (SAW)				✓			
Mannum WTP	RM	✓ (RW)					✓		✓	✓
Melrose	Bores						✓			
Middle River WTP	Res	✓ (SAW)				✓	✓		✓	
Millicent	Bores						✓			
Moorook WTP	RM				✓ (UGI)		✓			
Morgan WTP	RM	✓ (SAW)					✓ (Kimba to Lock only)	✓		✓
Morgan/Swan Reach WTP[3]	RM	✓ (Morgan WTP, SAW; Swan Reach WTP, RW)						✓	✓ (at Swan Reach WTP)	✓
Mt Burr	Bores						✓			
Mt Compass	Bores						✓			
Mt Gambier	Blue Lake / Bores						✓			✓ (as of October 2010, Blue Lake source only)

Country drinking water supply system sources and treatment (as at 30 June 2011)

Water Supply System	Supply Source	Treatment: *Conventional Water Treatment Plant*	Treatment: *Iron Removal Plant*	Treatment: *Desalination Plant*	Treatment: *Membrane Plant*	Treatment: *MIEX® Pre-treatment*	Disinfection: *Cl_2*	Disinfection: *NH_2Cl*	Disinfection: *UV*	Fluoridation
Mt Pleasant WTP	RM	✓ (SAW)			✓	✓	✓			✓
Murray Bridge WTP	RM	✓ (RW)					✓		✓	✓
Mypolonga WTP	RM				✓ (UGI)		✓			
Myponga WTP#	Res	✓ (UW)					✓			✓
Nangwarry	Bores						✓			
Naracoorte	Bores						✓			
Orroroo	Bores						✓			
Padthaway	Bores						✓			
Palmer WTP	RM				✓ (UGI)		✓			
Parachilna	Bores						✓ (backup only)		✓	
Parilla IRP	Bores		✓ (SAW)				✓			
Penneshaw WTP	Seawater			✓ (SAW)	✓		✓			
Penola IRP	Bores		✓ (SAW)				✓			
Pinnaroo IRP	Bores		✓ (SAW)				✓			
Port Lincoln[4]	Bores						✓			
Port MacDonnell	Bores							✓		
Quorn	Bores						✓			
Renmark WTP[5]	RM	✓ (RW)					✓		✓	✓
Robe IRP	Bores		✓ (SAW)					✓		
Streaky Bay[6]	Bores / RM	✓ (SAW) (Morgan WTP)					✓ (at Eyre South bores)	✓ (at Morgan WTP)		✓ (at Morgan WTP)
Summit WTP	RM	✓ (RW)						✓	✓	✓
Swan Reach WTP	RM	✓ (RW)						✓	✓	✓
Swan Reach Town WTP	RM				✓ (UGI)		✓			
Tailem Bend WTP	RM	✓ (RW)						✓	✓	✓
Tarpeena IRP	Bores		✓ (SAW)				✓			
Waikerie WTP	RM	✓ (RW)					✓		✓	✓
Warooka	Bores						✓			
Wilmington	Bores						✓			
Woolpunda WTP	RM				✓ (UGI)			✓		

1 Eyre South – supplied by Lincoln Basin, Uley South and Uley Wanilla borefields
2 Eyre South/Morgan WTP – primarily supplied by Lincoln Basin, Uley South and Uley Wanilla borefields and supplemented by Morgan WTP system
3 Morgan/Swan Reach WTP system supplied from either Morgan WTP or Swan Reach WTP
4 Port Lincoln system supplied by Lincoln Basin, Uley Wanilla and Uley South borefields
5 Renmark WTP – includes supply to Cooltong
6 Streaky Bay – Robinson Basin bores off-line, system currently supplied by Eyre South/ Morgan WTP system

Cl_2	Chlorine
IRP	Iron Removal Plant
MIEX®	Magnetic Ion Exchange
NH_2Cl	Chloramine
Res	Reservoir
RM	River Murray
RW	Operated by Riverland Water
SAW	Operated by SA Water
UGI	Operated by United Group Infrastructure
UV	Ultraviolet
UW	Operated by United Water (until 30 June 2011)
WTP	Water Treatment Plant
#	Supplies both country and metropolitan systems

Metropolitan Adelaide water treatment plant sources (as at 30 June 2011)

The following tables present a listing of metropolitan Adelaide's water supply systems, their raw water sources and type of treatment/disinfection applied:

Water Supply System	Treatment	Disinfection	Fluoridation
	Conventional water treatment plant	*Cl_2*	
Anstey Hill WTP	✓ (UW)	✓	✓
Barossa WTP	✓ (UW)	✓	✓
Happy Valley WTP	✓ (UW)	✓	✓
Hope Valley WTP	✓ (UW)	✓	✓
Little Para WTP	✓ (UW)	✓	✓
Myponga WTP	✓ (UW)	✓	✓

Cl_2 Chlorine   UW Operated by United Water (until 30 June 2011)   WTP Water Treatment Plant

Water Treatment Plant	Supply Source										
	River Murray	*Barossa Reservoir*	*Happy Valley Reservoir*	*Hope Valley Reservoir*	*Little Para Reservoir*	*Myponga Reservoir*	*Kangaroo Creek Reservoir*	*Millbrook Reservoir*	*Mt Bold Reservoir*	*South Para Reservoir*	*Warren Reservoir*
Anstey Hill	●✲							●✲			
Barossa	○	●								○	○
Happy Valley	○		●						○		
Hope Valley	○			●			○	○			
Little Para	○				●			○			
Myponga						●					

● direct supply (connected to a water treatment plant)

○ indirect supply (serves as a source/storage feeding into a direct supply reservoir)

✲ depending on operational configuration

Managing our water supplies

We use our Drinking Water Quality Management System to manage South Australia's drinking water supply systems and to deliver safe drinking water to our customers. A key principle of this approach is having barriers and preventive measures in place to ensure hazards are reduced from the catchment to the customer's tap. The focus of this approach is on the prevention and minimisation of hazards at the earliest point in the water quality management process and not relying solely on downstream controls.

Hazards in the water can take many forms and are generally categorised into three types – biological, physical or chemical.

Examples of typical hazards found in South Australia for each of these categories include:

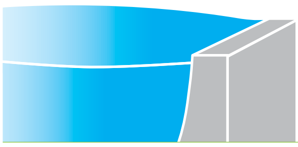
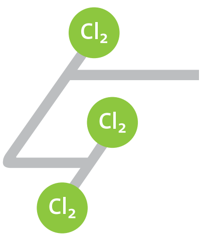
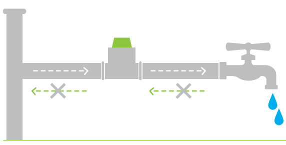
→ biological – algal metabolites (by-products), pathogens (e.g. *Cryptosporidium*, *Giardia*, Coliforms, *E. coli*)

→ physical – sediments (turbidity), colour

→ chemical – pesticides, hydrocarbons, iron, manganese.

For each of our water supply systems we have identified potential hazards and evaluated appropriate preventive measures. Improvements identified during this process are incorporated into Water Quality Improvement Plans.

The following table shows the barriers, preventive measures and management objectives from catchment to tap.

Barrier	Water quality management objective	Possible hazard(s)	Example of work to prevent/minimise hazard(s)
1. Catchment 	Minimise introduction of hazards into source water	→ Pathogens → Pesticides → Hydrocarbons → Iron and manganese → Sediments → Nutrients → Dissolved organic carbon	→ Works designed to mitigate pollutant influx into reservoirs from specific catchment streams. → Improved knowledge of bore aquifers. → Casing integrity of aging bores assessed and replacement bores drilled.
2. Reservoir 	Minimise introduction of hazards and remove some hazards	→ Pathogens → Pesticides → Hydrocarbons → Iron and manganese → Algal by-products including taste and odour compounds	→ Increased understanding of algal blooms in specific reservoirs. → Operation of thermistor chains and aerators. → Installation of a water quality profiling system in Myponga Reservoir.
3. Treatment 	Remove most hazards	→ Iron and manganese → Chemicals → Algal by-products including taste and odour compounds → Pathogens	→ More stringent process targets to improve hazard removal.
4. Disinfection 	Neutralise microbiological hazards and algal by-products	→ Algal by-products → Pathogens	→ Auto shutdown of bores in response to disinfection failure. → Capital works project to improve disinfection of water supplies.
5. Chlorine Residual Maintenance* 	Manage microbiological hazards throughout systems	→ Pathogens	→ Water supply system operation changes, e.g. alteration of tank levels and taking tanks offline to reduce water age in the distribution systems, leading to improved maintenance of disinfection residual.
6. Closed system* 	Prevent introduction of hazards	→ Pathogens → Chemicals	→ Replacement of old infrastructure and improved procedures to maintain integrity of closed systems, including improved/new training in water quality procedures.
7. Backflow prevention* 	Prevent introduction of hazards	→ Pathogens → Chemicals	→ Installation of backflow prevention devices on water conservation tanks.

* Barriers collectively known as distribution system

We have implemented a continuous review program for the identification, evaluation and planning of preventive measures based on water supply system-specific hazard identification and risk assessment. Additionally we are also developing an improved risk assessment process that will be integrated with other areas of SA Water.

Backflow prevention

Backflow refers to the undesirable reversal of flow within water supply pipes. If backflow occurs, contaminated water can be drawn back into the supply. Under some circumstances (back-pressure or back-siphonage) gases, water or other liquids or chemicals can flow back into the supply system. A measure of control within a consumer's premises is essential to maintain a safe potable drinking water supply. SA Water has a statutory responsibility to prevent backflow.

Our ongoing commitment to backflow prevention during 2010-11 included:

- All new 20mm water services laid included a meter with an inbuilt dual check device to prevent backflow into mains water
- A dual check valve outlet riser or a new type of water meter with a dual check was installed on any property where a possibility of a cross connection existed e.g. rain water tanks/systems
- Applications for new or enlarged (above 20mm) metered or non-metered services included specific instruction that a suitable backflow prevention device is required to meet the level of hazard posed by the site activity
- An audit regime to identify potential hazardous situations as changes in technology and water use practices occur was initiated
- A database for recording the installation of high and medium hazard backflow prevention devices was maintained.

Water Quality 2010-11

2010-11 presented us with extremely challenging water quality in the River Murray, requiring a substantial monitoring and operational response. After the years of prolonged drought and low flows, we were faced with significant floodwaters entering the River Murray, one of the critical sources of drinking water supplies for Adelaide and numerous regional communities.

SA Water introduced enhanced water quality monitoring initiatives to track the progress of the floodwaters and potential effects on water quality. These initiatives involved an improved routine monitoring program for key water quality parameters at our water supply offtakes, as well as immediate on-the-ground water quality assessments and tracking by our River Murray Field Response Team, providing an early warning of potential water quality challenges. This allowed the timely implementation of appropriate operational responses to address any impending water quality issues and to continue supply of high quality, safe drinking water.

A significant change in source water quality was delivered by a blackwater event that persisted from late December 2010 until late May 2011 through much the southern Murray-Darling Basin, including the South Australian reaches of the River Murray. The blackwater was characterised by very low dissolved oxygen, elevated dissolved organic carbon and high colour. In particular, the elevated levels of dissolved organic carbon associated with this event presented challenges from an operational perspective for some systems sourcing raw water from the river. Throughout this period, SA Water proactively monitored the progress of the blackwater and associated changes in water quality from a drinking water quality perspective. This provided us with the ability to "forecast" the rapid changes in key water quality parameters – important information for the operational management of our River Murray water supply offtakes and water treatment plants.

The following sections provide an outline of SA Water's key strategies and new initiatives relating to water quality and their progress during 2010-11.

Source water and catchments

Catchment management

The first barrier for source water quality protection is the drinking water supply catchment. Hence, SA Water encourages the adoption of best practice land management techniques to protect our source water quality. Most SA Water catchment areas are privately owned, intensively developed and co-managed by other agencies. For this reason we work closely with other government departments to achieve mutual water quality outcomes and to ensure we effectively and efficiently achieve our obligations under the ADWG. During 2010-11, we worked collaboratively with other government agencies and applied world best practice techniques where possible.

Highlights of the 2010-11 catchment management efforts are listed in the following table:

Catchment barrier status	As part of SA Water's Drinking Water Quality Management System (DWQMS), pollutant risks originating from the first barrier for water quality, the drinking water supply catchments are assessed using a combination of field investigations and semi-quantitative and quantitative risk analysis methods. In 2010-11, the 'catchment barrier status' has been assessed for key catchments in the Mount Lofty Ranges watershed. This effort has assisted SA Water to effectively communicate water quality risk areas from a drinking water supply perspective to internal and external stakeholders. In particular, this information has been an important contribution to the development of the EPA's Water Quality Improvement Program for the watershed.
***Cryptosporidium* risk in our drinking water supply catchments**	In 2010-11, SA Water continued to investigate risks of *Cryptosporidium* occurrences in catchments. The investigations showed that fencing and juvenile stock removal measures can provide significant *Cryptosporidium* reductions. SA Water will continue to work with other catchment managers in the State to implement targeted programs to effectively mitigate pathogens in the catchments.
Interagency incident response protocol	Water quality incidents in the catchments require multi-agency collaboration and a clear communication and response strategy to avoid impacts to various stakeholders in the catchments. SA Water has worked closely with the Environment Protection Authority (EPA) to progress the development of a pragmatic response protocol for the Mount Lofty Ranges watershed.
Waste control project	Over the past ten years, SA Water has been a major contributor to the implementation of the 'Waste Control Project', a septic tank auditing and upgrade services program with the goal to reduce pathogen risk in the Mount Lofty Ranges watershed. A ten year review of the project was commissioned in 2011. The review provided an indirect measure of success of the project and recommended to roll the project into an ongoing long term program.
Monitoring and assessment of impacts of acidified sediments (Acid Sulphate Soils) near raw water offtakes	Early winter rains in 2011 resulted in the initiative to re-wet the drought-stricken floodplain wetlands by the South Australian Murray Darling Basin Natural Resources Management Board (NRM Board). SA Water successfully collaborated with the NRM Board and used its hydrodynamic and water quality model for the River Murray – Estuary, Lake and Coastal Ocean Model / Computational Aquatic Ecosystem Dynamics Model (ELCOM/CAEDYM) – to forecast any potential water quality impacts that could arise from the wetland rewetting program. Of particular interest was to find out whether acidified wetland soils would contribute significant pollutant loads to SA Water's drinking water supply offtakes. A combination of real-time monitoring and modelling allowed the well-managed rewetting program to continue without any impacts on SA Water offtakes. SA Water continues to work with an interagency team to proactively assess the effects of the River Murray's flow recovery.
Cox Creek mitigation	Cox Creek nutrient mitigation works have been in operation for four years. The current monitoring program aims to evaluate the effectiveness of the sedimentation pond and wetland system in removing nutrients (especially phosphorus) from Cox Creek in order to ultimately reduce the nutrient loading at Happy Valley Reservoir. Monitoring consists of four composite sampler stations which measure nutrient loads as a function of concentration and flow at the inlet and outlet structures of the system. The monitoring and evaluation program has provided scientific evidence that the original maintenance cycle for the system (primarily in the form of dredging of sediments) of 2-3 years was adequate.
Mount Lofty Ranges Watershed – Water Quality Improvement Program	In 2010-11, the EPA continued a process of involving relevant stakeholders in developing environmental values for the Adelaide and Mount Lofty Ranges NRM region and a water quality improvement program for the Mount Lofty Ranges watershed. SA Water is collaborating with the EPA, local government, community and other agencies by providing input into the risk assessment and mitigation program.

eWater CRC	SA Water remains an active contributing member of the eWater CRC. The CRC has been in operation for over five years. In collaboration with the South Australian Research and Development Institute (SARDI), Department for Water (DFW), EPA and the Adelaide and Mount Lofty Ranges NRM Board, specific SA Water efforts have included the review and evaluation of water quality data from composite samplers for the 'SourceCatchment' model, contribution to refining a model for the Onkaparinga catchment and climate change considerations.
Bushfires and prescribed burns on SA Water land	During 2010-11, SA Water developed a refined water quality risk assessment approach for prescribed burns on SA Water owned land.
Catchments as (business) assets	During 2010-11, SA Water was one of two Australian participants in an international effort to road test a Corporate Ecosystem Valuation (CEV) guideline promoted by the World Business Council for Sustainable Development (WBCSD). Under the guidance of GHD, we actively participated in the Ecosystem Valuation Initiative (EVI) that used two case studies (Cox Creek and Myponga) to develop valuation frameworks for use by water businesses in incorporating ecosystem valuation into business planning and accounting systems and decision making. The guide has now been finalised and can be obtained from the World Business Council website.

In addition to the above key initiatives we continue to support activities of the State's Natural Resources Management (NRM) Boards through financial support and, where required, in-kind support. Financial support is provided through *ex gratia* payments or through a levy based on SA Water's water allocation.

Reservoirs and River Murray

During 2010-11, SA Water continued with improvements to water quality management strategies for our reservoirs and the River Murray and we worked collaboratively with South Australian and interstate government agencies. A key focus was on flood-related water quality management and new initiatives and strategies specifically in response to significant changes in River Murray water quality due to the blackwater event in the first half of 2011.

Key initiatives launched or enhanced in 2010-11 are summarised in the following table:

Control of algae in reservoirs	SA Water is leading a large international project to evaluate a range of alternative and innovative techniques for the control of algae (including blue-green algae) that have potential for application in drinking water reservoirs. This is an international project with partners in Australia, the USA and Taiwan and is supported by Water Quality Research Australia and the Water Research Foundation (USA). The study is considering a range of commercial products and techniques that are available in the USA and Australia and have differing degrees of acceptance and testing within the water industry. These have been tested in either laboratory experiments and/or small-scale field trials. The range of alternative methods and options investigated include alternative algaecides, sediment capping agents, surface mixers, ultrasound devices and a hybrid ultrasound/ozone algal control system. The experimental design for each evaluation enables the study to address the criteria of cost, effectiveness, feasibility, and environmental friendliness. The project has so far tested some new chemical treatments that will be further evaluated in larger scale field trials in real reservoir situations in 2011-12.
Testing for algal metabolites	Some blue-green algae produce metabolites (by-products) that, when present in high concentrations, can present a severe health concern unless appropriate treatment is carried out. Under accelerated algal growth situations there is a need for rapid testing to determine any potential health risks. SA Water's Australian Water Quality Centre (AWQC) has made significant advancements in the testing of algal metabolites during 2010-11: → Development of a new test method for simultaneously determining a total of 11 algal toxins within the following four groups: microcystins, nodularins, cylindrospermopsins and anatoxins. It is the most reliable, accurate and fastest method of its kind so far. → A new method for simultaneously determining 13 saxitoxins was developed, and is now the fastest and most reliable method for monitoring blue-green algal blooms in rivers and reservoirs. This method also provides details of the toxin profile and earlier toxicity during algal blooms. → A new, more sensitive, field assay for saxitoxins was assessed.

