SA Water

Drinking Water Quality Report

2012-13




Government of South Australia

SA Water

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This report covers the period of 1 July 2012 to 30 June 2013

2012-13 Highlights

Total water usage
(raw water for treatment)

223 483 ML

Population served

1 162 000 in metropolitan Adelaide through **9047 km** of water mains

430 000 in country areas through **17 627** km of water mains.

Raw water sources
% of total water supplied

River Murray: 55%

Surface water: 23%

Seawater: 16%

Groundwater: 6%

Number of routine water quality tests carried out

302 204
(total)

45 261
(metropolitan Adelaide)

256 943
(country)

Drinking water quality and performance

42 960 of the routine samples collected from our drinking water supplies throughout South Australia were used to determine health-related compliance.

Achieved **99.97%** compliance with the *Australian Drinking Water Guidelines* (ADWG 2011) health-related parameters in metropolitan Adelaide and **99.92%** in country areas.

E. coli compliance at customer taps was **99.96%** in metropolitan Adelaide and **99.91%** in country areas.

For detail see pages 33–34.

Incident management

Achieved a significant decrease in incident notifications compared with **2011–12**.

Incident response index exceeded the 82% target by 12%, achieving **94%**.

For detail see pages 36–37.

Total number of routine samples collected
(Includes samples for health-related compliance)

110 913 (total)

18 545 (metropolitan Adelaide)

92 368 (country)

A Message from our Chief Executive

John Ringham
Chief Executive

Following the release of our Strategic Plan 2012–16, this year we launched our new vision:

Meeting all challenges: to deliver safe, sustainable and affordable water services for the community.

Our vision captures our priorities and is the *'why?'* behind what we do at SA Water.

We have now completed our first 6 months operating under our economic regulatory framework put in place by the Essential Services Commission of South Australia and we have demonstrated we have what it takes to deliver outcomes that meet our regulator's requirements and our customers' expectations. We have also registered as a drinking water provider under the *Safe Drinking Water Act 2011* which commenced on 1 March 2013.

Investment in infrastructure is critical to our continued delivery of drinking water services across South Australia. This year we reached milestones on some major new assets. In December 2012, the Adelaide Desalination Plant was handed over to the plant's operator. The plant provides the state's first climate non-dependent water source and had produced more than 42 billion litres of water by the end of June 2013. It is now in its two-year proving period.

In March we launched the Kauwi Interpretive Centre located at the Adelaide Desalination Plant. The centre provides the community and school groups the chance to learn about the science of water and desalination in a fun, interactive and hands-on environment. As at 30 June 2013, the centre had hosted over 1300 visitors, many of whom spoke enthusiastically and positively about their experience.

The North South Interconnection System Project (NSISP), which was completed in December 2012 on time and within budget, now enables us to deliver desalinated water through the Happy Valley Water Treatment Plant to northern metropolitan Adelaide. This capability is critical to delivering water security to all Adelaide metropolitan customers as we plan for the future.

The NSISP represents a significant investment in our assets to meet future demand in metropolitan Adelaide and to make our water system more flexible to respond to changes and fluctuations in use.

In 2012–13 we collected more than 110 000 routine water samples across South Australia and conducted more than 300 000 tests to ensure our customers continue to be provided with safe drinking water.

SA Water continues to perform well against the *Australian Drinking Water Quality Guidelines*. We have again exceeded the national targets for public health in both of our metropolitan and country water supplies, achieving 99.97% compliance in metropolitan Adelaide and 99.92% in country areas.

I am proud of the significant achievements of our Research and Innovation group in both the national and international arenas. Our expertise in this area has continued to be recognised through our success securing competitive funding grants and winning high profile awards including two Australian Water Association SA Research Innovation Awards. Our focus on innovation and improvement has underpinned the successes outlined in this report. Seeking and applying better and more efficient ways to manage our water supply and water quality ensures we can provide reliable, safe and sustainable services for our customers now and in the future.

I'm particularly pleased that we significantly reduced the number of incidents reported in the 2012-13 financial year, and exceeded the Incident Response Index by 12%, achieving 94% compliance – a great result. This was largely due to our proactive water quality management and continual review and improvement of our incident management process.

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 *2012-13 Drinking Water Quality Report* is designed to help you better understand South Australia's drinking water quality as well as the related operational and research activities undertaken 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

Drinking water provided to the public by SA Water in the 2012–13 reporting period was safe. Operation of the interagency *Water/Wastewater Incident Notification and Communication Protocol* was maintained successfully throughout the 2012–13 reporting period. None of the incidents reported were considered to represent a risk to public health.

There was a significant reduction in the number of incidents reported by SA Water during the 2012–13 financial year. A number of criteria were revised in the current version of the Protocol and this resulted in a decrease in incidents. In addition there were fewer disinfection by-product (DBP) incidents compared to the previous reporting period. SA Water has implemented various mitigation strategies to reduce the formation and persistence of DBPs in drinking water supplies. The success of these strategies has been reflected in the closure of all ongoing DBP Type 1 incidents from the previous financial year. The majority of water quality incidents were notified by SA Water in a timely and appropriate manner and appropriate preventive measures were implemented.

SA Water collected a total of 42 960 samples in the reporting period for health-related compliance from drinking water supplies. Compliance with the *Australian Drinking Water Guidelines* (ADWG 2011) for *E. coli* was achieved in 99.96% of metropolitan Adelaide samples and 99.91% of country samples. Compliance with the ADWG for health-related parameters was 99.97% for metropolitan systems and 99.92% for country areas.

The *Safe Drinking Water Act 2011* and Safe Drinking Water Regulations 2012 commenced on 1 March 2013. The main requirements of the Act include registration of drinking water providers, developing and implementing risk management plans, monitoring protocols and incident protocols, regular inspection or audits of water providers and reporting of results to SA Health. Registrations closed on 1 June 2013 and SA Water registered the metropolitan, country and remote community supplies that it operates within the registration period.

Economic Regulation

The *Water Industry Act 2012* came into effect on 1 July 2012 with formal licensing requirements in place for SA Water from 1 January 2013.

During this time SA Water worked closely with the Essential Services Commission of South Australia (ESCOSA), the economic regulator for the South Australian water industry under the *Water Industry Act 2012*, as ESCOSA developed the regulatory framework to apply to SA Water and all other licensees.

SA Water has changed its business to ensure it can comply with regulatory requirements and still deliver the high quality of services expected by its customers. SA Water is dedicated to continuous improvement under the regulatory framework to ensure positive outcomes for its customers.

Safe Drinking Water Legislation

South Australia's *Safe Drinking Water Act 2011* commenced on 1 March 2013.

The Act provides the regulatory framework for drinking water providers in South Australia and is administered primarily by SA Health with assistance from local government. Provisions in the Act are underpinned by the ADWG (2011) and stipulate requirements for drinking water providers, including:

- Registration of drinking water providers with SA Health
- Development and implementation of risk management plans
- Establishment of approved drinking water quality monitoring programs
- Notification of incidents or non-compliance
- Audits and inspections to determine compliance with the Act
- Use of NATA accredited laboratories for sample testing
- Reporting of water quality test results to SA Health and providing consumers with drinking water quality information.

SA Water registered its drinking water supply systems in May 2013, within the required registration period.

At SA Water, our approach to managing drinking water quality through our Drinking Water Quality Management System (DWQMS) is based on the ADWG (2011) *Framework for Management of Drinking Water Quality*. This means that SA Water already satisfies most of the requirements outlined in the new *Safe Drinking Water Act*. Details of key components are outlined in this report, which in itself addresses one of the requirements of the Act – to report results and provide consumers with drinking water quality information.

Further information on the *Safe Drinking Water Act* can be found at: *www.sahealth.sa.gov.au/safedrinkingwateract*

The SA Water and Allwater Alliance

The Adelaide Services Alliance is a contract between SA Water and Allwater to operate and maintain metropolitan Adelaide's water, wastewater and recycled water systems.

The Alliance contract has an extensive series of internal performance measures to track progress, drive improvement and maintain excellent water quality. Allwater is a joint venture with partners Suez Environnement, Transfield Services and Degrémont, each bringing a wide range of water expertise to the partnership.

Delivering high quality water to Adelaide's customers is of paramount importance to all members of the Alliance. SA Water conducts regular testing to ensure the water produced by Allwater meets required standards. SA Water collected 11 151 samples from the metropolitan Adelaide drinking water systems over the last year to determine health-related compliance. Compliance was achieved in 99.97% of samples – a high performance result. In total, over 45 000 tests were conducted on metropolitan Adelaide's drinking water during 2012–13.

The North South Interconnection System and Adelaide Desalination Plant are now both fully operational and provide added water security for metropolitan Adelaide. Allwater worked closely with SA Water and SA Health during the blending of desalinated water into the distribution system. Complexities arising from this process were managed with minimal impact to Adelaide customers.

SA Water funded a number of capital projects at Allwater operated metropolitan water treatment plants in 2012–13, including filter and control system upgrades to improve water quality. Allwater has optimised filter operations at the Myponga Water Treatment Plant to improve water quality, increase capacity and reduce operational costs.

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 *Framework for Management of Drinking Water Quality* outlined in the ADWG (2011) that is endorsed by the National Health and Medical Research Council (NHMRC). 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:

1	Commitment to drinking water quality 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
7	Employee awareness and training
8	Community involvement and awareness
9	Research and development
10	Documentation and reporting
11	Evaluation and audit
12	Review and continual improvement.

SA Water's Drinking Water Quality Policy and Small Communities Policy underpin the corporation's commitment to deliver ongoing drinking water quality and improvement.

To regularly assess our improvements 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 (WSAA), as a key performance indicator. For the 2012–13 period, a target of 90% implementation of the framework was set and an actual implementation of 91.2% (88.4% in 2011–12) was achieved as outlined on page 7.

During 2012–13, SA Water achieved the following outcomes in relation to maintaining high water quality standards across our systems:

- Completed and endorsed 'responsibility matrices' – SA Water's water quality processes which contribute to communicating our water quality commitments to employees and our contractors
- Documented a process for senior leadership team review of the DWQMS
- Implemented a water quality System Risk Assessment process
- Developed a Water Quality Hazard and Risk Register, which incorporates an improvement planning process
- Developed an approved chemicals register as specified in the ADWG for chemicals recommended for use in the treatment of drinking water
- Established a drinking water quality external audit program
- Implemented a process for, and reporting of, long term water quality trending for source water
- Upgraded 27 bores across South East and Northern regions to improve source water quality, structural bore integrity and to ensure water security
- Implemented tank cleaning regimes across northern railway town supplies leading to improvements in chemical water quality
- Implemented a number of additional proactive water quality management strategies including aeration, system water age optimisation and disinfection residual management across a number of SA Water's drinking water supplies.

Future strategies that are proposed for the 2013–14 period include:

- Continued use of the 'AQUALITY' tool to determine strategies that will enable us to meet our ADWG framework implementation targets
- Continued roll-out of the framework across systems managed by our contractors to ensure continuous improvement to documentation, processes, procedures and practices in order to maintain high water quality standards
- Develop enhanced strategies and initiatives, in line with the *Safe Drinking Water Act 2011*, to meet regulatory requirements including risk processes, system auditing and reporting. These strategies will cover SA Water operations, its contractors and alliance partner Allwater.