River Murray floodwaters and the "blackwater" event	One of the effects of the prolonged drought was a significant build up of leaf litter and other organic material in dry wetlands, lagoons and floodplain forests located throughout the Murray Darling Basin. With the advent of floodwaters as a result of significant rainfall events during late 2010/early 2011, the vast floodplains throughout the Basin were inundated for the first time in years, leading to inputs of large amounts of organic matter into the river system. The breakdown of this organic matter through microbial activity resulted in water with substantially reduced dissolved oxygen (DO) levels and a distinctive dark colour (produced by tannins leaching out of the organic matter) – characteristics of "blackwater". This had a significant effect on source water quality in the river, with the large amount of organic matter resulting in increased dissolved organic carbon (DOC) levels. In order to enable timely operational responses to these source water quality challenges, SA Water was proactive in initiating and participating in a number of strategies: → Commencement of an enhanced water quality monitoring program at SA Water River Murray offtakes, including weekly monitoring at 17 locations for DO and 20 locations for DOC, and providing timely updates of results to both internal and external stakeholders. → SA Water's River Murray Field Response Team played a key role during the blackwater event. This included collecting field data and water samples in the River Murray and Darling River as far upstream as Wentworth (NSW) for laboratory testing to determine the water quality that our water treatment plants were likely to encounter. → SA Water was a key stakeholder in the "Blackwater Monitoring Group" convened by the Murray Darling Basin Authority. For the duration of the blackwater event this weekly teleconference provided a forum for government agencies from South Australia, NSW and Victoria to share water quality data and discuss the potential water quality impacts as the blackwater front moved downstream.
Algal bloom and water quality modelling	During 2010-11, we continued to apply and enhance our model for the Lower River Murray to predict water quality, including the growth of blue-green algae. During the period of elevated flows this model was used to forecast any potential water quality impacts on SA Water's drinking water supply offtakes from rewetting of wetlands and irrigation areas in the lower River Murray.
Aerial survey of the River Murray	An aerial survey of the South Australian reaches of the River Murray using high resolution digital photography was commissioned in early 2011. The images provided us with a better understanding of the extent of the floodwaters, in particular the connectivity of previously dry wetlands and lagoons with the main river channel. This allowed us to identify and investigate potential water quality issues emanating from these re-flooded wetlands. This information has also been used by other government agencies.
Water quality profiling system	To provide us with improved real-time, web-based access to water quality data, a state-of-the-art water quality profiling system is installed in Myponga Reservoir. This self-contained system provides us with real time water quality data, including turbidity, pH, conductivity, temperature, dissolved oxygen, chlorophyll and blue-green algal biomass. During 2010-11, we continued to enhance and fine-tune this system, including commencement of development of an improved web-based interface.

Key strategies and initiatives maintained in 2010-11 are summarised in the following table:

Flow meters at reservoir inlets	The installation of telemetry-linked flow meters at key reservoir inlet locations continued during 2010-11. This initiative included the upgrading of existing flow gauging stations and the installation of ultrasonic type flow meters at new locations to better manage the risks of catchment-derived pollutants from entering our reservoirs.
Early warning of harmful algal blooms in drinking water reservoirs	SA Water is an industry partner in a University of Adelaide Australian Research Council (ARC) Linkage Project entitled *Early Warning of Algal Blooms in Drinking Water Reservoirs by Means of Evolutionary Algorithms*. This project commenced in late 2009 with the aim to develop a novel early warning system for blue-green algal blooms in reservoirs. By using sophisticated sensor technology and time-series modelling the project will provide us with an improved understanding of ecological processes determining the growth of blue-green algae in reservoirs under different climate and environmental conditions. The project is showing some significant insights into the factors that control algal blooms and has developed several new practical models that will assist with predicting water quality issues associated with blue-green algal growth.
Contingency plans for removal of algae in water treatment plants	Contingency plans to maximise the removal of algae in our water treatment plants are in place. Under these plans process changes will be implemented at plants seriously challenged to provide enhanced treatment performance and water safety.
Blue-green algal management in reservoirs	We continued with the management of blue-green algal blooms in Myponga Reservoir without the need to apply copper sulphate. For the first time this strategy was also initiated in Little Para Reservoir. This was achieved through an alternative management strategy including *in-situ* field measurements of key water quality parameters, optimised management of the multiple offtake and enhanced water treatment plant processes, including the application of Powdered Activated Carbon (PAC) to remove blue-green algal derived taste and odour compounds.
Water quality probes	For the last four years we have used state-of-the-art water quality probes in our reservoirs and the River Murray to provide real-time *in-situ* data on key water quality parameters such as blue-green algal biomass, chlorophyll, turbidity, dissolved oxygen, pH, temperature and conductivity. These units have proven to be an important tool to provide information on the possible onset of blue-green algal blooms, track the progress of any blooms and provide an early indication of water quality issues in general, including during the blackwater event.
River Murray Field Response Team	The River Murray Field Response Team was first implemented by SA Water in September 2007 as a response to the drought. This specialist on-call field team has the expertise to identify and investigate potential water quality issues and provide immediate on-ground assessments of areas of elevated water quality risks along the South Australian reaches of the River Murray. This strategy ensures an early detection of any emerging water quality issues (e.g. blue-green algal blooms) so that appropriate management and operational actions can be implemented. The field team is equipped with in-field microscopy capability and water quality monitoring probes fitted with sensors to provide real-time data on key water quality parameters such as blue-green algae, conductivity and turbidity. Rapid test kits for detecting compounds found in the blue-green algae *Microcystis* (microcystins) and *Anabaena* (saxitoxins) are also being used by the field team.

Groundwater systems

During 2010-11, we continued with a program to secure the volume and quality of groundwater available for town water supplies.

Key initiatives are summarised in the following table:

Groundwater Risk Assessment Methodology	A Groundwater Risk Assessment Methodology was adopted based on a ranking system of consequence of hazard – likelihood of release – exposure pathway to receptor (groundwater vulnerability). This ranking system reflects relative contributions to the risk associated with a site. Using this approach, the importance of geological strata is considered as a barrier when protecting groundwater quality. Another important barrier considered is the type and design of well construction and its integrity. Annual reviews of risk assessments have been completed for the Mallee and South East, while the review of the Northern Region's borefields reached 90% completion. This information has been added to the Water Quality Management Plan reports in the DWQMS.
Bore assessment and replacement	The casing integrity assessment program for aging bores continued during 2010-11. Replacement bores were drilled for Penola, Millicent, and Bordertown, while new bores were designed for Mount Burr, Kalangadoo, Lucindale, Naracoorte, Kingston and Nangwarry.
Study and monitoring of groundwater sources and resource assessment	Studies undertaken during 2010-11 included: → Recharge estimation for Southern Eyre Peninsula groundwater basins using a variety of methodologies → Hydrogeological assessments of the Lincoln Basin → Assessment of coastal salinity in the Uley South basin to track the seawater/freshwater interface → Identification of the western Uley South basin as a potential area for further wellfield development and completion of magnetic resonance sounding to determine saturated thickness and porosity of the aquifer → A new wellfield for supplying low salinity groundwater to Kingston SE town was identified, and an investigation/production bore was drilled to the Dilwyn formation confined aquifer → Supply of low salinity groundwater to Naracoorte township using a wellfield located in the Bool Lagoon area: water quality testing of the targeted area confirmed that the Dilwyn formation confined aquifer contains water of similar quality to the Penola confined aquifer bores, indicating a high potential for wellfield development → Completion of the identification of stratigraphic units of the unconfined aquifer in the Blue Lake capture zone.

Water treatment and distribution

Improving water quality performance in regional South Australia

In 2010-11, we completed a number of projects to improve the quality of water delivered to our customers across the State.

These included:

Woolpunda water supply	Modifications of the pipework in the Woolpunda system to decrease water age in the system and improve water quality
Mount Pleasant water treatment plant	Upgrade of the treated water storage
Millicent water supply upgrade	Changes in system augmentation at Millicent and upgrades to the chlorination system as part of the Country Water Quality Improvement Program
Replacement bores	Replacement bores were drilled for Bordertown, Geranium, Melrose, Hawker and Parachilna
Kimba and Moseley main replacement	Relay of 6km of main between Kimba and Moseley to replace old pipe that was the cause of aesthetically poor water quality supplying services from that main
Fluoridation of the Mount Gambier water supply	Fluoridation of the Mt Gambier water supply commenced in October 2010 in line with Australian Drinking Water Guidelines

Water quality monitoring and testing

SA Water performs extensive water quality monitoring across metropolitan and country South Australia, from catchment to tap, including field and laboratory tests. Samples are collected by trained field staff to ensure samples are taken correctly and field results have a high degree of integrity. Laboratory analyses are carried out by the Australian Water Quality Centre (AWQC) in accordance with ISO 9001 Quality Systems and the requirements of the National Association of Testing Authorities (NATA).

The following table summarises monitoring and testing activities in our drinking water supply systems during 2010-11:

Number of samples – metropolitan and country (2010-11):

	Metropolitan	Country
Drinking water supply systems	6	62
Customer taps	197	333
Total sample taps	351	959
Total number of routine samples*	14 071	82 445
Total number of routine tests	**34 640**	**231 488**

* Includes distribution networks and water treatment plants

Drinking water quality and performance

Despite the challenges posed by the water quality in the River Murray as a result of the floodwaters and the blackwater event, SA Water consistently provided high quality drinking water to our customers. The following tables provide a summary of our performance for health and aesthetic related parameters of routine samples at customer taps during 2010-11:

Metropolitan and country drinking water supply systems health related performance (2010-11)

Health related parameters	Metropolitan systems	Country systems
% Samples free from *E. coli*	99.96% (2324)	99.94% (8425)
% Samples compliant with ADWG Health Parameters *	99.97% (10 624) 2010-11 target: 99.9%	99.41% (35 055) 2010-11 target: 99.8%

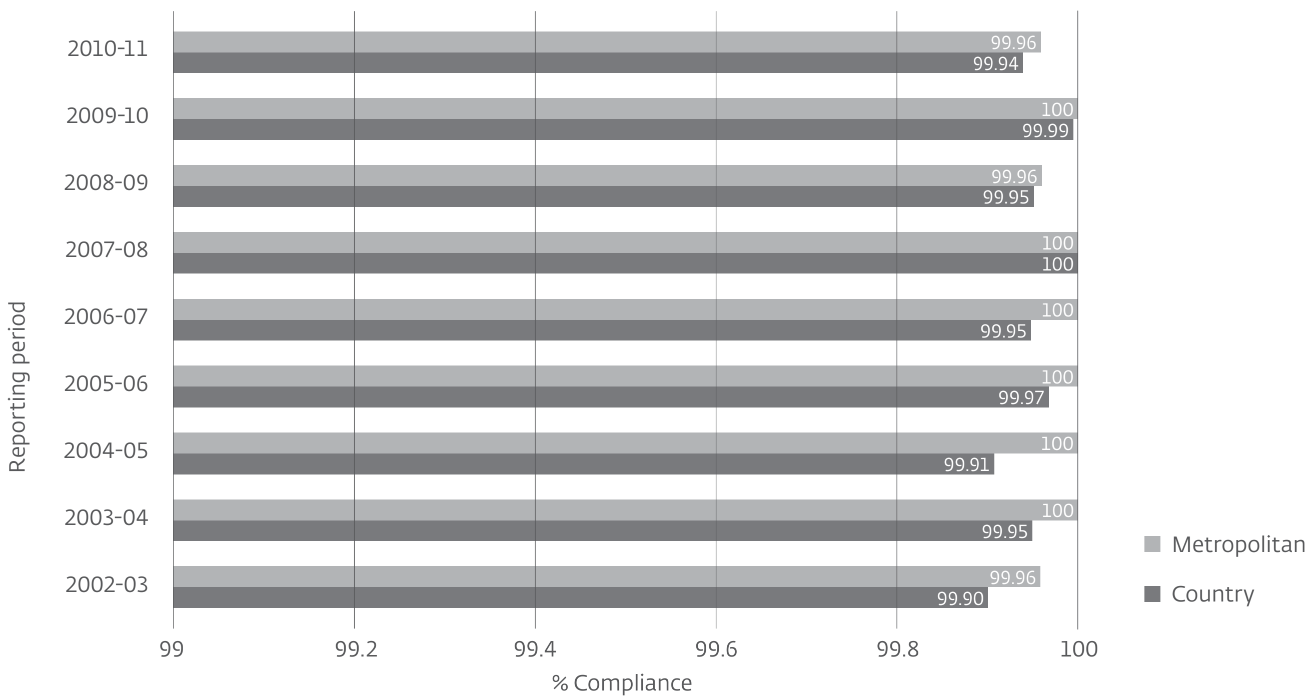
* Including performance against *E. coli* and total/soluble metals

(number of samples taken)

- → We achieved 99.96% *E. coli* compliance at all customer taps in metropolitan Adelaide for the 2010-11 financial year across 2324 samples taken from our six metropolitan supply systems (i.e. one sample out of 2324 collected was non-compliant for *E. coli*)
- → We achieved 99.94% *E. coli* compliance at all customer taps in regional South Australia for the 2010-11 financial year across 8425 samples taken from our 62 country supply systems (i.e. 8420 samples out of 8425 collected were free of *E. coli*)
- → Our water quality performance against the Australian Drinking Water Guidelines was slightly below target for our country systems due to the extremely challenging water quality in the River Murray associated with the floodwaters and blackwater event. During the year, we identified systems where we were below target and proactively worked to address these situations, including working with SA Health.

Immediate corrective action was taken to investigate any risks to public health. Such measures included flushing of systems, additional disinfection, immediate follow-up sampling and close communication with SA Health.

***E. coli* compliance at metropolitan and country drinking water supply system customer taps since 2002 (customer tap samples free from *E. coli*)**



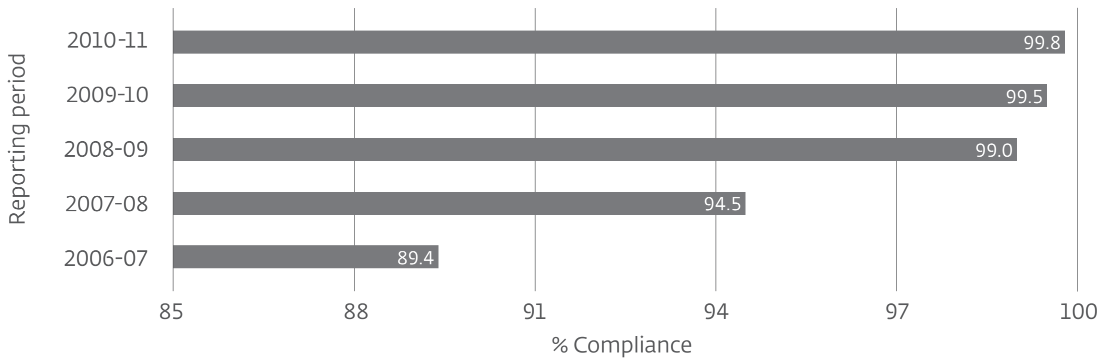
Metropolitan and country drinking water supply systems aesthetic performance (2010-11)

Aesthetic related parameters	Metropolitan systems	Country systems
TDS (<500mg/L)	100% (160)	42.0% (243)
Turbidity (<5 NTU)	100% (361)	99.8% (1522)
Colour (<15 HU)	100% (363)	100% (1358)
Total iron (<0.3mg/L)	100% (194)	99.4% (970)
Hardness (<200mg/L)	100% (84)	65.7% (467)
Free chlorine (<0.6mg/L)	74.3% (3155)	58.8% (8897)

(number of samples taken)

Aesthetic performance relates to the concentration or measure of water quality characteristics that are associated with acceptability of water to the consumer, e.g. turbidity, taste and odour (ADWG 2004).

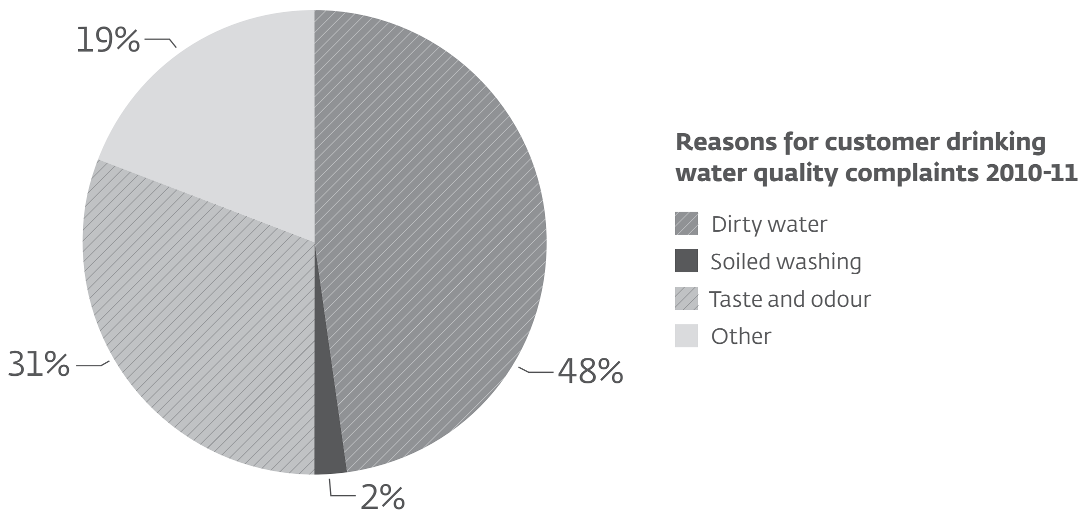
→ Implementation of the Country Water Quality Improvement Program over recent years has led to improvements in the quality of water supplied to country South Australia, with compliance for turbidity in country systems increasing from 89.4% in 2006-07 to 99.8% in 2010-11:



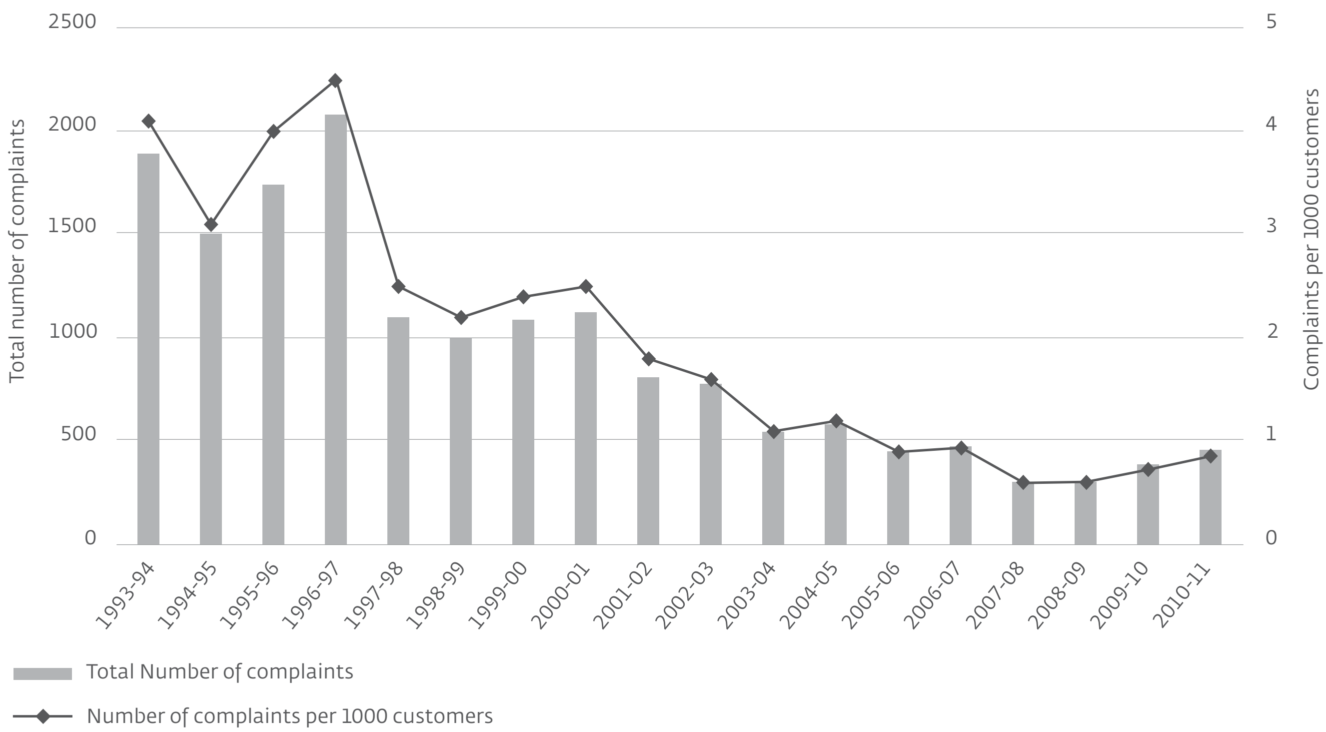
Turbidity – country drinking water supply systems

Customer satisfaction

A total of 457 customer complaints in the metropolitan region were received during 2010-11. Focussing on water quality impacts in the network and improving our knowledge of system operation and causes of water quality problems, will lead to better water quality outcomes in the distribution system.