The 12 elements included in the *Framework for Management of Drinking Water Quality* (ADWG 2011)

1 Commitment to drinking water quality management

System Analysis & 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

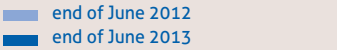
10 Documentation and reporting

Review

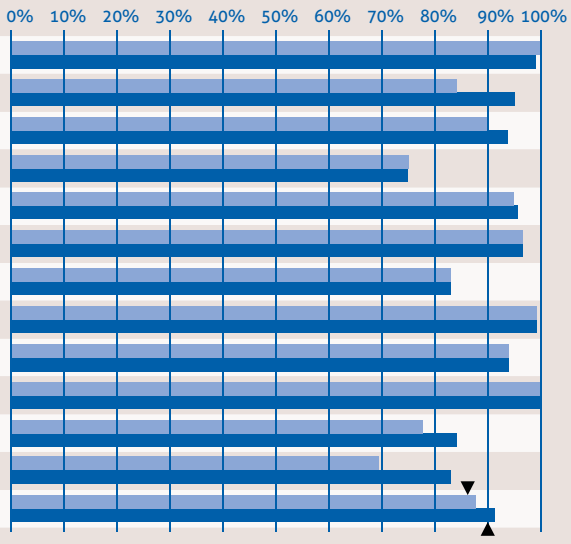
11 Evaluation and audit

12 Review and continual improvement

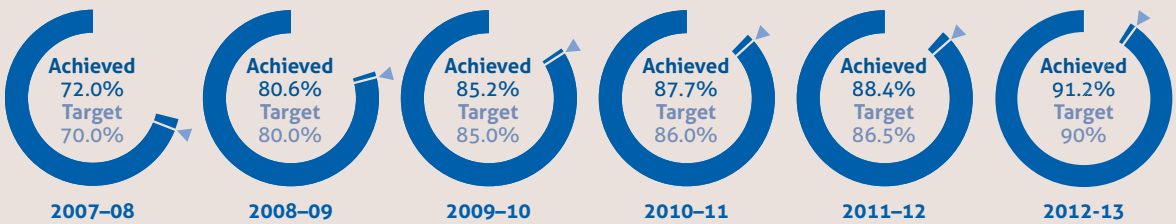
SA Water's progress in implementing the *Framework for Management of Drinking Water Quality* (ADWG 2011)



Framework element		'AQUALITY' score
1	Commitment to drinking water quality	
2	Assessment of the drinking water supply system	
3	Preventive measures for drinking water quality	
4	Operational procedures and process control	
5	Verification of drinking water quality	
6	Management of incidents and emergencies	
7	Employee awareness and training	
8	Community involvement and awareness	
9	Research and development	
10	Documentation and reporting	
11	Evaluation and audit	
12	Review and continual improvement	
'AQUALITY' overall score		



'AQUALITY' score across all elements



Examples of how SA Water is applying the *Framework for Management of Drinking Water Quality* (ADWG 2011)

1 /	Commitment to drinking water quality management	• A Drinking Water Quality Policy, endorsed by the Chief Executive, is in place and communicated to employees • Responsibility matrices that define roles, accountabilities and responsibilities for quality processes are implemented • Communication and notification protocols with SA Health for water quality monitoring and incident response are in place and reviewed regularly • Drinking Water Compliance Manual has been reviewed and updated in consultation with the Crown Solicitor's Office.
2 /	Assessment of the drinking water supply system	• Robust system risk assessment process developed • Water Quality Safety Plans (WQSP) documenting key characteristics of the water supply system reviewed and updated every two years • Document review cycle process developed and implemented • Proposed improvement of WQSPs in a web-based format • Advanced system analysis tools used to better understand 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 hazard identification, risk assessment, and risk mitigation centrally managed in a corporate Water Quality Hazard and Risk Register (WQH&RR). The register is a customised, flexible, web-based platform that can be accessed and populated by all SA Water staff and select contractors • Water Quality Operating Plans (WQOP) improved to include critical control points and system-specific water quality hazards to ensure water supply systems are operated to a high standard.
4 /	Operational procedures and process control	• Water quality procedures available to support reliable achievement of the target criteria, critical limits and water quality objectives • Response procedures developed to assist operators manage water quality in the event of exceedences in operational parameters or processes • Online monitoring Supervisory Control and Data Acquisition (SCADA) in place. SCADA allows SA Water to continuously remotely monitor and control water and wastewater assets and infrastructure • Telemetry/SCADA systems provide rapid notification of deviations in water quality, with response procedures in place to respond 24 hours a day, seven days a week • All new infrastructure in contact with drinking water is compliant with Australian Standard 4020.
5 /	Verification of drinking water quality	• SA Water's Water Quality Monitoring Handbook outlines our philosophy for water quality monitoring in all systems and is based on the ADWG. Deviations from the ADWG are documented in the Water Quality Monitoring Handbook and have been approved by SA Health • Routine and event-based monitoring programs reviewed and updated each year for all water supply systems. This is designed to improve management and system understanding • Automated processes in place to flag out-of-specification monitoring results • Analytical quality control program in place to verify the performance of instruments used for the measurement of various parameters to maintain water quality • National Association of Testing Authorities (NATA) accredited laboratory performs analysis of all water samples • Process in place to capture customer feedback and complaints. Reports developed to analyse feedback and to assist in determining appropriate responses to customers.

6 /	Management of incidents and emergencies	• A SA Health interagency *Water/Wastewater Incident Notification and Communication Protocol* is in place and updated regularly • An internal Water Quality Incident and Emergency Management Protocol integrates and consolidates the SA Health and SA Water requirements for identification, notification and response procedures • A web-based Incident Management System is in place to record and generate notification of water quality incidents to a defined list of key SA Water personnel • A root cause analysis process is conducted for every 'Priority Type 1' and 'Type 1' water quality incident notification • An Emergency Management Manual and emergency management plans are in place and regularly updated • Incident notification and emergency response training is included as part of water quality training • Specific training sessions are also provided to incident managers and other staff involved in the management of water quality incidents.
7 /	Employee awareness and training	• Water quality training courses have been developed in accordance with the National Australian Qualifications Framework (AQF) standard and presented to targeted staff, covering topics such as water quality sampling, water quality testing, disinfection for operators and demonstration of knowledge of ADWG risk management principles • Additional training modules are being developed to the National AQF Standard, including operation of granular media filters and control of water quality in distribution systems • Ongoing training program for water quality awareness, root cause analysis, incident management, corporate employee induction, odours in water supplies and introduction to recycled water reviewed and delivered to relevant staff • Environmental awareness and environmental best practice training courses provided to staff as required • Weekly knowledge sharing seminar series involving internal and external stakeholders implemented.
8 /	Community involvement and awareness	• Community involvement policy and procedure available on the corporate website • Dedicated community involvement team ensures customer issues and concerns are assessed and responded to according to policy requirements • Drinking Water Quality Report, including descriptions of relevant aspects of water quality management, is produced annually and made available to customers, regulators and stakeholders • SA Water Community Investment program delivers regular education sessions on water quality and treatment to school and community groups • SA Water's website *(www.sawater.com.au)* provides general water quality information (including hardness data for dishwasher settings), factsheets on key water quality parameters and water quality performance data for all SA Water drinking water supply systems (for individual suburbs and townships).
9 /	Research and development	• The Research and Innovation (R&I) group brokers and undertakes research to generate new knowledge, provide solutions by measuring, clarifying and controlling operational challenges and implement effective technologies to mitigate risk, drive efficiency, improve performance and ensure the sustainable growth of our business • Research is conducted internally and through partnerships, collaborations and alliances with other water utilities, universities and external research providers, both locally, nationally and internationally to ensure the delivery of optimum water quality solutions • SA Water's research program is managed using a strategic planning framework that is supported by a series of planning groups with membership from business units across SA Water. Their role is to identify business issues, risks and knowledge gaps and prioritise research investment to address these challenges

Continued over >

9 /	Research and development *continued*	• Beneficial outcomes and improvements to water quality management are implemented using operational and business champions who facilitate the transfer and smooth transition of new technologies into the business. Recent examples include: water quality monitoring linked by telemetry, vertical profiling system for monitoring reservoir water quality, rapid methods for testing blue-green algal by-products, viability and genotyping methods for *Cryptosporidium* • To enhance technology transfer and the uptake of project outcomes researchers regularly present at operational meetings, knowledge sharing seminars, conferences and workshops. SA Water also holds an annual R&I forum to showcase our business achievements, demonstrate the importance of research implementation and communicate the value of research.
10 /	Documentation and reporting	• All information associated with drinking water quality management is available to staff online via SA Water's AquaNet (SA Water Intranet) • The DWQMS has been developed to authorise, control and review water quality related documentation • SA Water's annual Drinking Water Quality Report details performance against the ADWG and outlines SA Water's commitment to delivering safe, reliable and high quality drinking water to South Australian communities. Overviews of key performance targets, achievements and areas identified for improvement are included in the report • Regular reporting of water quality and management system performance is provided to the Corporate and Technical Water Quality Committees, including key risks, water quality performance, progress of improvements, incident response and audit results.
11 /	Evaluation and audit	• Long-term trends for key water quality parameters are reviewed to assist in determining priorities for improving drinking water quality • All analytical results for water quality monitoring are stored in Waterscope (SA Water's database) and reports can be generated to enable validation to planned requirements • Internal auditing is programmed across the water supply systems to assess the performance of drinking water quality management and against the ADWG framework requirements • External audits are undertaken by independent third party auditors (qualified auditors under the Drinking Water Auditor Scheme – RABQSA). SA Water contractor and alliance partners are also audited as part of this process.
12 /	Review and continual improvement	• The DWQMS as a whole, including the policy, objectives and performance measures, is reviewed at a senior management level and by relevant Operations Business Units to ensure its ongoing relevance and effectiveness in addressing SA Water's water quality issues • WSAA developed 'AQUALITY' tool is used to report progress of the implementation of the ADWG framework within the content of the DWQMS • WQH&RR endorsed by SA Water's Water Quality Committee to identify and manage significant water quality risks on an on-going basis • Action Request and Compliance System in place to track progress of actions arising from audits, root cause analysis outcomes from incidents and agreed improvements • Comprehensive asset management plans maintained to meet short and long term needs • National and international links and partnerships have been established to ensure optimal water quality solutions are employed within the drinking water quality systems.

Our Water Supply Systems

SA Water has an extensive network of drinking water supply systems across South Australia, with more than 26 600 km of water mains.

We provide high quality drinking water to an estimated population of 1 162 000 across metropolitan Adelaide through 9047 km of water mains, and to an estimated population of 430 000 through 17 627 km of water mains across regional communities.

Our water supply sources

In South Australia, raw water for treatment is collected from four distinctly different sources: reservoirs, the River Murray, groundwater and the ocean.