Customer drinking water quality complaints in metropolitan Adelaide over the past 18 years



Incident management

SA Water is committed to the application of the *Australian Drinking Water Guidelines Framework for Management of Drinking Water Quality* (ADWG 2004) which includes two components for the management of incidents and emergencies – communication and the incident and emergency response protocols. SA Health defines three types of health related incident classifications based upon a precautionary approach:

→ Priority Type 1 incident notification – an incident that, without immediate appropriate response or intervention, could cause serious risk to human health and is likely to require immediate interagency meetings to consider responses

→ Type 1 incident notification – an incident that, without appropriate response or intervention, could cause serious risk to human health

→ Type 2 incident notification – an incident that, without appropriate response or intervention, represents a low risk to human health.

All Priority Type 1 and Type 1 notifications are immediately reported to SA Health, while all Type 2 notifications are reported within 24 hours, in line with the SA Health *Water/Wastewater Incident Notification and Communication Protocol*. During 2010-11, incident managers and other staff involved in the management of water quality incidents attended Water Quality Incident Management Training. These sessions provided opportunities to embed new initiatives introduced during the year, which resulted in further improvements to our incident management process. An integrated Incident Management Training Program, incorporating requirements for water quality, environmental and occupational health safety, and welfare incidents was also developed and implemented from May 2011 for SA Water and our alliance partners.

The *Water/Wastewater Incident Notification and Communication Protocol* was updated by SA Health in July 2011. As a consequence there have been several changes to our Water Quality Incident Notification Table which incorporates the SA Health Protocol and SA Water defined incidents that are reported internally.

A comparative summary of the Priority Type 1, Type 1 and Type 2 incident notifications reported against SA Health protocols:

Reporting period	Priority Type 1	Type 1	Type 2
2010-11	5	111	172
2009-10	9	88	135
2008-09	N/A	92	75
2007-08	N/A	82	59
2006-07	N/A	50	20
2005-06	N/A	42	90

N.B. The Priority Type 1 classification of incidents became effective in July 2009, hence previous financial years are marked "Not Applicable" (N/A)

SA Water continually reviews and enhances work practices to improve our water quality performance and operations. A key component of this is the continual review and improvement of incident management, resulting in changes that have impacted on the way incidents are defined, captured and recorded. This, together with the effects of extremely challenging source water in the River Murray during much of 2010-11 associated with the floodwaters from upstream catchments resulted in an increase in the number of incident notifications from late 2010 for some systems sourcing water from the River Murray.

However, while the number of incidents increased, water quality management of targeted individual water supply systems, and detection and management of risks, has improved. We are improving our diligence in managing these risks, as reflected in the improvement of our Incident Response Index. We have an intensified focus on early detection, rapid corrective action and prevention, addressing the causes of preventable Type 1 notifications such as disinfection failures or inadequate treatment facilities of ground water. The strategies include capital improvements and improving the robust operation of systems.

Incident Response Index (IRI)

The purpose of the Incident Response Index (IRI) is to drive and guide correct response when a Type 1 incident is detected. The IRI is assessed against a number of criteria, with each component in the IRI designed to assist with the management of water quality incidents, including reporting, initial response and longer term preventive measures. The overall 2010-11 strategic target for the IRI is at least 80% compliance.

Criteria used in the Incident Response Index (based on total reportable SA Health Type 1 incidents)	
Incident reported to SA Health by phone immediately (<1 hour)	Overall strategic 2010-11 target: at least 80%
Incident entered into the Incident Management System (IMS) in <2 hours	
Initial effective response taken within 3 hours	
Written report to Minister for Water within 24 hours	
Root Cause Analysis completed within 10 working days	
Preventive actions implemented within agreed timeframes	

The Incident Response Index achieved in country and metropolitan areas and overall for 2010-11:

System	Incident Response Index (IRI) 2010-11 financial year	Incident Response Index (IRI) 2009-10 financial year
Overall (weighted combined country and metropolitan)	81%	81%
Country	81%	82%
Metropolitan	74%	72%

Incident notifications

Summaries of the Priority Type 1, Type 1 and Type 2 incident notifications reported against the SA Health *Water/Wastewater Incident and Communication Protocol* – excluding wastewater, recycled water, environment, SA Health exemptions, incident notifications that have been downgraded due to original incorrect classification and SA Water internally triggered incidents – are provided in the following tables:

Metropolitan region

SA Health Priority Type 1, Type 1 and Type 2 incident notifications (metropolitan):

Reporting period	Priority Type 1	Type 1	Type 2
2010-11	3	10	24
2009-10	3	9	5
2008-09	N/A	4	1
2007-08	N/A	2	1

N.B. The Priority Type 1 classification of incidents became effective in July 2009, hence previous financial years are marked "Not Applicable" (N/A)

Breakdown of Priority Type 1 and Type 1 SA Health notifications (metropolitan):

	Treatment plant inlets		Treatment plant outlets		Distribution system	
	Priority Type 1	Type 1	Priority Type 1	Type 1	Priority Type 1	Type 1
2010-11	0	9	3	0	0	1
2009-10	1	9	1	0	1	0
2008-09	*		N/A	1	N/A	3
2007-08	*		N/A	0	N/A	2

* Up to 2008-09 incident notifications relating to metropolitan treatment plant inlets were included in the country system notifications

N.B. The Priority Type 1 classification of incidents became effective in July 2009, hence previous financial years are marked "Not Applicable" (N/A)

Breakdown of Type 2 SA Health notifications (metropolitan):

Type 2 incidents	Treatment plant inlets	Treatment plant outlets	Distribution system
2010-11	12	1	11
2009-10	5	0	0
2008-09	*	0	1
2007-08	*	1	0

* Up to 2008-09 incident notifications relating to metropolitan treatment plant inlets were included in the country system notifications

Country regions

SA Health Priority Type 1, Type 1 and Type 2 incident notifications (country) – includes Riverland Water and United Group Infrastructure (UGI) incident notifications:

Reporting period	Priority Type 1	Type 1	Type 2
2010-11	2	101	148
2009-10	6	79	130
2008-09	N/A	88	74
2007-08	N/A	80	58

N.B. The Priority Type 1 classification of incidents became effective in July 2009, hence previous financial years are marked "Not Applicable" (N/A)

Breakdown of Priority Type 1 and Type 1 SA Health notifications (country):

	Catchment	Treatment plant inlets		Treatment plant outlets		Distribution system	
	Type 1	Priority Type 1	Type 1	Priority Type 1	Type 1	Priority Type 1	Type 1
2010-11	6	0	19	2	32	0	44
2009-10	8	1	14	2	25	3	32
2008-09	6	N/A	22	N/A	29	N/A	31
2007-08	9	N/A	26	N/A	28	N/A	17

N.B. The Priority Type 1 classification of incidents became effective in July 2009, hence previous financial years are marked "Not Applicable" (N/A)

Breakdown of Type 2 SA Health notifications (country):

Type 2 incidents	Catchment	Treatment plant inlets	Treatment plant outlets	Distribution system
2010-11	55	28	7	58
2009-10	83	12	12	23
2008-09	35	20	13	6
2007-08	38	12	3	5

In 2011-12 we will:

→ Increase compliance of the Incident Response Index (IRI) to 81%

→ Integrate our water quality incident management process with environmental, wastewater and recycled water incident management requirements to streamline the process for our Incident Managers

→ Conduct refresher training for Incident Managers

→ Continue rollout of Integrated Root Cause Analysis Training to guide determination of the root cause of incidents and aid in prevention of future occurrences.

Research, Development and Innovation

SA Water has a national and international reputation for high quality water science and engineering, research and technical innovation. We continue our work to encourage innovation and communication to strengthen our external collaborations for Research, Development and Innovation (RDI) and deliver better ways to manage our water business. SA Water and the Australian Water Quality Centre (AWQC) are recognised as leaders in the water industry for their strategic and operationally focussed research. At the annual RDI Workshop in May 2011, more than 160 people registered to attend at least one of the six workshop sessions. External guests including representatives from the Department for Water, SA Health, Goyder Institute, South East Water, CSIRO, Melbourne Water and Allwater (Suez Environment, Degremont and Transfield Services). This demonstrates the significant interest in our research and development portfolio.

Business and customer focus

SA Water's research aims to generate new knowledge to improve efficiency and to reduce risk to the business and our customers. Investigations can lead to direct savings in costs for treatment or other business processes or costs related to future investment decisions. Research can also achieve a reduction in risk from having sound information to manage and avoid costly water quality incidents.

Our practical application of research and development was highlighted with our annual RDI Innovation Award presented to our Treatment and Customer Technical Services Groups for outcomes generated by their RDI project on 'Co-Digestion of Wastewater Sludge with Trade Waste'. The team assessed the potential of a range of trade waste concentrates to improve SA Water wastewater treatment processes to reduce the risks to sewer network operations of asset corrosion, sewer blockage, sewage overflows and odours. Modifying our treatment processes resulted in improved digester gas production and subsequently increased SA Water's production of renewable energy.

This is the first time this technology has been applied in Australia and it has led to a major shift in how we manage these types of waste.

In 2010-11 we had a major advance in the laboratory testing for the water-borne and human infectious pathogen *Cryptosporidium*, which is a contaminant particularly in run-off from catchments after rainfall. The AWQC operational and research microbiology laboratories developed a novel test that can identify the two important types of *Cryptosporidium* that cause disease in people. Known as 'FISH' (Fluorescence In Situ Hybridisation) probes – a diagnostic DNA molecular technique – the tests are rapid, highly sensitive and precise and will lead to increased confidence in our monitoring for these organisms.

Our RDI program encourages participation between researchers, operational personnel, government departments and external research providers. Our new SA Water Metropolitan Alliance with Allwater presents a great opportunity to enhance our research portfolio and develop new innovative processes to enhance our water treatment and management processes.

National and international success

SA Water continues to achieve significant national and international RDI success in receiving competitive funding grants for new research projects, many which are in partnership with external research agencies and universities. In 2010-11 two new grants were received under the Australian Research Council (ARC) Linkage Grants scheme:

→ Multi-scale strategy to manage chloramine decay and nitrification in water distribution systems

→ Impact of natural organic matter and nutrients on water quality: identification of catchment sources and attenuation processes.

SA Water's research into water science, engineering and technology is highly regarded nationally and internationally. Some of the highlights from international collaborations and partnerships this year included:

→ Three scientists from the Research Centre for Eco-Environmental Sciences (RCEES) in China made separate visits to work at our Australian Water Quality Centre. SA Water has, since 2006, undertaken a range of strategic projects with RCEES, which is one of the prestigious Chinese Academy of Sciences Institutes. This collaboration continues to grow in strength with joint science and technology work in the areas of water treatment, environmental science and reservoir management.

→ A range of international visitors from universities and institutes including the Technical University of Montreal, Canada; the University of Washington, USA; and the University of Birmingham, UK.

→ A joint science and technology workshop hosted by SA Water in Adelaide in August 2010 with representatives of the Sustainable Environment Research Centre (SERC) of National Cheng Kung University in Taiwan. The workshop delegation was comprised of eight leading research engineers and was led by Distinguished Professor Juu-En Chang, who is the former national minister for the Taiwan EPA and Director of SERC. The workshop culminated with the signing of a Memorandum of Understanding for the two organisations to continue to engage in joint water quality research. Areas of common interest for collaboration include drinking water quality, cyanobacteria management, climate change, biomolecular methods in environmental systems and remote sensing. The relationship is further developing to include a new focus on recycled water management and alternative water supplies.

Strategic Alliances for RDI

Our ongoing collaboration with national and international agencies helps South Australia benefit from the latest advances as many of the problems we face are also faced nationally and globally.

Some of our strategic alliances and new activities in 2010-11 were:

→ Support for the SA Water Centre for Water Management and Reuse (CWMR) at the University of South Australia. SA Water is providing support to the Centre until 2014. CWMR has realigned its research themes to provide additional support to areas of interest to SA Water.

→ Goyder Institute – a South Australian initiative for water research funded by the State Government and CSIRO. The three major SA universities are partners and SA Water is involved as a partner through the participation of researchers from the AWQC. SA Water is currently involved in two Goyder Institute projects in the Urban Water and Climate Change areas and anticipates more involvement across our business in this important initiative.

Collaborating organisations

Our business is recognised nationally and internationally for delivering high quality focussed research and technological outcomes for the water industry. This has been achieved by building strong relationships with a diverse group of external stakeholders and collaborators including: CSIRO; Water Quality Research Australia; Global Water Research Coalition; Natural Resource Management Research & Innovation Network; Natural Resources Management Boards; University of Adelaide; Flinders University; University of South Australia; Griffith University; University of Melbourne; Murdoch University; University of New South Wales; University of Queensland; Cranfield University; Washington State University, USA; Brown University, USA; Research Centre for Eco-Environmental Sciences, Beijing; Metropolitan Water District of Southern California, USA; American Water, USA; Public Utilities Board, Singapore; National Cheng Kung University, Taiwan; Trility; Veolia; Water Corporation; Melbourne Water; Hunter Water; Sydney Water; Grampians Wimmera Water; ACTEW; Barwon Water; Gold Coast Water.

Corporate memberships

Through our culture of supporting innovation and research we have actively maintained our access to leading edge knowledge by maintaining alliances with national and international organisations including: Water Research Foundation, USA; Water Environment Research Foundation, USA; Water Re-use Association, USA; Water Quality Research Australia; Water Services Association of Australia, Water Industry Alliance, Australia; International Centre of Excellence for Water Resources Management, Australia; Australian Water Association, International Water Association, UK.

Employee Awareness and Training

During 2010-11, improving the water quality awareness and skills of SA Water employees was again a major focus. The development of new courses continued, as did the delivery of existing training modules. Some 400 SA Water employees and 119 external participants attended either awareness or skills training, including Allwater Alliance and project management and procurement partners. All current training courses are annually reviewed for course content and subject to continual improvement.

The training undertaken during 2010-11 is summarised in the table below:

Competency training

Overview of water quality management	This water quality awareness training course was held over five two-day sessions. The course provides attendees with a sound understanding of water quality principles involved in providing safe water from catchment to tap. This training is mandatory for all operators engaged in water supply management.
Water quality, environmental and occupational health, safety and welfare incident management	Three one-day training sessions were conducted, providing attendees with knowledge and understanding of SA Water's water quality incident management protocols and procedures. Presentations, case studies and assessment exercises are used to transfer the knowledge and assess competence. All incident managers, their nominated proxies and support managers are required to attend and achieve competency.
Water sampling and field testing	This comprehensive two-day training course is run quarterly with extra courses provided as needed. The objectives are to enable staff to confidently undertake water quality field testing and sample collection in accordance with SA Water procedures and AS/NZS 5667.1:1998. Guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples are also key components. Training incorporates presentations, active discussions, hands on practical exercises and demonstrations, theory and case studies. All staff who undertake sampling and/or field testing as part of their role are progressively attending this training. Both internal SA Water employees and contractors participate.
Disinfection for operators	Held over four two-day sessions during 2010-11, this comprehensive two-day training ensures operators have the required knowledge and skills to operate, maintain and manage the disinfection processes within water supply systems. Training incorporates presentations, active discussions, workshops and practical exercises. Material is orientated towards SA Water processes and procedures and complements the five-day external *Disinfection: Chlorine/Chloramination* course run by the Water Industry Training Centre. All staff who operate disinfection systems are required to attend, including field maintenance managers, chlorine fitters, district managers and team leaders.