Surface water (reservoirs)

Treatment plants supplying the Adelaide metropolitan area are supplied with raw water collected from 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 transferred 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 which provides filtered and disinfected water to Kingscote and smaller communities along the transfer pipeline. In 2012–13, 23% of the water supplied by SA Water was provided by surface water.

River Murray

The River Murray is a key source of raw water for South Australia's water supplies. Of SA Water's 70 drinking water supply systems, 35 source water either directly or indirectly from the River Murray, including 18 water treatment plants located along South Australia's reaches of the River Murray. The River Murray also supplements metropolitan Adelaide's reservoirs (with the exception of Myponga reservoir) via two raw water pipelines: the Murray Bridge-Onkaparinga pipeline (48 km in length) and the Mannum-Adelaide pipeline (60 km in length).

Three major pipelines supply treated water from the River Murray to various regional communities. The Morgan-Whyalla pipeline (356 km long via Port Augusta and 281 km long via the undersea section from Baroota) is used to transfer treated River Murray water from the Morgan water treatment plant to the Iron Triangle, significant areas of the mid-north, the Yorke Peninsula, and the Eyre Peninsula.

The Swan Reach-Stockwell pipeline (54 km in length) supplies treated water from the Swan Reach water treatment plant to communities along its route, including those in the Barossa Valley, and also feeds into the Yorke Peninsula supply. The Tailem Bend-Keith pipeline (133 km in length) supplies treated water from the Tailem Bend treatment plant to 13 communities in the upper South East and around Lake Albert.

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 2012–13, 55% of water supplied by SA Water was sourced from the River Murray.

Groundwater

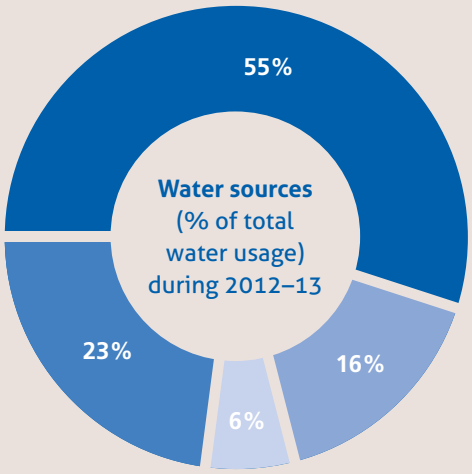
Groundwater is contained in underground water bodies known as aquifers. SA Water has 31 drinking water supply systems that draw water from aquifers as their primary source of domestic water. Most of these are located in the South East, Eyre Peninsula and northern region of South Australia. The Blue Lake, 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 2012–13, 6% of water supplied by SA Water was provided by groundwater.

Seawater

Desalinated drinking water from the Adelaide Desalination Plant (ADP) was introduced into the distribution network in October 2011. Desalinated drinking water from the plant is pumped through a transfer pipeline to the Happy Valley water treatment plant where it is blended with treated water from Happy Valley reservoir before being delivered to customers via the distribution network.

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 2012–13, desalinated seawater accounted for 16% of South Australia's total water supply. The increase in the percentage of seawater used from 1.8% in 2011–12 to 16% in 2012–13 is a reflection of the operation of the ADP.



Water sources (% of total water usage) during 2012–13
(Total water usage: 223 483 ML)

- River Murray
- Surface Water
- Seawater
- Groundwater

Water treatment

A number of water treatment plants have been constructed in South Australia to improve the quality of available water sources. The treatment program started with the construction of an iron removal plant at Kingston SE in 1963.

Today there are 42 operational water treatment plants, comprising:

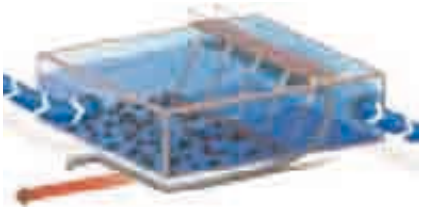
- Six large conventional water treatment plants serving metropolitan Adelaide
- Twenty-three water treatment plants serving country regions and towns. Earlier plants were of conventional design while more recent plants incorporate newer technologies such as ion exchange, membrane filtration and activated carbon adsorption
- Eleven iron removal plants serving towns in the South East and Hawker
- Two seawater desalination plants serving Adelaide and Penneshaw.

Conventional water treatment plants

SA Water's conventional water treatment plants typically 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 much of the dissolved organic material. The success of the treatment process very much depends on successful coagulation and SA Water is investing in the latest instrumentation to maximise coagulation effectiveness.

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



Step 3: Sedimentation – water and suspended flocs pass slowly through sedimentation basins or clarifiers, where most of the floc settles to the bottom as a sludge. The clarified water (now containing only a small amount of very fine floc particles) continues on to the filters. The sludge is periodically removed from the basins for further treatment and disposal. An alternative technique called Dissolved Air Floatation (DAF) is used at the Myponga treatment plant. This uses fine air bubbles to float floc to the surface to form a sludge blanket, which is periodically removed by overflowing the floatation tanks.

Step 4: Filtration – the remaining floc particles are removed by passing the clarified water through filtration media. The most common filters at the larger treatment plants are deep beds of sand or a sand/anthracite combination. In our more recent, smaller treatment plants, the final filtration step is achieved by forcing the clarified water through synthetic membranes.

Step 5: Disinfection – a chemical disinfectant 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. In South Australia, chlorine is the disinfectant of choice for supply systems with relatively short detention times of a day or two, while chloramine (produced by reacting chlorine and ammonia) is used in supply systems with longer regional pipeline systems. Disinfection also includes a pH adjustment process, to ensure that the water is at the optimum pH for the particular disinfectant used. In some more recently built plants, ultraviolet (UV) light is used to complement chemical disinfection.