Odours in drinking water supplies	This comprehensive training is undertaken on a demand basis and incorporates presentations, sensory analysis, practical exercises and case studies to provide operators with the basic skills to identify, assess and respond to odours in drinking water supplies. Both treatment plant operators and distribution system operators are required to attend this training.
Disinfection of mains	Held over three one-day courses and also provided as needed. Presented to enhance operator understanding of current procedures and requirements to undertake supplementary water mains disinfection using mobile chlorine dosing equipment. Training involves presentations, practical exercises, case studies and field work. All staff that plan and/or undertake mains disinfection are targeted to attend and achieve competency.
Chlorine/chloramination for plant operators	The Water Industry Training Centre at Deakin University was engaged to present a training course over five days designed to upskill newly appointed chlorine fitters in the operation, maintenance and management of chlorine and chloramination plants. This intense competency based course was run on-site at the Morgan Water Treatment Plant.
Integrated root cause analysis	Training developed for incident managers and staff who are involved in the response to and management of incidents. Training was developed with co-operation from all groups across SA Water to standardise post-incident review to one generic process.
Introduction to water quality awareness	Developed to supplement *Overview of Water Quality Management* as a refresher training. Provides staff with a basic understanding of the key aspects of SA Water's role in supplying safe drinking water to customers at all times.
Introduction to recycled water awareness	Developed as an introduction to recycled water, to acquaint employees with a broad awareness of the key factors and issues that influence the supply, use and regulation of recycled water systems.
Native vegetation guidelines	Provides an overview of native vegetation standard operating procedures. This training has been developed to give staff an operational understanding of the processes and procedures associated with clearing of native vegetation according to legislative requirements.
Best practice operating procedures	Water quality/environmental procedural training outlining SA Water and legislative requirements associated with operational controlled discharges of water to the environment.
Environmental management for project managers	An introduction to environmental law and requirements for project managers. This training course covers environmental impact assessment processes and general requirements for project managers in regards to environmental issues related to capital projects.
Environmental management awareness	A course designed to provide staff with an overview and understanding of strategic environmental law and policy, SA Water's Environmental Management System and responding to environmental incidents.
Disinfection system awareness	An awareness training course developed for operations staff who are required to work on or adjacent to chlorine dosing stations.
Construction and commissioning – water quality considerations	Awareness training course specifically developed for contractors associated with delivery of the North South Interconnection System Project.

Glossary of Water Quality Terminology

Algae
A diverse group of simple photosynthetic organisms with no true roots, stems or leaves. They occur mostly in freshwater and marine environments and range in size from unicellular to multicellular forms.

Algal bloom
A rapid growth of algae in aquatic environments often triggered by an input of high levels of nutrients (particularly nitrogen and phosphorus) and an increase in temperature. Blue-green algae (or cyanobacteria) are of most concern to SA Water. Algal blooms frequently cause environmental problems and can create challenges for water treatment.

Alum
An aluminium sulphate based chemical used as a coagulant in the water treatment process.

Aluminum (Al)
A naturally occurring element in soils which can enter water from catchments.

Ammonia (NH_3)
A highly soluble compound resulting from the decomposition of organic matter containing nitrogen. Usually only found in small concentrations in surface waters.

Aquifer
A layer or section of earth or rock that contains freshwater (known as groundwater), any water that is stored naturally underground or that flows through rock or soil, supplying springs and wells.

Australian Drinking Water Guidelines (ADWG)
Drinking water guidelines established by a joint committee of the National Health and Medical Research Council (NHMRC) and Agricultural Resource Management Council of Australia and New Zealand (ARMCANZ), published in 2004. These national guidelines provide a framework and benchmark water quality values for best practice in drinking water supply operations.

Australian Water Quality Centre (AWQC)
A business unit of SA Water which provides a comprehensive range of water and wastewater services and undertakes investigations and consultancies on a commercial basis on a wide range of water quality and treatment technology issues. The AWQC has been National Association of Testing Authorities (NATA) accredited since 1974 and obtained quality system certification to ISO 9001 in 1997.

Blue-green algae
See cyanobacteria.

Calcium (Ca)
A naturally occurring element that can enter water from catchments. It may also be added to water in the treatment process to reduce the acidity levels or increase the capacity of water to buffer pH changes.

Catchment
An area of land surrounding a water storage. The runoff water from rain falling over the catchment drains into the storage and collects nutrients, minerals and other contaminants (including microorganisms) from the surface of the land.

Chloramination
The application of chlorine followed by ammonia to create monochloramine (NH_2Cl), a stable disinfectant that is added to drinking water to kill bacteria or to oxidise undesirable compounds. Chloramines persist for a longer time than chlorine and as a result are used in longer water distribution systems.

Chlorination
The disinfection of water, wastewater and industrial waste through the application of chlorine (Cl) as part of the water treatment process. Chlorination kills microorganisms and oxidises undesirable compounds.

Coliforms
Coliform bacteria are used as one of the indicators of the quality of drinking water and the possible presence of disease causing microorganisms. These bacteria are killed by chlorine.

Colour
See True colour.

Cryptosporidium
A parasitic protozoan (microorganism) which can cause gastroenteritis (stomach upsets) in humans. These organisms occur in the gut of infected warm-blooded animals and can be introduced into source water through faecal contamination.

Customer tap
Strategically placed sampling location in a water distribution system to enable verification of water quality in the distribution system as supplied to customers; typically located near a water meter.

Cyanobacteria (Blue-green algae)
Single-celled, filamentous or colony forming organisms which are widely distributed in freshwater and marine environments. Under favourable conditions of light, temperature and nutrient supply, extensive growth of cyanobacteria may occur, leading to blooms. Cyanobacteria blooms frequently result in environmental problems and can create challenges for water treatment.

Desalination
A water treatment process used to convert highly saline water into water suitable for human consumption. Treatment involves passing saline water through membranes at a high pressure.

Disinfection
Inactivation (killing) of pathogens or organisms capable of causing infectious disease by physical or chemical processes, including chlorination.

Dissolved Organic Carbon (DOC)
Dissolved Organic Carbon (DOC) is derived from organic materials (such as decomposed plant matter) which may give water a brownish appearance.

Drinking water
Water that is suitable for human consumption.

Drinking Water Quality Management System (DWQMS)
SA Water's Drinking Water Quality Management System (DWQMS) is used to ensure our drinking water supplies are managed effectively to provide high quality drinking water and to ensure the protection of public health.

Escherichia coli (E. coli)
The most common thermotolerant (heat tolerant) coliform present in faeces, which is regarded as the most specific indicator of recent faecal contamination. *E. coli* can be killed by standard disinfection practices.

Faecal coliforms
Bacteria which inhabit the intestines of humans and other mammals and are present in faeces. Faecal coliforms are used as an indicator of human and animal waste contamination and can be killed by standard disinfection practices.

Filtration
A process for removing particles by passing water through a porous barrier, such as a screen, membrane, sand or gravel. Often used in conjunction with a coagulant (e.g. alum) to settle contaminants.

Fluoride (F)
Fluoride is regarded as a useful constituent of drinking water, particularly for the prevention of tooth decay. Fluoride has been added to Adelaide's water supply since 1971. Concentration is maintained within the recommended levels set by SA Health.

Geosmin
An organic compound with a distinct earthy/musty smell, produced by certain blue-green algae, which can impart an unpleasant smell and taste to water.

Giardia
A parasitic protozoan (microorganism) found in untreated surface water and removed by filtration. It can cause gastroenteritis (stomach upsets) in humans. These microorganisms occur in the gut of infected warm-blooded animals and can be introduced into source waters through faecal contamination.

Gigalitre (GL)
A metric unit of volume equal to one thousand million (1 000 000 000) litres or 1000 megalitres.

Groundwater
Water beneath the earth's surface (often between saturated soil and rock) that supplies bores, wells or springs.

Heavy metals
Individual metals and metal compounds that negatively affect people's health. These occur naturally in the environment and include arsenic and selenium. In very small amounts, many of these metals are necessary to support life. However, in larger amounts, they become toxic.

Incident Management System (IMS)
The Incident Management System (IMS) is SA Water's web-based incident management tool for the reporting and management of all incidents.

Inflows
Water flowing from catchments into reservoirs through streams, rivers and creeks.

Iron (Fe)
An element which, when found in water, leads to a brownish discolouration. Limits on the amount of iron in water are usually due to taste and appearance factors, rather than any detrimental health effects.

Kilolitre (kL)
A metric unit of volume equal to 1000 litres.

Magnetic Ion Exchange (MIEX®)
An ion exchange resin that is designed to remove dissolved organic carbon (DOC) from water as part of the water treatment process.

Manganese (Mn)
Manganese in a water supply may affect taste, cause staining of clothes, produce deposits in pipes and contribute to turbidity.

Megalitre (ML)
A metric unit of volume equal to one million (1 000 000) litres or 1000 kilolitres.

2-Methyl Isoborneol (MIB)
An earthy/musty smelling organic compound produced by certain blue-green algae, which can impart an unpleasant smell/taste to water.

Microorganisms
Organisms invisible to the unaided eye.

Monitoring
An ongoing observation and testing program to assess potential changes in circumstances.

National Association of Testing Authorities (NATA)
The National Association of Testing Authorities (NATA) is Australia's national laboratory accreditation authority. NATA accreditation recognises and promotes facilities competent in specific types of testing, measurement, inspection and calibration.

National Health and Medical Research Council (NHMRC)
The National Health and Medical Research Council (NHMRC) is Australia's peak body for supporting health and medical research for developing health advice for the Australian community, health professionals and governments, and for providing advice on ethical behaviour in health care and in the conduct of health and medical research.

Naturally occurring
Present in the natural environment as minerals, elements, salts and other substances.

Nephelometric Turbidity Unit (NTU)
A measure of turbidity in the water.

Nitrate (NO_3)
The most stable form of combined nitrogen in water. Present in surface waters in small amounts, the major sources are from human and animal wastes.

Nitrogen (N)
Nitrogen is an essential nutrient for plant growth. It is used in fertilisers and is present in sewage effluent. High levels of nutrients (including nitrogen) can lead to excessive algal growth in lakes, rivers and reservoirs.

Non-drinking water
Water that is not suitable for human consumption.

Nutrients
Compounds required for growth by plants and other organisms. Major nutrients for plant growth are phosphorus and nitrogen.

Organic
Substances that come from animal or plant sources and always contain carbon.

Parasite
An organism that relies on a host organism to grow.

Pathogens
Disease-causing organisms such as bacteria and viruses.

pH
The pH value indicates if a substance is acidic, neutral or alkaline. It is calculated from the number of hydrogen ions present and is measured on a scale from 0 to 14. A pH greater than 7 is alkaline, less than 7 is acidic and 7 is neutral. The pH of public water supplies should be slightly alkaline to minimise corrosion.

Phosphorus (P)
Phosphorus is an essential nutrient for plant growth.
High levels of phosphorus can lead to excessive algal growth in lakes, rivers and reservoirs and can be due to inputs from human activity such as fertiliser run-off and land clearing.

Protozoa
Single-celled organisms that feed on other, smaller microorganisms. A number of these (such as some types of *Giardia* and *Cryptosporidium*) are responsible for waterborne diseases.

Reservoir
A natural or artificial body of water used as a storage for water supply.

SA Health Water/Wastewater Incident Notification and Communication Protocol
An agreement between SA Health and SA Water which covers incident notification and reporting requirements.

Salinity
The concentration of salts in water, mostly sodium chloride. Salinity can affect potability, use for irrigation and industrial purposes, as well as aquatic life.

Source water
Water prior to any treatment or disinfection.

Suspended solids
Particles suspended in water that may be removed by sedimentation or filtration.

Total Dissolved Solids (TDS)
A measure of inorganic salts and small amounts of organic matter that are dissolved in water. Usually determined by converting electrical conductivity (EC) to TDS values.

Total hardness
Total hardness is the sum of the concentrations of calcium and magnesium ions expressed as calcium carbonate ($CaCO_3$) equivalent. Waters with a high mineral content (a total hardness in excess of 200mg/L) are considered hard.

Treatment (water)
The filtration and disinfection processes employed to produce drinking water.

Trihalomethanes (THMs)
Compounds that may occur in a chlorinated water supply as a by-product of organic materials present in the water reacting with chlorine.

True colour
Colour is mainly due to the presence of dissolved substances from organic matter in water, such as decaying leaves and vegetation. True colour refers to the colour of water after particles of organic matter have been removed through filtration and is the measurement of the extent to which light is absorbed by the water. Measured in Hazen Units (HU).

Turbidity
Refers to the presence of suspended solids in water causing a muddy or discoloured appearance. Turbidity is measured in Nephelometric Turbidity Units (NTU).

Ultraviolet
Natural ultraviolet (UV) light from the sun or artificial UV light from low pressure mercury lamps will kill pathogens, depending on contact time and light intensity. The water must be relatively clear, of low turbidity and dissolved compounds.

Water cycle
The water cycle is the simplest natural cycle on earth involving the transfer of water between waterbodies (e.g. oceans and lakes) and the atmosphere. Water is evaporated from water bodies into the atmosphere. The water vapour rises and cools, forming droplets that join together to form clouds (condensation). As the droplets join together and become heavier they fall to earth as rain or other forms of precipitation. The rain can then infiltrate the soil into ground water aquifers or flow as surface runoff into waterbodies and the cycle begins again.

Water Services Association of Australia (WSAA)
Australia's peak body for the Australian urban water industry. Its members provide water services to over 15 million Australians.

Water supply system
The complete system that provides a water supply to customers. It includes all infrastructure from catchment to tap, including the source water, water storage reservoirs, treatment plants and distribution networks.

Water Treatment Plant (WTP)
A treatment plant that improves water quality by removing impurities through filtration and disinfection.

Country drinking water supply systems and towns supplied (as at 30 June 2011)

Water supply system	Towns supplied
Anstey Hill WTP#	Houghton, Inglewood, Paracombe
Barmera WTP	Barmera, Cobdogla
Barossa WTP#	Angle Vale, Cockatoo Valley, Dublin, Evanston Gardens, Gawler, Gawler River, Hamley Bridge, Kalbeeba, Lewiston, Mallala, Owen, Port Parham, Redbanks, Roseworthy, Two Wells, Wasley, Wild Horse Plains, Willaston, Windsor
Beachport IRP	Beachport
Berri WTP	Berri
Blanchetown WTP	Blanchetown
Bordertown	Bordertown
Cadell WTP	Cadell
Coffin Bay	Coffin Bay
Cowirra WTP	Cowirra, Neeta, Pompoota
Elliston	Elliston
Eyre South	Arno Bay, Cleve, Cowell, Cummins, Lipson, Louth Bay, North Shields, Port Neill, Tumby Bay, Ungarra, Yeelanna
Eyre South/Morgan WTP	Ceduna, Cungena, Haslam, Kyancutta, Minnipa, Poochera, Pygery, Smoky Bay, Streaky Bay, Thevenard, Wirrulla, Wudinna, Yantanabie
Geranium	Geranium
Glossop WTP	Glossop, Monash
Happy Valley WTP#	Cherry Gardens, Clarendon, Mount Osmond
Hawker IRP	Hawker
Kalangadoo IRP	Kalangadoo
Kanmantoo WTP	Callington, Kanmantoo
Kingston SE IRP	Kingston SE
Lameroo IRP	Lameroo
Loxton WTP	Loxton
Lucindale IRP	Lucindale
Mannum WTP	Mannum
Melrose	Melrose
Middle River WTP	Brownlow, Emu Bay, Kingscote, Parndana
Millicent	Millicent
Moorook WTP	Kingston on Murray, Moorook
Morgan WTP	Alford, Appila, Auburn, Blyth, Booborowie, Booleroo Centre, Bower, Brinkworth, Bute, Burra, Caltowie, Clare, Crystal Brook, Drake Peak, Eudunda, Farrell Flat, Georgetown, Gladstone, Gulnare, Iron Knob, Jamestown, Kiepa, Kimba, Koolunga, Konanda, Kybunga, Laura, Leasingham, Lock, Merriton, Mintaro, Morgan, Mount Mary, Mundoora, Napperby, Narridy, Penwortham, Peterborough, Port Augusta, Port Broughton, Port Germein, Point Pass, Port Pirie, Redhill, Robertstown, Rudall, Sevenhill, Snowtown, Spalding, Stirling North, Sutherlands, Tickera, Warnertown, Watervale, Wirrabara, Whyalla, Yacka, Yongala
Morgan/Swan Reach WTP	Ardrossan, Arthurton, Balaklava, Bowmans, Clinton, Coobowie, Curramulka, Edithburgh, Halbury, Hoyleton, Kadina, Lochiel, Maitland, Melton, Minlaton, Moonta, Paskeville, Pine Point, Price, Point Pearce, Port Hughes, Port Victoria, Port Vincent, Port Wakefield, South Kilkerran, Stansbury, Wallaroo, Wool Bay, Yorketown

Country drinking water supply systems and towns supplied (as at 30 June 2011)

Water supply system	Towns supplied
Mount Burr	Mount Burr
Mount Compass	Mount Compass
Mount Gambier	Mount Gambier
Mount Pleasant WTP	Eden Valley, Mount Pleasant, Springton, Tungkillo
Murray Bridge WTP	Murray Bridge
Mypolonga WTP	Mypolonga, Wall Flat
Myponga WTP#	Aldinga, Aldinga Beach, Carrickalinga, Christies Beach, Goolwa, Hindmarsh Island, Middleton, McLaren Flat, McLaren Vale, Moana, Myponga, Noarlunga, Noarlunga Downs, Normanville, Old Port Willunga, Port Elliot, Port Noarlunga, Seaford, Sellicks Beach, Victor Harbor, Yankallila
Nangwarry	Nangwarry
Naracoorte	Naracoorte
Orroroo	Orroroo
Padthaway	Padthaway
Palmer WTP	Caloote, Palmer
Parachilna	Parachilna
Parilla IRP	Parilla
Penneshaw WTP	Penneshaw
Penola IRP	Penola
Pinnaroo IRP	Pinnaroo
Port Lincoln	Port Lincoln
Port MacDonnell	Port MacDonnell
Quorn	Quorn
Renmark WTP	Cooltong, Paringa, Renmark
Robe IRP	Robe
Streaky Bay *	Streaky Bay
Summit WTP	Aldgate, Balhannah, Blakiston, Bridgewater, Birdwood, Brukunga, Charleston, Clayton, Crafers, Crafers West, Dawesley, Forest Range, Gumeracha, Hahndorf, Heathfield, Iron Bank, Kersbrook, Langhorne Creek, Lenswood, Littlehampton, Lobethal, Milang, Mount Barker, Mount Torrens, Nairne, Oakbank, Stirling, Strathalbyn, Sturt, Upper Willyaroo, Wistow, Woodside, Verdun
Swan Reach WTP	Angaston, Cambrai, Freeling, Greenock, Kapunda, Lyndoch, Marrabel, Moculta, Nuriootpa, Riverton, Rowland Flat, Rhynie, Saddleworth, Sedan, Seppeltsfield, Sheoak Log, Stockport, Stockwell, Tanunda, Tarlee, Templers, Towitta, Truro, Williamstown
Swan Reach Town WTP	Swan Reach
Tailem Bend WTP	Coomandook, Coonalpyn, Culburra, Jervois, Karoonda, Keith, Ki Ki, Meningie, Narrung, Salt Creek, Sherlock, Tailem Bend, Tintinara, Wynarka, Yumali
Tarpeena IRP	Tarpeena
Waikerie WTP	Waikerie
Warooka	Port Turton, Warooka
Wilmington	Wilmington
Woolpunda WTP	Cadell, Mantung, Woolpunda, Wunkar