Step 6: Fluoridation – fluoride is added to major water supply systems at a rate determined by SA Health 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.

Magnetic Ion Exchange (MIEX®)

Magnetic Ion Exchange is used in some more recently built water treatment plants that service country regions or towns. 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, which causes 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.

Ultraviolet light disinfection

Ultraviolet (UV) light is used to disinfect water in some water treatment plants. Exposure to adequate doses of 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 18.

Iron removal plants (IRPs)

Many South Australian groundwater sources contain elevated iron concentrations. The presence of iron in water does not pose a risk to human health, but it can lead to brown discolouration and possible staining of fixtures and washing. IRPs are a simplified version of conventional treatment plants, where chlorine is added to oxidise the iron to an insoluble form that precipitates naturally, forming small floc. The iron floc is removed from the water by filtration through sand media. SA Water is currently engaged in a program to upgrade many iron removal plants by installing facilities to capture and reprocess filter backwash water. This will reduce the amount of groundwater extracted and minimise environmental impact. For a listing of IRPs please refer to the country drinking water supply system sources and treatment table on page 18.

Desalination

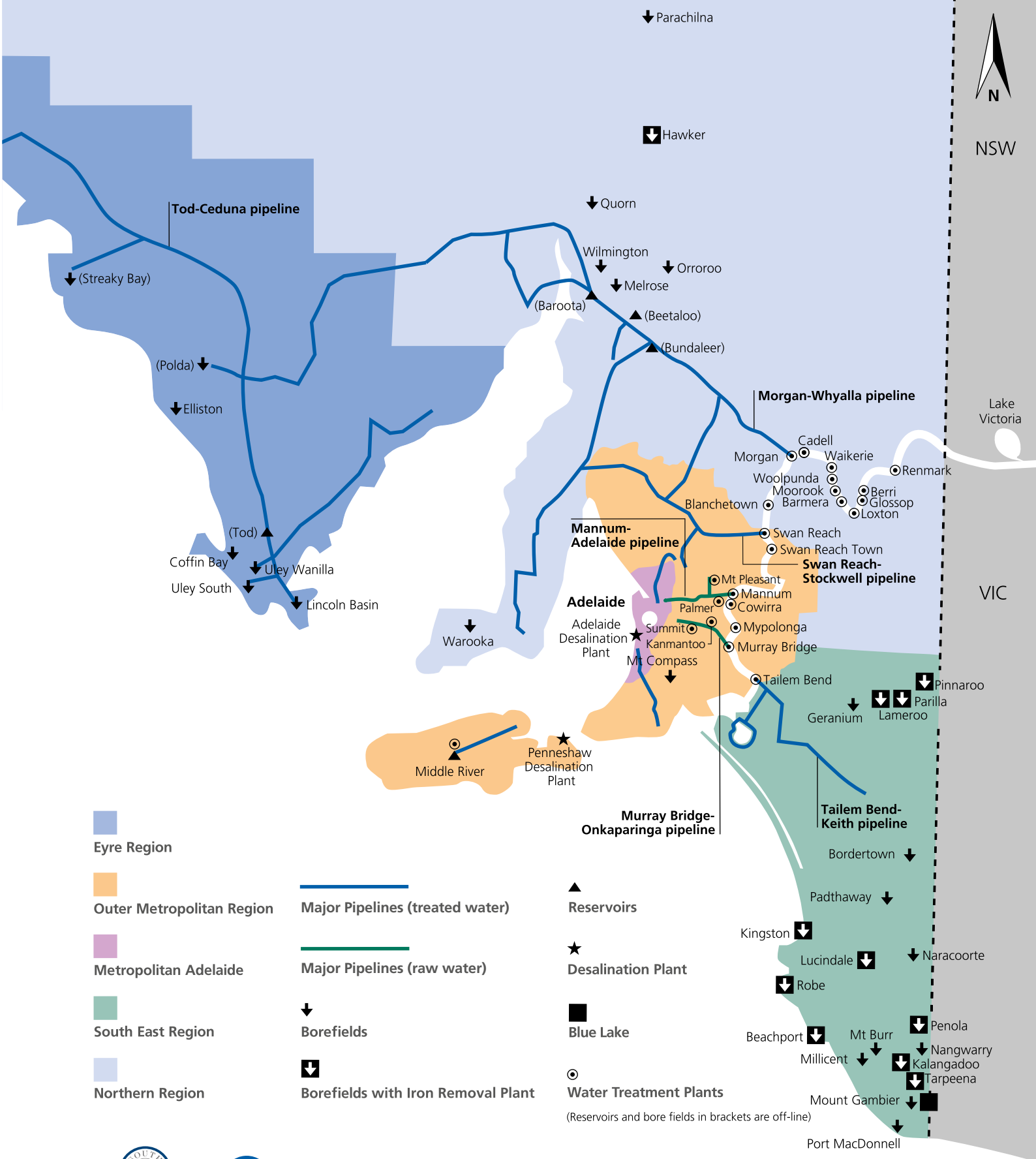
A small seawater desalination plant was constructed at Penneshaw on Kangaroo Island in 1999, because there was no alternative viable water supply. Seawater is drawn into the plant through an intake pipe and pre-screened. UV disinfection is used to minimise biological growth and filters remove most of the particulate matter. The filtered seawater is forced under high pressure through reverse osmosis membranes that allow fresh water to pass through, with 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. Desalination experience gained at Penneshaw was used to good effect in the design of the Adelaide Desalination Plant.

The 100 GL Adelaide Desalination Plant at Port Stanvac also uses reverse osmosis with pre- and post-treatment. The plant first produced drinking water in 2011 and has the ability to produce up to 100 billion litres of drinking water each year – about half of metropolitan Adelaide's current annual water demand. The water produced is transferred to the Happy Valley water treatment plant, where it is blended with Happy Valley filtered water prior to distribution. As the ratio of desalinated water in the blend can be quite variable and because the water quality differs from Happy Valley water in characteristics such as chlorine demand, considerable care is exercised at Happy Valley to ensure that the blended water received by customers is of a consistently high quality.

Reservoirs, Water Treatment Plants, Bore Fields, Major Pipelines & SA Water Regions

Statewide (as at 30 June 2013)

See map on following pages for detailed enlargement of Metropolitan and Outer Metropolitan areas.



Eyre Region

Outer Metropolitan Region

Metropolitan Adelaide

South East Region

Northern Region

Major Pipelines (treated water)

Major Pipelines (raw water)

Borefields

Borefields with Iron Removal Plant

Reservoirs

Desalination Plant

Blue Lake

Water Treatment Plants

(Reservoirs and bore fields in brackets are off-line)

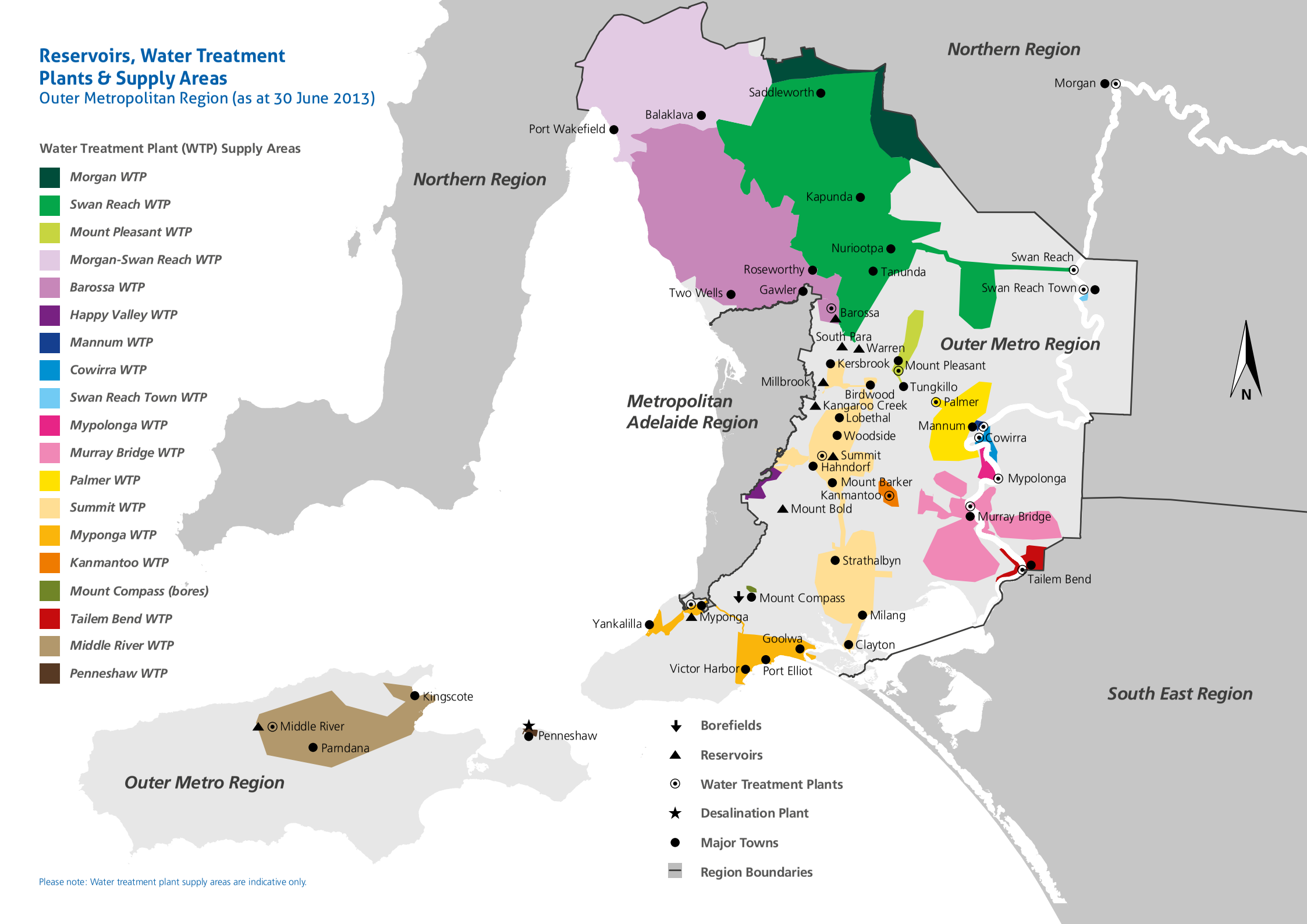
Government of South Australia

SA Water

Please note: Map detail is indicative only.

Reservoirs, Water Treatment Plants & Supply Areas

Outer Metropolitan Region (as at 30 June 2013)



Please note: Water treatment plant supply areas are indicative only.