Supplies both country and metropolitan systems

* Streaky Bay currently supplied by Eyre South/Morgan WTP system

Water Quality Data

10 11

Government of South Australia

SA Water

Table 1 2010-11 Metropolitan Adelaide source water quality (inlets to Water Treatment Plants)

	Anstey Hill WTP					Hope Valley WTP				
Parameter	*Samples*	*Min*	*Max*	*Ave*	*Median*	*Samples*	*Min*	*Max*	*Ave*	*Median*
Colour – True [456nm] [HU]*	103	12	71	36	31	70	14	60	38	38
Dissolved Organic Carbon [mg/L]	25	3.2	13.9	8.5	9.5	23	4.1	9.4	8.0	8.2
Fluoride [mg/L]*	105	0.02	0.31	0.18	0.21	67	0.23	0.37	0.28	0.28
Hardness – Total [mg/L]	12	43	109	84	103	9	124	147	134	130
Nitrate as Nitrogen [mg/L]	12	0.016	0.457	0.167	0.165	11	<0.005	0.269	0.086	0.074
Nitrite as Nitrogen [mg/L]	12	<0.005	0.044	0.010	0.007	11	<0.005	0.013	0.005	0.004
pH Units*	363	6.9	8.0	7.4	7.4	255	6.9	9.1	8.2	8.2
Phosphorus – Total [mg/L]	12	0.027	0.310	0.099	0.057	11	0.006	0.101	0.050	0.049
Total Dissolved Solids [mg/L]	13	140	360	257	315	19	310	360	331	330
Turbidity [NTU]*	363	0.5	122.0	44.5	12.3	256	0.3	7.5	2.6	2.5

* Water Treatment Plant data source: United Water

	Barossa WTP					Little Para WTP				
Parameter	*Samples*	*Min*	*Max*	*Ave*	*Median*	*Samples*	*Min*	*Max*	*Ave*	*Median*
Colour – True [456nm] [HU]*	105	30	51	41	41	107	7	64	39	41
Dissolved Organic Carbon [mg/L]	25	9.3	12.7	10.6	10.5	38	4.8	10.8	8.0	7.9
Fluoride [mg/L]*	105	0.27	0.35	0.30	0.28	106	0.14	0.32	0.22	0.22
Hardness – Total [mg/L]	13	86	109	96	94	10	85	120	103	102
Nitrate as Nitrogen [mg/L]	12	0.016	0.083	0.054	0.066	13	0.163	0.394	0.289	0.298
Nitrite as Nitrogen [mg/L]	12	<0.005	0.011	0.004	0.003	13	<0.005	0.017	0.006	0.005
pH Units*	363	7.3	7.9	7.6	7.6	104	7.2	8.2	7.8	7.8
Phosphorus – Total [mg/L]	12	<0.005	0.032	0.016	0.015	13	0.026	0.076	0.053	0.055
Total Dissolved Solids [mg/L]	25	300	370	325	320	17	250	380	285	280
Turbidity [NTU]*	363	0.2	9.3	0.9	0.8	363	8.8	60.0	22.2	20.0

* Water Treatment Plant data source: United Water

	Happy Valley WTP					Myponga WTP				
Parameter	*Samples*	*Min*	*Max*	*Ave*	*Median*	*Samples*	*Min*	*Max*	*Ave*	*Median*
Colour – True [456nm] [HU]*	105	18	66	50	52	105	36	84	51	47
Dissolved Organic Carbon [mg/L]	25	5.0	9.7	8.0	8.3	25	10.6	14.4	12.2	12.0
Fluoride [mg/L]*	104	0.20	0.33	0.25	0.24	104	0.18	0.27	0.23	0.23
Hardness – Total [mg/L]	13	94	109	100	99	10	109	128	121	122
Nitrate as Nitrogen [mg/L]	11	<0.005	0.194	0.087	0.084	12	0.020	0.132	0.087	0.087
Nitrite as Nitrogen [mg/L]	11	<0.005	0.009	0.006	0.006	12	<0.005	0.027	0.007	0.005
pH Units*	363	7.2	8.2	7.6	7.6	363	6.9	8.1	7.6	7.6
Phosphorus – Total [mg/L]	11	0.044	0.163	0.072	0.063	12	0.023	0.080	0.048	0.046
Total Dissolved Solids [mg/L]	13	260	320	287	290	20	370	430	396	390
Turbidity [NTU]*	363	4.7	15.1	9.1	8.7	361	0.1	20.0	2.5	2.1

* Water Treatment Plant data source: United Water

Table 2 2010-11 Metropolitan Adelaide distribution system customer tap water quality against 2004 ADWG

Anstey Hill System								
Parameter	*Health Guideline*	*Aesthetic Guideline*	*Samples*	*Min*	*Max*	*Ave*	*Median*	*% Compliance*
E. coli [per 100 mL]	98% free from *E. coli*	–	452	0	0	0	0	100
Coliforms [per 100 mL]	95% free from coliforms#	–	452	0	50	0	0	94.9
Chlorine Residual – Free [mg/L]	≤ 5 mg/L	–	613	<0.1	1.7	0.4	0.5	100
Chlorine Residual – Free [mg/L]	–	≤ 0.6 mg/L#	613	<0.1	1.7	0.4	0.5	71.8
Colour – True [HU]	–	≤ 15 HU	52	<1	3	1	2	100
Fluoride [mg/L]	≤ 1.5 mg/L	–	12	0.11	0.96	0.75	0.90	100
Hardness – Total [mg/L]	–	≤ 200 mg/L	12	53	127	103	113	100
Iron – Total [mg/L]	–	≤ 0.3 mg/L	28	<0.005	0.039	0.013	0.013	100
Manganese – Total [mg/L]	≤ 0.5 mg/L	–	28	<0.001	0.014	0.002	0.002	100
Manganese – Total [mg/L]	–	≤ 0.1 mg/L	28	<0.001	0.014	0.002	0.002	100
pH Units	–	6.5 - 8.5	52	7.0	8.0	7.5	7.5	100
Total Dissolved Solids [mg/L]	–	≤ 500 mg/L	12	130	390	288	300	100
Turbidity [NTU]	–	≤ 5 NTU	52	<0.10	0.45	0.16	0.15	100
Trihalomethanes – Total [µg/L]	≤ 250 µg/L	–	52	38	234	147	157	100

SA Water Guideline Value
Data source: United Water

Hope Valley System								
Parameter	*Health Guideline*	*Aesthetic Guideline*	*Samples*	*Min*	*Max*	*Ave*	*Median*	*% Compliance*
E. coli [per 100 mL]	98% free from *E. coli*	–	437	0	0	0	0	100
Coliforms [per 100 mL]	95% free from coliforms#	–	437	0	200	1	0	96.6
Chlorine Residual – Free [mg/L]	≤ 5 mg/L	–	570	<0.1	1.4	0.4	0.5	100
Chlorine Residual – Free [mg/L]	–	≤ 0.6 mg/L#	570	<0.1	1.4	0.4	0.5	75.3
Colour – True [HU]	–	≤ 15 HU	52	<1	3	1	2	100
Fluoride [mg/L]	≤ 1.5 mg/L	–	12	0.17	0.90	0.79	0.85	100
Hardness – Total [mg/L]	–	≤ 200 mg/L	12	111	160	130	120	100
Iron – Total [mg/L]	–	≤ 0.3 mg/L	28	<0.005	0.036	0.014	0.018	100
Manganese – Total [mg/L]	≤ 0.5 mg/L	–	28	<0.001	0.005	0.001	0.002	100
Manganese – Total [mg/L]	–	≤ 0.1 mg/L	28	<0.001	0.005	0.001	0.002	100
pH Units	–	6.5 - 8.5	52	7.0	8.0	7.4	7.4	100
Total Dissolved Solids [mg/L]	–	≤ 500 mg/L	12	290	380	337	340	100
Turbidity [NTU]	–	≤ 5 NTU	52	<0.10	0.46	0.14	0.14	100
Trihalomethanes – Total [µg/L]	≤ 250 µg/L	–	52	80	232	160	161	100

SA Water Guideline Value
Data source: United Water

Table 2 2010-11 Metropolitan Adelaide distribution system customer tap water quality against 2004 ADWG *continued*

Barossa System								
Parameter	*Health Guideline*	*Aesthetic Guideline*	*Samples*	*Min*	*Max*	*Ave*	*Median*	*% Compliance*
E. coli [per 100 mL]	98% free from *E. coli*	–	236	0	0	0	0	100
Coliforms [per 100 mL]	95% free from coliforms#	–	236	0	38	0	0	96.6
Chlorine Residual – Free [mg/L]	≤ 5 mg/L	–	340	<0.1	1.3	0.2	0.2	100
Chlorine Residual – Free [mg/L]	–	≤ 0.6 mg/L#	340	<0.1	1.3	0.2	0.2	91.2
Colour – True [HU]	–	≤ 15 HU	52	<1	3	1	1	100
Fluoride [mg/L]	≤ 1.5 mg/L	–	12	0.84	0.95	0.90	0.90	100
Hardness – Total [mg/L]	–	≤ 200 mg/L	12	117	143	126	126	100
Iron – Total [mg/L]	–	≤ 0.3 mg/L	30	<0.005	0.227	0.022	0.011	100
Manganese – Total [mg/L]	≤ 0.5 mg/L	–	30	<0.001	0.004	0.001	0.002	100
Manganese – Total [mg/L]	–	≤ 0.1 mg/L	30	<0.001	0.004	0.001	0.002	100
pH Units	–	6.5 - 8.5	52	7.0	8.0	7.3	7.3	100
Total Dissolved Solids [mg/L]	–	≤ 500 mg/L	12	340	400	367	360	100
Turbidity [NTU]	–	≤ 5 NTU	52	<0.10	0.20	0.13	0.13	100
Trihalomethanes – Total [µg/L]	≤ 250 µg/L	–	52	98	232	158	158	100

SA Water Guideline Value
Data source: United Water

Little Para System								
Parameter	*Health Guideline*	*Aesthetic Guideline*	*Samples*	*Min*	*Max*	*Ave*	*Median*	*% Compliance*
E. coli [per 100 mL]	98% free from *E. coli*	–	324	0	0	0	0	100
Coliforms [per 100 mL]	95% free from coliforms#	–	324	0	200	1	0	97.5
Chlorine Residual – Free [mg/L]	≤ 5 mg/L	–	423	<0.1	1.5	0.3	0.4	100
Chlorine Residual – Free [mg/L]	–	≤ 0.6 mg/L#	423	<0.1	1.5	0.3	0.4	85.3
Colour – True [HU]	–	≤ 15 HU	52	<1	3	2	2	100
Fluoride [mg/L]	≤ 1.5 mg/L	–	12	0.52	0.99	0.85	0.86	100
Hardness – Total [mg/L]	–	≤ 200 mg/L	12	98	139	123	125	100
Iron – Total [mg/L]	–	≤ 0.3 mg/L	27	<0.005	0.077	0.015	0.012	100
Manganese – Total [mg/L]	≤ 0.5 mg/L	–	27	<0.001	0.002	0.001	0.001	100
Manganese – Total [mg/L]	–	≤ 0.1 mg/L	27	<0.001	0.002	0.001	0.001	100
pH Units	–	6.5 - 8.5	52	7.0	7.9	7.3	7.3	100
Total Dissolved Solids [mg/L]	–	≤ 500 mg/L	12	270	350	310	305	100
Turbidity [NTU]	–	≤ 5 NTU	52	<0.10	1.20	0.15	0.14	100
Trihalomethanes – Total [µg/L]	≤ 250 µg/L	–	52	56	207	131	139	100

SA Water Guideline Value
Data source: United Water

Table 2 2010-11 Metropolitan Adelaide distribution system customer tap water quality against 2004 ADWG *continued*

Happy Valley System								
Parameter	*Health Guideline*	*Aesthetic Guideline*	*Samples*	*Min*	*Max*	*Ave*	*Median*	*% Compliance*
E. coli [per 100 mL]	98% free from *E. coli*	–	788	0	1	0	0	99.9
Coliforms [per 100 mL]	95% free from coliforms#	–	788	0	53	0	0	97.8
Chlorine Residual – Free [mg/L]	≤ 5 mg/L	–	1012	<0.1	2.0	0.5	0.6	100
Chlorine Residual – Free [mg/L]	–	≤ 0.6 mg/L#	1012	<0.1	2.0	0.5	0.6	63.3
Colour – True [HU]	–	≤ 15 HU	104	<1	3	1	1	100
Fluoride [mg/L]	≤ 1.5 mg/L	–	24	0.16	0.88	0.78	0.84	100
Hardness – Total [mg/L]	–	≤ 200 mg/L	24	108	126	118	118	100
Iron – Total [mg/L]	–	≤ 0.3 mg/L	53	<0.005	0.094	0.018	0.014	100
Manganese – Total [mg/L]	≤ 0.5 mg/L	–	53	<0.001	0.049	0.003	0.002	100
Manganese – Total [mg/L]	–	≤ 0.1 mg/L	53	<0.001	0.049	0.003	0.002	100
pH Units	–	6.5 - 8.5	103	7.0	8.0	7.4	7.4	100
Total Dissolved Solids [mg/L]	–	≤ 500 mg/L	26	290	440	321	310	100
Turbidity [NTU]	–	≤ 5 NTU	103	<0.10	0.80	0.15	0.14	100
Trihalomethanes – Total [µg/L]	≤ 250 µg/L	–	103	81	231	153	159	100

SA Water Guideline Value
Data source: United Water

Myponga System								
Parameter	*Health Guideline*	*Aesthetic Guideline*	*Samples*	*Min*	*Max*	*Ave*	*Median*	*% Compliance*
E. coli [per 100 mL]	98% free from *E. coli*	–	83	0	0	0	0	100
Coliforms [per 100 mL]	95% free from coliforms#	–	83	0	27	1	0	91.6
Chlorine Residual – Free [mg/L]	≤ 5 mg/L	–	116	<0.1	1.8	0.2	0.2	100
Chlorine Residual – Free [mg/L]	–	≤ 0.6 mg/L#	116	<0.1	1.8	0.2	0.2	91.4
Colour – True [HU]	–	≤ 15 HU	51	<1	3	1	1	100
Fluoride [mg/L]	≤ 1.5 mg/L	–	12	0.72	0.91	0.83	0.86	100
Hardness – Total [mg/L]	–	≤ 200 mg/L	12	103	131	123	126	100
Iron – Total [mg/L]	–	≤ 0.3 mg/L	29	<0.005	0.030	0.013	0.012	100
Manganese – Total [mg/L]	≤ 0.5 mg/L	–	29	<0.001	0.009	0.002	0.002	100
Manganese – Total [mg/L]	–	≤ 0.1 mg/L	29	<0.001	0.009	0.002	0.002	100
pH Units	–	6.5 - 8.5	51	7.1	8.0	7.5	7.5	100
Total Dissolved Solids [mg/L]	–	≤ 500 mg/L	12	380	460	437	440	100
Turbidity [NTU]	–	≤ 5 NTU	51	<0.10	0.49	0.15	0.15	100
Trihalomethanes – Total [µg/L]	≤ 250 µg/L	–	50	95	255	196	196	96

SA Water Guideline Value
Data source: United Water

Table 2 2010-11 Metropolitan Adelaide distribution system customer tap water quality against 2004 ADWG
continued

Metropolitan Adelaide – Total Distribution System								
Parameter	*Health Guideline*	*Aesthetic Guideline*	*Samples*	*Min*	*Max*	*Ave*	*Median*	*% Compliance*
E. coli [per 100 mL]	98% free from *E. coli*	–	2320	0	1	0	0	100
Coliforms [per 100 mL]	95% free from coliforms#	–	2320	0	200	1	0	96.6
Chlorine Residual – Free [mg/L]	≤ 5 mg/L	–	3074	<0.1	2.0	0.4	0.5	100
Chlorine Residual – Free [mg/L]	–	≤ 0.6 mg/L#	3074	<0.1	2.0	0.4	0.5	74.4
Colour – True [HU]	–	≤ 15 HU	363	<1	3	1	2	100
Fluoride [mg/L]	≤ 1.5 mg/L	–	84	0.11	0.99	0.81	0.86	100
Hardness – Total [mg/L]	–	≤ 200 mg/L	84	53	160	120	120	100
Iron – Total [mg/L]	–	≤ 0.3 mg/L	195	<0.005	0.227	0.016	0.013	100
Manganese – Total [mg/L]	≤ 0.5 mg/L	–	195	<0.001	0.049	0.002	0.002	100
Manganese – Total [mg/L]	–	≤ 0.1 mg/L	195	<0.001	0.049	0.002	0.002	100
pH Units	–	6.5 - 8.5	362	7.0	8.0	7.4	7.4	100
Total Dissolved Solids [mg/L]	–	≤ 500 mg/L	86	130	460	340	335	100
Turbidity [NTU]	–	≤ 5 NTU	362	<0.10	1.20	0.15	0.14	100
Trihalomethanes – Total [µg/L]	≤ 250 µg/L	–	361	38	255	157	161	99.4

SA Water Guideline Value
Data source: United Water

Table 3 2010-11 Country source water quality

Eyre Region												
	Total Dissolved Solids [mg/L]			Hardness – Total [mg/L]			Dissolved Organic Carbon [mg/L]			pH Units		
System	*Min*	*Max*	*Ave*	*Min*	*Max*	*Ave*	*Min*	*Max*	*Ave*	*Min*	*Max*	*Ave*
Coffin Bay	180	480	383	211	250	223	<0.3	0.4	0.4	7.7	7.8	7.8
Elliston	550	990	765	263	343	303	0.4	0.5	0.5	7.4	7.9	7.6
Eyre South[1]	480	830	601	259	369	303	0.7	1.0	0.8	7.5	7.7	7.6
Eyre South/Morgan WTP[2]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Port Lincoln[3]	440	2400	772	229	554	319	0.4	1.7	0.7	7.2	7.7	7.4
Streaky Bay[4]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Turbidity [NTU]			Colour – True [HU]			Nitrate as Nitrogen [mg/L]			Phosphorus – Total [mg/L]		
System	*Min*	*Max*	*Ave*	*Min*	*Max*	*Ave*	*Min*	*Max*	*Ave*	*Min*	*Max*	*Ave*
Coffin Bay	<0.1	0.2	0.1	N/A	N/A	N/A	0.192	1.180	0.800	0.009	0.015	0.012
Elliston	<0.1	0.2	0.1	<1	2	1	2.500	3.910	3.205	<0.005	0.006	0.006
Eyre South[1]	<0.1	0.9	0.2	<1	1	1	2.830	4.910	3.783	0.008	0.022	0.016
Eyre South/Morgan WTP[2]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Port Lincoln[3]	<0.1	22.0	0.4	<1	1	1	0.855	5.880	3.363	<0.005	0.018	0.009
Streaky Bay[4]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

[1] Eyre South – supplied by Lincoln Basin, Uley South and Uley Wanilla borefields
[2] Eyre South/Morgan WTP – primarily supplied by Lincoln Basin, Uley South and Uley Wanilla borefields and supplemented by Morgan WTP system
[3] Port Lincoln system supplied by Lincoln Basin, Uley Wanilla and Uley South borefields
[4] Streaky Bay – bores off-line, system currently supplied by Eyre South/Morgan WTP system
N/A – Not applicable

Northern Region												
	Total Dissolved Solids [mg/L]			Hardness – Total [mg/L]			Dissolved Organic Carbon [mg/L]			pH Units		
System	*Min*	*Max*	*Ave*	*Min*	*Max*	*Ave*	*Min*	*Max*	*Ave*	*Min*	*Max*	*Ave*
Barmera WTP	78	210	151	N/A	N/A	N/A	2.8	18.1	10.3	7.0	7.7	7.4
Berri WTP	75	210	137	46	46	46	2.4	16.5	9.5	6.3	8.0	7.5
Blanchetown WTP	99	280	169	63	63	63	3.2	19.1	9.9	7.2	8.1	7.6
Cadell WTP	88	230	162	N/A	N/A	N/A	3.1	17.3	9.6	7.2	8.0	7.5
Glossop WTP	75	210	137	46	46	46	2.4	16.5	9.5	6.3	8.0	7.5
Hawker IRP	2100	2700	2415	894	1150	1022	0.5	0.6	0.6	7.1	7.1	7.1
Loxton WTP	82	270	153	48	48	48	2.7	18.4	9.7	7.1	8.4	7.6
Melrose	1200	1700	1446	290	424	357	0.4	0.4	0.4	7.0	7.4	7.2
Moorook WTP	82	250	161	54	54	54	2.8	18.0	9.8	7.2	8.8	7.7
Morgan / Swan Reach WTP[1]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Morgan WTP	92	230	163	26	89	60	2.6	19.3	9.8	7.1	8.2	7.6
Orroroo	1500	2100	1958	694	694	694	0.4	0.4	0.4	7.3	7.3	7.3
Parachilna	790	830	811	294	326	306	0.4	0.4	0.4	7.5	7.6	7.5
Quorn	1100	1400	1214	472	578	519	0.5	1.5	0.8	6.8	7.2	7.0
Renmark WTP[2]	71	190	128	45	45	45	2.7	18.3	10.1	6.4	8.0	7.4
Waikerie WTP	56	270	161	28	85	58	2.8	19.1	10.1	7.2	8.2	7.6
Warooka	680	770	730	323	329	326	0.9	1.0	1.0	7.4	7.6	7.5
Wilmington	270	290	282	91	110	100	0.4	1.6	1.2	6.0	7.0	6.5
Woolpunda	62	230	156	53	53	53	2.8	17.8	9.8	7.2	8.6	7.6

[1] Morgan/Swan Reach WTP system supplied from either Morgan WTP or Swan Reach WTP
[2] Renmark WTP – includes supply to Cooltong
N/A – Not applicable

Table 3 2010-11 Country source water quality *continued*

Northern Region *continued*												
	Turbidity [NTU]			Colour – True [HU]			Nitrate as Nitrogen [mg/L]			Phosphorus – Total [mg/L]		
System	*Min*	*Max*	*Ave*	*Min*	*Max*	*Ave*	*Min*	*Max*	*Ave*	*Min*	*Max*	*Ave*
Barmera WTP	15.0	150.0	77.8	7	134	55	0.005	0.407	0.104	0.124	0.290	0.200
Berri WTP	20.0	170.0	79.1	7	158	58	0.007	0.447	0.137	0.091	0.354	0.196
Blanchetown WTP	11.0	160.0	78.2	8	156	54	0.018	0.334	0.133	0.103	0.263	0.187
Cadell WTP	9.7	140.0	77.8	8	120	52	<0.005	0.335	0.109	0.104	0.272	0.182
Glossop WTP	20.0	170.0	79.1	7	158	58	0.007	0.447	0.137	0.091	0.354	0.196
Hawker IRP	9.9	17.0	12.5	<1	<1	<1	<0.005	<0.005	<0.005	0.012	0.014	0.013
Loxton WTP	16.0	150.0	78.4	7	167	57	<0.005	0.386	0.137	0.120	0.305	0.199
Melrose	0.1	2.4	1.3	<1	<1	<1	0.283	0.861	0.572	0.011	0.025	0.018
Moorook WTP	17.0	150.0	80.3	9	119	54	<0.005	0.406	0.105	0.114	0.526	0.208
Morgan / Swan Reach WTP[1]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Morgan WTP	18.0	180.0	87.1	8	152	54	<0.005	0.366	0.112	0.084	0.290	0.192
Orroroo	<0.1	0.1	0.1	<1	<1	<1	0.007	0.007	0.007	0.012	0.012	0.012
Parachilna	<0.1	<0.1	<0.1	<1	<1	<1	1.220	1.220	1.220	0.009	0.009	0.009
Quorn	<0.1	0.5	0.2	<1	<1	<1	0.103	0.128	0.112	0.015	0.026	0.020
Renmark WTP[2]	16.0	170.0	86.2	8	162	59	0.015	0.343	0.119	0.117	0.355	0.217
Waikerie WTP	16.0	160.0	81.3	7	157	57	0.009	0.369	0.127	0.115	0.293	0.192
Warooka	<0.1	<0.1	<0.1	<1	<1	<1	2.160	3.360	2.760	0.009	0.011	0.010
Wilmington	<0.1	1.7	0.4	<1	1	1	0.067	0.200	0.117	0.070	0.095	0.088
Woolpunda	13.0	150.0	79.2	10	137	56	0.009	0.369	0.099	0.110	0.265	0.189

[1] Morgan/Swan Reach WTP system supplied from either Morgan WTP or Swan Reach WTP
[2] Renmark WTP – includes supply to Cooltong
N/A – Not applicable

River Murray System												
	Total Dissolved Solids [mg/L]			Hardness – Total [mg/L]			Dissolved Organic Carbon [mg/L]			pH Units		
System	*Min*	*Max*	*Ave*	*Min*	*Max*	*Ave*	*Min*	*Max*	*Ave*	*Min*	*Max*	*Ave*
River Murray[1]	15	420	156	26	89	61	2.3	20.3	9.6	6.3	9.2	7.5
	Turbidity [NTU]			Colour – True [HU]			Nitrate as Nitrogen [mg/L]			Phosphorus – Total [mg/L]		
System	*Min*	*Max*	*Ave*	*Min*	*Max*	*Ave*	*Min*	*Max*	*Ave*	*Min*	*Max*	*Ave*
River Murray[1]	9.7	230.0	84.9	<1	168	54	<0.005	0.447	0.133	<0.005	0.526	0.194

[1] River Murray – average data for all systems from Lock 9 to Tailem Bend

Table 3 2010-11 Country source water quality *continued*

Outer Metro Region												
	Total Dissolved Solids [mg/L]			Hardness – Total [mg/L]			Dissolved Organic Carbon [mg/L]			pH Units		
System	*Min*	*Max*	*Ave*	*Min*	*Max*	*Ave*	*Min*	*Max*	*Ave*	*Min*	*Max*	*Ave*
Anstey Hill WTP#	310	380	336	99	99	99	7.8	11.8	9.8	7.5	7.5	7.5
Barossa WTP#	300	360	327	89	89	89	9.6	12.2	10.5	7.6	7.6	7.6
Cowirra WTP	100	230	172	N/A	N/A	N/A	3.2	16.2	9.0	6.9	7.9	7.4
Happy Valley WTP#	260	320	282	100	100	100	7.7	11.4	9.0	6.4	8.8	7.8
Kanmantoo WTP	97	280	178	71	71	71	3.1	18.7	9.7	6.8	7.9	7.4
Mannum WTP	100	230	174	39	81	63	2.9	17.4	10.3	7.0	7.9	7.5
Middle River WTP	130	730	447	18	122	73	10.7	15.2	13.0	6.6	7.6	7.0
Morgan / Swan Reach WTP[1]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Mt Compass	150	310	236	63	69	66	<0.3	<0.3	<0.3	6.2	7.4	6.6
Mt Pleasant WTP	100	230	174	39	81	63	2.9	17.4	10.3	7.0	7.9	7.5
Murray Bridge WTP	97	280	178	71	71	71	3.1	18.7	9.7	6.8	7.9	7.4
Mypolonga WTP	100	230	178	68	68	68	3.2	17.1	9.5	7.1	7.8	7.3
Myponga WTP#	380	420	395	124	124	124	10.6	14.7	12.1	7.4	7.4	7.4
Palmer WTP	100	230	174	39	81	63	2.9	17.4	10.3	7.0	7.9	7.5
Penneshaw WTP	32000	38000	34154	N/A	N/A	N/A	N/A	N/A	N/A	6.5	7.3	6.8
Summit WTP	97	280	178	71	71	71	3.1	18.7	9.7	6.8	7.9	7.4
Swan Reach Town WTP	96	220	168	34	86	62	3.1	17.1	9.5	7.0	8.1	7.5
Swan Reach WTP	90	220	166	30	87	61	3.2	19.7	11.1	7.0	7.7	7.4
Tailem Bend WTP	100	290	186	38	87	65	3.5	17.8	9.9	6.8	7.8	7.5
	Turbidity [NTU]			Colour – True [HU]			Nitrate as Nitrogen [mg/L]			Phosphorus – Total [mg/L]		
System	*Min*	*Max*	*Ave*	*Min*	*Max*	*Ave*	*Min*	*Max*	*Ave*	*Min*	*Max*	*Ave*
Anstey Hill WTP#	1.2	40.0	6.2	20	78	40	<0.005	0.167	0.052	0.021	0.290	0.070
Barossa WTP#	0.3	4.4	1.0	28	55	41	0.013	0.082	0.047	0.011	0.097	0.030
Cowirra WTP	23.0	180.0	99.0	12	134	49	N/A	N/A	N/A	N/A	N/A	N/A
Happy Valley WTP#	5.7	18.0	10.1	16	80	62	0.039	0.306	0.131	0.035	0.202	0.085
Kanmantoo WTP	19.0	160.0	80.2	<1	136	51	0.128	0.128	0.128	0.044	0.348	0.198
Mannum WTP	19.0	160.0	83.7	9	135	49	0.006	0.270	0.134	0.129	0.280	0.199
Middle River WTP	3.5	23.0	8.0	107	240	161	N/A	N/A	N/A	N/A	N/A	N/A
Morgan / Swan Reach WTP[1]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Mt Compass	<0.1	12.0	1.1	<1	<1	<1	0.036	0.037	0.037	0.011	0.028	0.020
Mt Pleasant WTP	19.0	160.0	83.7	9	135	49	0.006	0.270	0.134	0.129	0.280	0.199
Murray Bridge WTP	19.0	160.0	80.2	<1	136	51	0.128	0.128	0.128	0.044	0.348	0.198
Mypolonga WTP	15.0	160.0	74.8	11	136	51	0.007	0.357	0.142	0.117	0.289	0.187
Myponga WTP#	0.8	8.9	2.0	38	80	53	<0.005	0.127	0.047	0.010	0.286	0.053
Palmer WTP	19.0	160.0	83.7	9	135	49	0.006	0.270	0.134	0.129	0.280	0.199
Penneshaw WTP	<0.1	4.0	0.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Summit WTP	19.0	160.0	80.2	<1	136	51	0.128	0.128	0.128	0.044	0.348	0.198
Swan Reach Town WTP	15.0	130.0	79.0	11	134	52	0.068	0.383	0.219	0.146	0.313	0.221
Swan Reach WTP	26.0	150.0	93.3	10	133	58	0.029	0.443	0.186	0.135	0.330	0.211
Tailem Bend WTP	28.0	180.0	94.1	11	147	51	N/A	N/A	N/A	0.114	0.443	0.228

Supplies both country and metropolitan systems
[1] Morgan/Swan Reach WTP system supplied from either Morgan WTP or Swan Reach WTP
N/A – Not applicable

Table 3 2010-11 Country source water quality *continued*

South East Region												
	Total Dissolved Solids [mg/L]			Hardness – Total [mg/L]			Dissolved Organic Carbon [mg/L]			pH Units		
System	*Min*	*Max*	*Ave*	*Min*	*Max*	*Ave*	*Min*	*Max*	*Ave*	*Min*	*Max*	*Ave*
Beachport IRP	620	670	646	254	281	271	1.1	1.1	1.1	7.0	7.5	7.3
Bordertown	390	670	482	229	274	246	0.6	1.0	0.7	7.0	7.2	7.2
Geranium	1300	1600	1450	550	555	553	0.7	1.2	1.0	6.9	7.2	7.1
Kalangadoo IRP	510	630	570	351	413	387	1.0	1.2	1.1	7.0	7.4	7.2
Kingston SE IRP	760	1300	961	184	236	214	0.8	0.9	0.8	7.2	7.9	7.4
Lameroo IRP	920	1000	961	234	246	240	0.5	0.5	0.5	7.5	7.7	7.6
Lucindale IRP	780	820	802	308	324	317	2.3	2.4	2.4	7.2	7.7	7.4
Millicent	570	730	602	323	357	343	1.0	1.1	1.1	7.2	7.7	7.4
Mt Burr	390	490	443	259	297	281	0.4	0.6	0.5	7.2	7.7	7.4
Mt Gambier	340	630	531	170	328	261	<0.3	1.9	1.1	7.1	8.3	7.6
Nangwarry	520	700	612	332	441	387	1.0	1.0	1.0	6.9	7.2	7.1
Naracoorte	1200	1300	1262	326	361	340	1.5	2.3	2.0	7.6	7.8	7.7
Padthaway	1300	1500	1423	569	631	600	0.6	0.7	0.7	6.9	7.2	7.1
Parilla IRP	630	690	655	178	193	186	0.4	0.4	0.4	7.3	8.0	7.7
Penola IRP	620	780	714	283	370	326	1.0	2.8	1.8	6.8	7.5	7.1
Pinnaroo IRP	670	1400	881	235	418	299	0.5	1.1	0.8	7.2	7.7	7.4
Port MacDonnell	680	720	695	9	15	13	1.5	1.5	1.5	8.2	8.5	8.3
Robe IRP	720	1100	899	68	127	105	0.9	1.4	1.1	7.5	7.9	7.7
Tarpeena IRP	620	730	685	378	378	378	1.2	1.2	1.2	7.0	7.3	7.2
	Turbidity [NTU]			Colour – True [HU]			Nitrate as Nitrogen [mg/L]			Phosphorus – Total [mg/L]		
System	*Min*	*Max*	*Ave*	*Min*	*Max*	*Ave*	*Min*	*Max*	*Ave*	*Min*	*Max*	*Ave*
Beachport IRP	2.0	3.9	3.0	<1	2	1	0.005	0.005	0.005	0.047	0.047	0.047
Bordertown	<0.1	0.4	0.1	<1	1	1	0.021	0.570	0.284	<0.005	0.011	0.007
Geranium	<0.1	0.9	0.3	<1	<1	<1	0.029	0.068	0.049	0.034	0.040	0.037
Kalangadoo IRP	1.8	57.0	7.4	<1	1	1	<0.005	0.046	0.026	0.019	0.020	0.020
Kingston SE IRP	7.3	48.0	15.8	<1	1	1	<0.005	<0.005	<0.005	0.012	0.014	0.013
Lameroo IRP	2.4	4.8	3.6	<1	<1	<1	<0.005	<0.005	<0.005	0.051	0.059	0.055
Lucindale IRP	2.9	17.0	8.6	<1	3	2	<0.005	<0.005	<0.005	0.038	0.040	0.039
Millicent	<0.1	2.8	0.6	2	6	3	<0.005	0.035	0.020	0.012	0.020	0.016
Mt Burr	<0.1	0.3	0.1	<1	2	1	0.197	3.070	1.016	0.024	0.086	0.044
Mt Gambier	0.1	4.3	1.1	<1	3	1	<0.005	3.740	1.883	<0.005	0.046	0.023
Nangwarry	<0.1	1.4	0.3	<1	4	1	0.785	2.640	1.713	0.019	0.026	0.023
Naracoorte	0.2	10.0	1.1	3	8	5	<0.005	0.007	0.006	0.063	0.089	0.072
Padthaway	0.1	1.1	0.4	<1	2	1	0.033	0.090	0.062	0.020	0.023	0.022
Parilla IRP	1.6	3.1	2.2	<1	1	1	<0.005	<0.005	<0.005	0.027	0.033	0.030
Penola IRP	9.3	29.0	18.3	<1	3	2	<0.005	0.034	0.011	0.020	0.041	0.029
Pinnaroo IRP	1.5	9.8	4.3	<1	1	1	<0.005	0.007	0.006	0.052	0.068	0.058
Port MacDonnell	<0.1	0.2	0.1	4	7	5	<0.005	<0.005	<0.005	0.234	0.234	0.234
Robe IRP	0.2	3.5	0.9	<1	2	1	<0.005	<0.005	<0.005	0.042	0.058	0.046
Tarpeena IRP	0.3	17.0	8.2	<1	1	1	<0.005	<0.005	<0.005	0.033	0.033	0.033

Table 4 2010-11 Country drinking water distribution systems – customer tap water quality against 2004 ADWG

Eyre Region

	Coliforms/100 mL		*E. coli*/100 mL		Chlorine Residual – Free [mg/L]*				Chlorine Residual – Total [mg/L]**			
System	*Samples*	*Health Compliance %*	*Samples*	*Health Compliance %*	*Min*	*Max*	*Ave*	*Health Compliance %*	*Min*	*Max*	*Ave*	*Health Compliance %*
ADWG Value Target		*0 > 95% free*[x]		*0 > 98% free*				*< 5 100%*				*< 4.1 100%*
Coffin Bay	52	100	52	100	0.7	1.3	0.9	100	N/A	N/A	N/A	-
Elliston	53	100	53	100	0.4	1.5	0.9	100	N/A	N/A	N/A	-
Eyre South	256	99	256	100	0.6	2.0	1.0	100	N/A	N/A	N/A	-
Eyre South/ Morgan WTP	288	100	288	100	0.3	3.6	1.6	100	N/A	N/A	N/A	-
Morgan WTP	1077	99	1077	100	N/A	N/A	N/A	-	<0.1	4.4	2.4	100
Port Lincoln	130	99	130	99	0.4	1.4	1.0	100	N/A	N/A	N/A	-
Streaky Bay	52	100	52	100	0.6	1.9	1.3	100	N/A	N/A	N/A	-

	Total Dissolved Solids [mg/L]				Colour – True [HU]				Turbidity [NTU]			
System	*Min*	*Max*	*Ave*	*Aesthetic Compliance %*	*Min*	*Max*	*Ave*	*Aesthetic Compliance %*	*Min*	*Max*	*Ave*	*Aesthetic Compliance %*
ADWG Value Target				*< 500 100%*				*< 15*				*< 5*
Coffin Bay	350	420	400	100	<1	<1	<1	100	<0.1	0.2	0.1	100
Elliston	550	830	690	0	<1	<1	<1	100	<0.1	0.1	0.1	100
Eyre South	520	670	574	0	<1	<1	<1	100	<0.1	0.2	0.1	100
Eyre South/ Morgan WTP	480	590	525	23	<1	<1	<1	100	<0.1	0.3	0.1	100
Morgan WTP	160	290	232	100	<1	11	3	100	<0.1	1.2	0.2	100
Port Lincoln	530	660	578	0	<1	1	1	100	<0.1	<0.1	<0.1	100
Streaky Bay	520	560	535	0	<1	2	1	100	<0.1	0.2	0.1	100

	pH Units				Trihalomethanes – Total [µg/L]				Fluoride [mg/L]			
System	*Min*	*Max*	*Ave*	*Aesthetic Compliance %*	*Min*	*Max*	*Ave*	*Health Compliance %*	*Min*	*Max*	*Ave*	*Health Compliance %*
ADWG Value Target				*6.5 - 8.5*				*< 250 100%*				*< 1.5 100%*
Coffin Bay	7.7	7.8	7.8	100	<4	5	4	100	1.1	1.3	1.2	100
Elliston	7.7	8.1	7.8	100	6	10	8	100	0.5	0.7	0.6	100
Eyre South	7.6	8.1	7.8	100	14	40	24	100	0.4	0.5	0.4	100
Eyre South/ Morgan WTP	7.6	8.1	7.9	100	47	293	144	83	0.5	0.6	0.5	100
Morgan WTP	6.7	9.8	8.5	40	14	160	57	100	0.8	1.0	0.8	100
Port Lincoln	7.4	7.7	7.6	100	6	12	10	100	0.4	0.5	0.4	100
Streaky Bay	7.9	8.0	8.0	100	39	178	114	100	0.5	0.6	0.5	100

* Chlorinated systems only
** Chloraminated systems only
x SA Water internal guideline value
N/A – Not applicable

Table 4 2010-11 Country drinking water distribution systems – customer tap water quality against 2004 ADWG *continued*

Eyre Region *continued*													
	Iron – Total [mg/L]				Manganese – Total [mg/L]					Hardness – Total [mg/L]			
System	*Min*	*Max*	*Ave*	*Aesthetic Compliance %*	*Min*	*Max*	*Ave*	*Health Compliance %*	*Aesthetic Compliance %*	*Min*	*Max*	*Ave*	*Aesthetic Compliance %*
ADWG Value Target				*< 0.3 100%*				*< 0.5 100%*	*< 0.1 100%*				*< 200*
Coffin Bay	<0.005	<0.005	<0.005	100	<0.001	<0.001	<0.001	100	100	216	232	227	0
Elliston	<0.005	<0.005	<0.005	100	<0.001	<0.001	<0.001	100	100	249	347	289	0
Eyre South	<0.005	0.019	0.006	100	<0.001	<0.001	<0.001	100	100	256	299	272	0
Eyre South/ Morgan WTP	<0.005	0.013	0.007	100	<0.001	0.002	0.001	100	100	236	252	247	0
Morgan WTP	<0.005	0.059	0.008	100	<0.001	0.016	0.003	100	100	52	107	74	100
Port Lincoln	<0.005	0.028	0.010	100	<0.001	<0.001	<0.001	100	100	256	286	265	0
Streaky Bay	<0.005	<0.005	<0.005	100	<0.001	<0.001	<0.001	100	100	237	249	246	0

Table 4 2010-11 Country drinking water distribution systems – customer tap water quality against 2004 ADWG
continued

Northern Region												
	Coliforms/100 mL		***E. coli*/100 mL**		**Chlorine Residual – Free [mg/L]***				**Chlorine Residual – Total [mg/L]****			
System	*Samples*	*Health Compliance %*	*Samples*	*Health Compliance %*	*Min*	*Max*	*Ave*	*Health Compliance %*	*Min*	*Max*	*Ave*	*Health Compliance %*
ADWG Value Target		*0 > 95% free[x]*		*0 > 98% free*				*< 5 100%*				*< 4.1 100%*
Barmera WTP	38	100	38	100	0.2	3.0	1.5	100	N/A	N/A	N/A	-
Berri WTP	65	100	65	100	<0.1	2.7	1.1	100	N/A	N/A	N/A	-
Blanchetown WTP	52	100	52	100	<0.1	1.6	0.7	100	N/A	N/A	N/A	-
Cadell WTP	51	98	51	100	<0.1	1.8	0.9	100	N/A	N/A	N/A	-
Glossop WTP	101	96	101	100	<0.1	4.5	1.0	100	N/A	N/A	N/A	-
Hawker IRP	52	98	52	100	0.5	1.7	1.2	100	N/A	N/A	N/A	-
Loxton WTP	101	100	101	100	N/A	N/A	N/A	-	2.3	5.0	3.5	84
Melrose	52	100	52	100	0.8	1.5	1.1	100	N/A	N/A	N/A	-
Moorook WTP	97	97	97	100	<0.1	2.3	1.1	100	N/A	N/A	N/A	-
Morgan / Swan Reach WTP	545	97	545	100	N/A	N/A	N/A	-	<0.1	4.2	1.8	100
Morgan WTP	1077	99	1077	100	N/A	N/A	N/A	-	<0.1	4.4	2.4	100
Orroroo	52	100	52	100	0.8	2.2	1.3	100	N/A	N/A	N/A	-
Parachilna	13	100	13	100	<0.1	1.2	0.2	100	N/A	N/A	N/A	-
Quorn	52	100	52	100	0.4	1.3	0.8	100	N/A	N/A	N/A	-
Renmark WTP	141	96	141	100	<0.1	2.8	0.8	100	N/A	N/A	N/A	-
Waikerie WTP	58	98	58	100	<0.1	2.5	0.9	100	N/A	N/A	N/A	-
Warooka	51	100	51	100	0.2	1.1	0.8	100	N/A	N/A	N/A	-
Wilmington	52	100	52	100	<0.1	2.0	0.6	100	N/A	N/A	N/A	-
Woolpunda	78	100	78	100	N/A	N/A	N/A	-	<0.1	2.5	1.1	100

* Chlorinated systems only
** Chloraminated systems only
x SA Water internal guideline value
N/A – Not applicable

Table 4 2010-11 Country drinking water distribution systems – customer tap water quality against 2004 ADWG *continued*

Northern Region *continued*												
	Total Dissolved Solids [mg/L]				**Colour – True [HU]**				**Turbidity [NTU]**			
System	*Min*	*Max*	*Ave*	*Aesthetic Compliance %*	*Min*	*Max*	*Ave*	*Aesthetic Compliance %*	*Min*	*Max*	*Ave*	*Aesthetic Compliance %*
ADWG Value Target				< 500 100%				< 15				< 5
Barmera WTP	140	270	210	100	<1	2	1	100	0.1	0.5	0.2	100
Berri WTP	110	230	183	100	<1	3	1	100	0.1	0.6	0.2	100
Blanchetown WTP	200	210	205	100	<1	2	1	100	<0.1	0.2	0.1	100
Cadell WTP	130	240	185	100	<1	4	2	100	<0.1	0.2	0.1	100
Glossop WTP	110	170	143	100	<1	3	1	100	<0.1	2.3	0.3	100
Hawker IRP	1200	2400	2075	0	<1	<1	<1	100	<0.1	<0.1	<0.1	100
Loxton WTP	110	270	208	100	<1	7	3	100	<0.1	0.3	0.2	100
Melrose	1400	1500	1475	0	<1	<1	<1	100	0.1	1.2	0.5	100
Moorook WTP	150	210	188	100	<1	2	1	100	<0.1	0.4	0.1	100
Morgan / Swan Reach WTP	150	270	221	100	<1	6	3	100	<0.1	0.7	0.2	100
Morgan WTP	160	290	232	100	<1	11	3	100	<0.1	1.2	0.2	100
Orroroo	1900	2000	1950	0	<1	<1	<1	100	<0.1	0.2	0.1	100
Parachilna	810	820	815	0	<1	2	1	100	<0.1	0.3	0.1	100
Quorn	1200	1200	1200	0	<1	<1	<1	100	<0.1	0.1	0.1	100
Renmark WTP	140	240	194	100	<1	2	1	100	<0.1	0.8	0.2	100
Waikerie WTP	140	260	218	100	<1	8	2	100	<0.1	1.0	0.4	100
Warooka	750	760	753	0	<1	<1	<1	100	<0.1	0.1	0.1	100
Wilmington	280	300	293	100	<1	<1	<1	100	0.1	0.3	0.2	100
Woolpunda	140	240	194	100	1	9	4	100	<0.1	4.0	0.4	100

Table 4 2010-11 Country drinking water distribution systems – customer tap water quality against 2004 ADWG *continued*

Northern Region *continued*												
	pH Units				Trihalomethanes – Total [µg/L]				Fluoride [mg/L]			
System	*Min*	*Max*	*Ave*	*Aesthetic Compliance %*	*Min*	*Max*	*Ave*	*Health Compliance %*	*Min*	*Max*	*Ave*	*Health Compliance %*
ADWG Value Target				*6.5 - 8.5*				*< 250 100%*				*< 1.5 100%*
Barmera WTP	7.6	7.9	7.8	100	53	230	134	100	0.8	1.0	0.9	100
Berri WTP	7.8	8.0	7.9	100	57	282	139	85	0.8	0.9	0.9	100
Blanchetown WTP	7.4	7.9	7.6	100	62	384	176	77	<0.1	<0.1	<0.1	100
Cadell WTP	7.5	7.9	7.7	100	68	376	176	77	<0.1	0.1	0.1	100
Glossop WTP	6.9	8.1	7.8	100	44	372	148	84	<0.1	<0.1	<0.1	100
Hawker IRP	7.0	7.6	7.2	100	18	36	29	100	0.6	0.7	0.6	100
Loxton WTP	8.1	9.3	8.9	8	9	58	32	100	0.7	1.0	0.9	100
Melrose	7.4	7.7	7.5	100	<4	5	5	100	1.0	1.1	1.0	100
Moorook WTP	7.5	9.2	8.0	96	56	337	148	88	<0.1	0.1	0.1	100
Morgan / Swan Reach WTP	7.5	9.4	8.7	36	11	283	67	96	0.2	1.0	0.8	100
Morgan WTP	6.7	9.8	8.5	40	14	160	57	100	0.8	1.0	0.8	100
Orroroo	6.1	7.6	7.2	75	<4	8	5	100	1.2	1.3	1.3	100
Parachilna	7.8	7.8	7.8	100	N/A	N/A	N/A	-	0.6	0.6	0.6	100
Quorn	7.0	7.2	7.2	100	4	5	5	100	0.5	0.6	0.5	100
Renmark WTP	7.4	9.6	8.1	75	38	457	203	78	0.7	0.9	0.9	100
Waikerie WTP	7.9	8.4	8.1	100	62	235	155	100	0.8	1.0	0.9	100
Warooka	7.4	7.6	7.5	100	32	38	35	100	0.9	1.1	1.0	100
Wilmington	6.2	6.8	6.5	50	4	50	23	100	0.1	0.2	0.1	100
Woolpunda	7.8	8.9	8.2	80	7	202	66	100	<0.1	0.1	0.1	100

N/A – Not applicable

Table 4 2010-11 Country drinking water distribution systems – customer tap water quality against 2004 ADWG *continued*

Northern Region *continued*													
	Iron – Total [mg/L]				**Manganese – Total [mg/L]**					**Hardness – Total [mg/L]**			
System	*Min*	*Max*	*Ave*	*Aesthetic Compliance %*	*Min*	*Max*	*Ave*	*Health Compliance %*	*Aesthetic Compliance %*	*Min*	*Max*	*Ave*	*Aesthetic Compliance %*
ADWG Value Target				*< 0.3 100%*				*< 0.5 100%*	*< 0.1 100%*				*< 200*
Barmera WTP	0.015	0.028	0.020	100	0.004	0.004	0.004	100	100	36	82	62	100
Berri WTP	0.019	0.036	0.026	100	0.001	0.001	0.001	100	100	29	72	56	100
Blanchetown WTP	0.010	0.023	0.014	100	<0.001	0.002	0.001	100	100	51	73	62	100
Cadell WTP	<0.005	0.010	0.008	100	<0.001	0.002	0.001	100	100	34	77	56	100
Glossop WTP	0.018	0.139	0.045	100	<0.001	0.007	0.002	100	100	32	67	51	100
Hawker IRP	0.007	0.102	0.023	100	<0.001	<0.001	<0.001	100	100	521	1010	876	0
Loxton WTP	<0.005	0.009	0.005	100	<0.001	0.028	0.006	100	100	26	77	56	100
Melrose	0.007	0.027	0.017	100	<0.001	<0.001	<0.001	100	100	336	338	337	0
Moorook WTP	0.006	0.092	0.022	100	<0.001	0.008	0.001	100	100	42	71	62	100
Morgan / Swan Reach WTP	<0.005	0.115	0.021	100	<0.001	0.008	0.003	100	100	41	87	72	100
Morgan WTP	<0.005	0.059	0.008	100	<0.001	0.016	0.003	100	100	52	107	74	100
Orroroo	<0.005	0.014	0.010	100	<0.001	<0.001	<0.001	100	100	616	727	679	0
Parachilna	<0.005	<0.005	<0.005	100	<0.001	<0.001	<0.001	100	100	309	318	314	0
Quorn	<0.005	<0.005	<0.005	100	<0.001	<0.001	<0.001	100	100	515	524	520	0
Renmark WTP	0.005	0.051	0.014	100	<0.001	0.054	0.009	100	100	41	85	62	100
Waikerie WTP	0.065	0.152	0.111	100	0.006	0.006	0.006	100	100	36	87	69	100
Warooka	<0.005	0.008	0.006	100	<0.001	<0.001	<0.001	100	100	303	340	327	0
Wilmington	0.034	0.085	0.053	100	<0.001	0.001	0.001	100	100	99	116	110	100
Woolpunda	N/A	N/A	N/A	-	N/A	N/A	N/A	-	-	41	77	60	100

N/A – Not applicable

Table 4 2010-11 Country drinking water distribution systems – customer tap water quality against 2004 ADWG *continued*

Outer Metro Region												
	Coliforms/100 mL		***E. coli*/100 mL**		**Chlorine Residual – Free [mg/L]***				**Chlorine Residual – Total [mg/L]****			
System	*Samples*	*Health Compliance %*	*Samples*	*Health Compliance %*	*Min*	*Max*	*Ave*	*Health Compliance %*	*Min*	*Max*	*Ave*	*Health Compliance %*
ADWG Value Target		*0 > 95% free[x]*		*0 > 98% free*				*< 5 100%*				*< 4.1 100%*
Anstey Hill WTP#	49	96	49	100	<0.1	1.4	0.4	100	N/A	N/A	N/A	-
Barossa WTP#	459	98	459	100	<0.1	3.0	0.5	100	N/A	N/A	N/A	-
Cowirra WTP	101	96	101	100	<0.1	2.5	0.9	100	N/A	N/A	N/A	-
Happy Valley WTP#	88	98	88	99	<0.1	2.0	0.9	100	N/A	N/A	N/A	-
Kanmantoo WTP	99	100	99	100	<0.1	1.9	1.0	100	N/A	N/A	N/A	-
Mannum WTP	104	100	104	100	0.2	3.5	2.1	100	N/A	N/A	N/A	-
Middle River WTP	102	93	103	100	<0.1	1.8	0.6	100	N/A	N/A	N/A	-
Morgan / Swan Reach WTP	545	97	545	100	N/A	N/A	N/A	-	<0.1	4.2	1.8	100
Morgan WTP	1077	99	1077	100	N/A	N/A	N/A	-	<0.1	4.4	2.4	100
Mt Compass	77	100	77	100	0.2	1.5	1.1	100	N/A	N/A	N/A	-
Mt Pleasant WTP	114	97	114	100	<0.1	1.8	0.5	100	N/A	N/A	N/A	-
Murray Bridge WTP	240	98	240	100	<0.1	4.0	1.3	100	N/A	N/A	N/A	-
Mypolonga WTP	141	93	141	100	<0.1	2.4	0.7	100	N/A	N/A	N/A	-
Myponga WTP#	376	98	376	100	<0.1	2.7	0.7	100	N/A	N/A	N/A	-
Palmer WTP	104	97	104	100	<0.1	2.6	1.0	100	N/A	N/A	N/A	-
Penneshaw WTP	77	97	77	100	0.6	4.3	1.2	100	N/A	N/A	N/A	-
Summit WTP	698	98	698	100	N/A	N/A	N/A	-	<0.1	4.1	1.8	100
Swan Reach Town WTP	53	100	53	100	<0.1	1.7	0.7	100	N/A	N/A	N/A	-
Swan Reach WTP	437	98	437	100	N/A	N/A	N/A	-	<0.1	3.6	1.8	100
Tailem Bend WTP	439	96	439	100	N/A	N/A	N/A	-	<0.1	3.8	1.5	100

* Chlorinated systems only
** Chloraminated systems only
x SA Water internal guideline value
\# Supplies both country and metropolitan systems
N/A – Not applicable

Table 4 2010-11 Country drinking water distribution systems – customer tap water quality against 2004 ADWG *continued*

Outer Metro Region *continued*												
	Total Dissolved Solids [mg/L]				Colour – True [HU]				Turbidity [NTU]			
System	*Min*	*Max*	*Ave*	*Aesthetic Compliance %*	*Min*	*Max*	*Ave*	*Aesthetic Compliance %*	*Min*	*Max*	*Ave*	*Aesthetic Compliance %*
ADWG Value Target				< 500 100%				< 15				< 5
Anstey Hill WTP#	240	370	305	100	<1	1	1	100	0.1	0.2	0.1	100
Barossa WTP#	280	440	355	100	<1	2	1	100	<0.1	0.2	0.2	100
Cowirra WTP	140	240	185	100	<1	3	1	100	<0.1	0.2	0.1	100
Happy Valley WTP#	N/A	N/A	N/A	-	<1	<1	<1	100	<0.1	0.2	0.1	100
Kanmantoo WTP	200	250	225	100	<1	3	2	100	<0.1	3.8	1.2	100
Mannum WTP	140	250	207	100	<1	2	1	100	<0.1	0.5	0.1	100
Middle River WTP	410	770	555	25	<1	1	1	100	0.1	0.5	0.2	100
Morgan / Swan Reach WTP	150	270	221	100	<1	6	3	100	<0.1	0.7	0.2	100
Morgan WTP	160	290	232	100	<1	11	3	100	<0.1	1.2	0.2	100
Mt Compass	220	240	230	100	<1	<1	<1	100	<0.1	0.2	0.1	100
Mt Pleasant WTP	180	240	220	100	<1	4	1	100	<0.1	0.3	0.1	100
Murray Bridge WTP	150	290	221	100	<1	3	1	100	<0.1	1.9	0.3	100
Mypolonga WTP	180	220	203	100	<1	4	2	100	<0.1	1.1	0.2	100
Myponga WTP#	430	530	458	91	<1	3	1	100	<0.1	0.4	0.2	100
Palmer WTP	100	360	207	100	<1	2	1	100	<0.1	0.4	0.1	100
Penneshaw WTP	180	290	220	100	<1	2	1	100	<0.1	0.4	0.2	100
Summit WTP	170	260	218	100	<1	7	3	100	<0.1	3.4	0.3	100
Swan Reach Town WTP	140	230	185	100	<1	2	1	100	<0.1	0.2	0.1	100
Swan Reach WTP	140	300	229	100	<1	6	4	100	<0.1	0.2	0.1	100
Tailem Bend WTP	130	310	248	100	<1	7	3	100	<0.1	0.9	0.2	100

Supplies both country and metropolitan systems
N/A – Not applicable

Table 4 2010-11 Country drinking water distribution systems – customer tap water quality against 2004 ADWG *continued*

Outer Metro Region *continued*												
	pH Units				**Trihalomethanes – Total [µg/L]**				**Fluoride [mg/L]**			
System	*Min*	*Max*	*Ave*	*Aesthetic Compliance %*	*Min*	*Max*	*Ave*	*Health Compliance %*	*Min*	*Max*	*Ave*	*Health Compliance %*
ADWG Value Target				*6.5 - 8.5*				*< 250 100%*				*< 1.5 100%*
Anstey Hill WTP[#]	7.3	7.5	7.4	100	65	203	134	100	0.9	1.1	1.0	100
Barossa WTP[#]	6.3	8.9	7.7	84	49	315	199	74	0.9	0.9	0.9	100
Cowirra WTP	7.3	8.1	7.7	100	48	349	151	85	<0.1	0.1	0.1	100
Happy Valley WTP[#]	N/A	N/A	N/A	-	177	277	229	88	N/A	N/A	N/A	-
Kanmantoo WTP	7.1	8.3	7.7	100	76	362	178	78	<0.1	0.1	0.1	100
Mannum WTP	7.4	7.9	7.7	100	66	241	135	100	0.9	0.9	0.9	100
Middle River WTP	7.6	7.9	7.8	100	74	365	176	95	<0.1	<0.1	<0.1	100
Morgan / Swan Reach WTP	7.5	9.4	8.7	36	11	283	67	96	0.2	1.0	0.8	100
Morgan WTP	6.7	9.8	8.5	40	14	160	57	100	0.8	1.0	0.8	100
Mt Compass	6.3	7.7	6.6	61	4	9	6	100	0.3	0.4	0.3	100
Mt Pleasant WTP	7.7	8.2	7.8	100	27	367	134	90	0.9	0.9	0.9	100
Murray Bridge WTP	7.0	8.5	7.8	100	43	362	162	84	0.7	0.9	0.8	100
Mypolonga WTP	7.3	9.3	7.9	83	71	384	180	76	<0.1	0.1	0.1	100
Myponga WTP[#]	7.0	8.7	7.5	86	138	353	235	69	0.8	0.9	0.8	100
Palmer WTP	7.0	8.7	7.7	99	70	381	192	71	<0.1	0.1	0.1	100
Penneshaw WTP	7.7	8.4	8.0	100	<4	<4	<4	100	<0.1	<0.1	<0.1	100
Summit WTP	7.3	8.9	8.3	62	4	68	24	100	0.8	1.0	0.9	100
Swan Reach Town WTP	7.2	8.0	7.8	100	52	341	148	86	<0.1	0.1	0.1	100
Swan Reach WTP	7.3	9.0	8.5	35	8	69	33	100	0.8	1.0	0.9	100
Tailem Bend WTP	6.9	9.5	8.3	64	8	216	30	100	0.8	1.0	0.9	100

[#] Supplies both country and metropolitan systems
N/A – Not applicable

Table 4 2010-11 Country drinking water distribution systems – customer tap water quality against 2004 ADWG *continued*

Outer Metro Region *continued*													
	Iron – Total [mg/L]				Manganese – Total [mg/L]					Hardness – Total [mg/L]			
System	*Min*	*Max*	*Ave*	*Aesthetic Compliance %*	*Min*	*Max*	*Ave*	*Health Compliance %*	*Aesthetic Compliance %*	*Min*	*Max*	*Ave*	*Aesthetic Compliance %*
ADWG Value Target				*< 0.3 100%*				*< 0.5 100%*	*< 0.1 100%*				*< 200*
Anstey Hill WTP#	0.005	0.026	0.015	100	<0.001	0.002	0.001	100	100	96	129	113	100
Barossa WTP#	0.006	0.038	0.017	100	<0.001	0.002	0.001	100	100	117	136	126	100
Cowirra WTP	<0.005	0.022	0.009	100	<0.001	0.004	0.001	100	100	38	81	60	100
Happy Valley WTP#	0.009	0.021	0.015	100	<0.001	0.002	0.002	100	100	N/A	N/A	N/A	-
Kanmantoo WTP	<0.005	0.262	0.088	100	<0.001	0.004	0.001	100	100	56	88	72	100
Mannum WTP	<0.005	0.008	0.007	100	0.002	0.007	0.005	100	100	37	78	59	100
Middle River WTP	0.041	0.071	0.053	100	0.002	0.003	0.002	100	100	54	114	82	100
Morgan / Swan Reach WTP	<0.005	0.115	0.021	100	<0.001	0.008	0.003	100	100	41	87	72	100
Morgan WTP	<0.005	0.059	0.008	100	<0.001	0.016	0.003	100	100	52	107	74	100
Mt Compass	<0.005	0.010	0.007	100	<0.001	<0.001	<0.001	100	100	66	81	72	100
Mt Pleasant WTP	<0.005	0.019	0.011	100	<0.001	0.007	0.003	100	100	43	76	62	100
Murray Bridge WTP	<0.005	0.190	0.020	100	<0.001	0.005	0.002	100	100	46	88	66	100
Mypolonga WTP	<0.005	0.032	0.016	100	<0.001	0.007	0.002	100	100	56	71	65	100
Myponga WTP#	0.013	0.073	0.049	100	<0.001	0.003	0.002	100	100	119	133	125	100
Palmer WTP	0.017	0.088	0.037	100	<0.001	0.005	0.002	100	100	37	85	62	100
Penneshaw WTP	<0.005	0.116	0.011	100	<0.001	0.005	0.001	100	100	54	96	65	100
Summit WTP	<0.005	0.506	0.067	88	<0.001	0.022	0.005	100	100	47	104	75	100
Swan Reach Town WTP	0.014	0.056	0.029	100	<0.001	0.003	0.002	100	100	34	85	60	100
Swan Reach WTP	<0.005	0.012	0.006	100	<0.001	0.006	0.003	100	100	41	100	76	100
Tailem Bend WTP	<0.005	0.101	0.010	100	<0.001	0.014	0.006	100	100	35	107	80	100

Supplies both country and metropolitan systems
N/A – Not applicable

Table 4 2010-11 Country drinking water distribution systems – customer tap water quality against 2004 ADWG *continued*

South East Region												
	Coliforms/100 mL		***E. coli*/100 mL**		**Chlorine Residual – Free [mg/L]***				**Chlorine Residual – Total [mg/L]****			
System	*Samples*	*Health Compliance %*	*Samples*	*Health Compliance %*	*Min*	*Max*	*Ave*	*Health Compliance %*	*Min*	*Max*	*Ave*	*Health Compliance %*
ADWG Value Target		*0 > 95% free[x]*		*0 > 98% free*				*< 5 100%*				*< 4.1 100%*
Beachport IRP	52	100	52	100	0.4	1.5	1.2	100	N/A	N/A	N/A	-
Bordertown	63	97	64	100	1.0	1.9	1.4	100	N/A	N/A	N/A	-
Geranium	51	100	51	100	0.8	1.9	1.3	100	N/A	N/A	N/A	-
Kalangadoo IRP	51	100	51	100	0.2	1.8	0.9	100	N/A	N/A	N/A	-
Kingston SE IRP	51	98	51	100	0.6	1.6	1.1	100	N/A	N/A	N/A	-
Lameroo IRP	52	100	52	100	0.7	1.3	1.0	100	N/A	N/A	N/A	-
Lucindale IRP	51	100	51	100	0.2	1.2	0.7	100	N/A	N/A	N/A	-
Millicent	77	97	77	100	<0.1	1.3	0.4	100	N/A	N/A	N/A	-
Mt Burr	52	100	52	100	<0.1	1.0	0.7	100	N/A	N/A	N/A	-
Mt Gambier	102	98	103	100	0.7	1.8	1.0	100	N/A	N/A	N/A	-
Nangwarry	51	96	51	100	0.1	1.8	0.8	100	N/A	N/A	N/A	-
Naracoorte	64	88	64	100	<0.1	2.5	0.1	100	N/A	N/A	N/A	-
Padthaway	52	100	52	100	<0.1	1.5	0.9	100	N/A	N/A	N/A	-
Parilla IRP	26	100	26	100	0.7	1.5	1.0	100	N/A	N/A	N/A	-
Penola IRP	65	100	65	100	0.3	1.5	0.9	100	N/A	N/A	N/A	-
Pinnaroo IRP	77	99	77	100	0.6	2.1	1.1	100	N/A	N/A	N/A	-
Port MacDonnell	51	98	51	100	N/A	N/A	N/A	-	<0.1	1.1	0.6	100
Robe IRP	65	100	65	100	N/A	N/A	N/A	-	0.6	1.9	1.4	100
Tailem Bend WTP	439	96	439	100	N/A	N/A	N/A	-	<0.1	3.8	1.5	100
Tarpeena IRP	52	98	52	100	<0.1	1.5	1.0	100	N/A	N/A	N/A	-

* Chlorinated systems only
** Chloraminated systems only
x SA Water internal guideline value
N/A – Not applicable

Table 4 2010-11 Country drinking water distribution systems – customer tap water quality against 2004 ADWG *continued*

South East Region *continued*												
	Total Dissolved Solids [mg/L]				**Colour – True [HU]**				**Turbidity [NTU]**			
System	*Min*	*Max*	*Ave*	*Aesthetic Compliance %*	*Min*	*Max*	*Ave*	*Aesthetic Compliance %*	*Min*	*Max*	*Ave*	*Aesthetic Compliance %*
ADWG Value Target				< 500 100%				< 15				< 5
Beachport IRP	640	660	650	0	<1	<1	<1	100	<0.1	0.2	0.1	100
Bordertown	500	540	523	0	<1	<1	<1	100	<0.1	0.2	0.1	100
Geranium	1400	1600	1500	0	<1	1	1	100	0.1	0.2	0.2	100
Kalangadoo IRP	550	610	580	0	<1	1	1	100	<0.1	0.2	0.1	100
Kingston SE IRP	950	1000	975	0	<1	1	1	100	<0.1	0.2	0.1	100
Lameroo IRP	950	980	970	0	<1	<1	<1	100	0.1	0.3	0.2	100
Lucindale IRP	800	810	805	0	<1	<1	<1	100	<0.1	0.2	0.1	100
Millicent	590	630	607	0	<1	4	2	100	<0.1	0.4	0.1	100
Mt Burr	440	450	445	100	<1	1	1	100	<0.1	0.1	0.1	100
Mt Gambier	340	630	381	89	<1	1	1	100	<0.1	1.4	0.2	100
Nangwarry	550	620	588	0	<1	<1	<1	100	<0.1	0.2	0.1	100
Naracoorte	1300	1300	1300	0	3	6	4	100	0.1	14.0	0.9	97
Padthaway	1400	1400	1400	0	<1	<1	<1	100	0.1	0.3	0.2	100
Parilla IRP	650	660	655	0	<1	1	1	100	<0.1	0.2	0.1	100
Penola IRP	720	720	720	0	<1	1	1	100	<0.1	0.2	0.1	100
Pinnaroo IRP	670	780	710	0	<1	1	1	100	<0.1	0.2	0.1	100
Port MacDonnell	690	720	708	0	<1	6	4	100	0.2	1.2	0.6	100
Robe IRP	790	970	839	0	<1	1	1	100	<0.1	0.2	0.1	100
Tailem Bend WTP	130	310	248	100	<1	7	3	100	<0.1	0.9	0.2	100
Tarpeena IRP	670	730	695	0	<1	1	1	100	<0.1	0.1	0.1	100

Table 4 2010-11 Country drinking water distribution systems – customer tap water quality against 2004 ADWG *continued*

South East Region *continued*												
	pH Units				**Trihalomethanes – Total [µg/L]**				**Fluoride [mg/L]**			
System	*Min*	*Max*	*Ave*	*Aesthetic Compliance %*	*Min*	*Max*	*Ave*	*Health Compliance %*	*Min*	*Max*	*Ave*	*Health Compliance %*
ADWG Value Target				*6.5 - 8.5*				*< 250 100%*				*< 1.5 100%*
Beachport IRP	7.4	7.8	7.6	100	34	40	36	100	0.2	0.3	0.2	100
Bordertown	7.0	7.7	7.4	100	7	11	9	100	0.3	0.3	0.3	100
Geranium	7.1	7.2	7.2	100	<4	7	6	100	0.9	1.0	1.0	100
Kalangadoo IRP	7.1	7.5	7.3	100	24	57	40	100	0.1	0.2	0.2	100
Kingston SE IRP	7.3	7.7	7.5	100	27	41	32	100	0.3	0.3	0.3	100
Lameroo IRP	7.7	7.8	7.7	100	18	22	20	100	0.6	0.6	0.6	100
Lucindale IRP	7.4	7.5	7.4	100	58	104	88	100	0.3	0.3	0.3	100
Millicent	7.3	7.8	7.5	100	<4	100	60	100	1.0	1.2	1.1	100
Mt Burr	7.5	7.9	7.8	100	7	11	9	100	0.2	0.3	0.2	100
Mt Gambier	7.3	8.4	8.1	100	6	59	31	100	0.2	0.9	0.4	100
Nangwarry	7.0	7.5	7.2	100	<4	21	11	100	<0.1	0.1	0.1	100
Naracoorte	7.5	7.9	7.7	100	25	142	81	100	1.1	1.2	1.2	100
Padthaway	7.3	7.5	7.4	100	5	7	6	100	0.1	0.1	0.1	100
Parilla IRP	7.4	7.9	7.7	100	13	21	18	100	0.4	0.4	0.4	100
Penola IRP	7.0	7.2	7.1	100	31	91	61	100	0.2	0.3	0.2	100
Pinnaroo IRP	7.3	7.7	7.5	100	5	10	8	100	0.7	0.7	0.7	100
Port MacDonnell	8.2	8.7	8.3	96	N/A	N/A	N/A	-	0.9	1.0	1.0	100
Robe IRP	7.6	8.0	7.7	100	<4	4	4	100	0.3	0.3	0.3	100
Tailem Bend WTP	6.9	9.5	8.3	64	8	216	30	100	0.8	1.0	0.9	100
Tarpeena IRP	7.4	7.6	7.5	100	58	58	58	100	0.2	0.2	0.2	100

N/A – Not applicable

Table 4 2010-11 Country drinking water distribution systems – customer tap water quality against 2004 ADWG *continued*

South East Region *continued*													
	Iron – Total [mg/L]				**Manganese – Total [mg/L]**					**Hardness – Total [mg/L]**			
System	*Min*	*Max*	*Ave*	*Aesthetic Compliance %*	*Min*	*Max*	*Ave*	*Health Compliance %*	*Aesthetic Compliance %*	*Min*	*Max*	*Ave*	*Aesthetic Compliance %*
ADWG Value Target				*< 0.3 100%*				*< 0.5 100%*	*< 0.1 100%*				*< 200*
Beachport IRP	<0.005	0.014	0.007	100	<0.001	<0.001	<0.001	100	100	266	287	277	0
Bordertown	<0.005	0.031	0.009	100	<0.001	<0.001	<0.001	100	100	265	276	271	0
Geranium	0.009	0.042	0.031	100	<0.001	0.001	0.001	100	100	524	552	538	0
Kalangadoo IRP	<0.005	0.025	0.016	100	<0.001	<0.001	<0.001	100	100	341	466	407	0
Kingston SE IRP	<0.005	0.072	0.021	100	<0.001	<0.001	<0.001	100	100	215	232	223	0
Lameroo IRP	0.020	0.070	0.030	100	<0.001	<0.001	<0.001	100	100	232	241	236	0
Lucindale IRP	0.005	0.013	0.008	100	<0.001	<0.001	<0.001	100	100	312	321	318	0
Millicent	<0.005	0.099	0.031	100	<0.001	0.004	0.002	100	100	308	378	342	0
Mt Burr	<0.005	0.009	0.006	100	<0.001	<0.001	<0.001	100	100	274	289	285	0
Mt Gambier	<0.005	0.090	0.008	100	<0.001	<0.001	<0.001	100	100	168	313	195	86
Nangwarry	<0.005	<0.005	<0.005	100	<0.001	<0.001	<0.001	100	100	335	372	351	0
Naracoorte	0.006	0.302	0.076	96	0.002	0.029	0.008	100	100	351	373	359	0
Padthaway	0.024	0.033	0.027	100	N/A	N/A	N/A	-	-	554	562	558	0
Parilla IRP	<0.005	0.053	0.029	100	<0.001	<0.001	<0.001	100	100	182	192	187	100
Penola IRP	0.006	0.180	0.028	100	<0.001	<0.001	<0.001	100	100	331	342	337	0
Pinnaroo IRP	0.010	0.045	0.022	100	<0.001	<0.001	<0.001	100	100	231	251	243	0
Port MacDonnell	0.049	0.049	0.049	100	<0.001	<0.001	<0.001	100	100	16	20	18	100
Robe IRP	<0.005	0.041	0.009	100	<0.001	0.003	0.001	100	100	80	123	104	100
Tailem Bend WTP	<0.005	0.101	0.010	100	<0.001	0.014	0.006	100	100	35	107	80	100
Tarpeena IRP	<0.005	0.102	0.031	100	<0.001	0.003	0.002	100	100	381	401	391	0

N/A – Not applicable

Sovereign Offset is FSC Certified and considered to be one of the most environmentally adapted products on the market. Containing fibre sourced only from responsible forestry practices, this sheet is ISO 14001 EMS accredited and made with elemental chlorine free pulps.

SA Water Corporation
ABN: 69 336 525019

Head Office
250 Victoria Square
Adelaide SA 5000

Postal Address
GPO Box 1751
Adelaide SA 5001

Customer Service Centre
1300 650 950

Website
www.sawater.com.au

Enquiries relating to this report should be directed to our Customer Service Centre

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SA Water