Reservoirs, Water Treatment Plants & Supply Areas

Metropolitan Adelaide (as at 30 June 2013)

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

Government of South Australia

SA Water

Country drinking water supply system sources and treatment (as at 30 June 2013)

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	SA Water region
		Conventional water treatment plant	Iron removal plant	Desalination plant	Membrane plant	MIEX® pre-treatment	Cl_2	NH_2Cl	UV		
Barmera WTP	RM	✔ (RW)					✔		✔	✔	Northern
Barossa WTP #	Res/RM	✔ (AW)					✔			✔	Metro/ Outer Metro
Beachport IRP	Bores		✔ (SAW)				✔				South East
Berri WTP	RM	✔ (RW)					✔		✔	✔	Northern
Blanchetown WTP	RM				✔ (UGI/ SAW*)		✔				Northern
Bordertown	Bores						✔				South East
Cadell WTP	RM				✔ (UGI/ SAW*)		✔				Northern
Coffin Bay	Bores						✔		✔ (back-up only)		Eyre
Cowirra WTP	RM				✔ (UGI/ SAW*)		✔				Outer Metro
Elliston	Bores						✔				Eyre
Eyre South [1]	Bores						✔				Eyre
Eyre South/ Morgan WTP [2]	Bores/RM	✔ (SAW) (Morgan WTP)					✔ (at Eyre South bores)	✔ (at Morgan WTP)		✔ (at Morgan WTP)	Eyre
Geranium	Bores						✔				South East
Glossop WTP	RM				✔ (UGI/ SAW*)		✔				Northern
Happy Valley WTP #	Res/RM	✔ (AW)					✔			✔	Metro/ Outer Metro
Hawker IRP	Bores		✔ (SAW)				✔				Northern
Kalangadoo IRP	Bores		✔ (SAW)				✔				South East
Kanmantoo WTP	RM				✔ (UGI/ SAW*)		✔				Outer Metro
Kingston SE IRP	Bores		✔ (SAW)				✔				South East
Lameroo IRP	Bores		✔ (SAW)				✔				South East
Loxton WTP	RM	✔ (RW)						✔	✔	✔	Northern
Lucindale IRP	Bores		✔ (SAW)				✔				South East
Mannum WTP	RM	✔ (RW)					✔		✔	✔	Outer Metro
Melrose	Bores						✔				Northern
Middle River WTP	Res	✔ (SAW)				✔	✔		✔		Outer Metro
Millicent	Bores						✔				South East
Moorook WTP	RM				✔ (UGI/ SAW*)		✔				Northern
Morgan WTP	RM	✔ (SAW)						✔		✔	Northern/ Outer Metro/ Eyre
Morgan/Swan Reach WTP [3]	RM	✔ (Morgan WTP, SAW; Swan Reach WTP, RW)						✔	✔ (at Swan Reach WTP)	✔	Outer Metro/ Northern
Mt Burr	Bores						✔				South East

Water supply system	Supply source	Treatment					Disinfection			Fluoridation	SA Water region
		Conventional water treatment plant	Iron removal plant	Desalination plant	Membrane plant	MIEX® pre-treatment	Cl_2	NH_2Cl	UV		
Mt Compass	Bores						✔				Outer Metro
Mt Gambier	Blue Lake/ bores						✔			✔ (Blue Lake source only)	South East
Mt Pleasant WTP	RM	✔ (SAW)			✔	✔	✔			✔	Outer Metro
Murray Bridge WTP	RM	✔ (RW)					✔		✔	✔	Outer Metro
Mypolonga WTP	RM				✔ (UGI/ SAW*)		✔				Outer Metro
Myponga WTP [#]	Res	✔ (AW)					✔			✔	Metro/ Outer Metro
Nangwarry	Bores						✔				South East
Naracoorte	Bores						✔				South East
Orroroo	Bores						✔				Northern
Padthaway	Bores						✔				South East
Palmer WTP	RM				✔ (UGI/ SAW*)		✔				Outer Metro
Parachilna	Bores						✔ (back-up only)		✔		Northern
Parilla IRP	Bores		✔ (SAW)				✔				South East
Penneshaw WTP	Seawater			✔ (SAW)	✔		✔				Outer Metro
Penola IRP	Bores		✔ (SAW)				✔				South East
Pinnaroo IRP	Bores		✔ (SAW)				✔				South East
Polda [4]	Bores/RM	✔ (SAW) (Morgan WTP)						✔ (at Morgan WTP)		✔ (at Morgan WTP)	Eyre
Port Lincoln [5]	Bores						✔				Eyre
Port MacDonnell	Bores						✔ (commenced February 2013)	✔ (until February 2013)			South East
Quorn	Bores						✔				Northern
Renmark WTP [6]	RM	✔ (RW)					✔		✔	✔	Northern
Robe IRP	Bores		✔ (SAW)					✔			South East
Streaky Bay [7]	Bores/RM	✔ (SAW) (Morgan WTP)					✔ (at Eyre South bores)	✔ (at Morgan WTP)		✔ (at Morgan WTP)	Eyre
Summit WTP	RM	✔ (RW)						✔	✔	✔	Outer Metro
Swan Reach WTP	RM	✔ (RW)						✔	✔	✔	Outer Metro
Swan Reach Town WTP	RM				✔ (UGI/ SAW*)		✔				Outer Metro
Tailem Bend WTP	RM	✔ (RW)						✔	✔	✔	Outer Metro/ South East
Tarpeena IRP	Bores		✔ (SAW)				✔				South East
Waikerie WTP	RM	✔ (RW)					✔		✔	✔	Northern
Warooka	Bores						✔				Northern
Wilmington	Bores						✔				Northern
Woolpunda WTP	RM				✔ (UGI/ SAW*)			✔			Northern

AW Operated by Allwater
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
WTP Water Treatment Plant

[#] Supplies both country and metropolitan systems
* Operated by SA Water commencing 1 February 2013
[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] Polda bores off-line, system supplied by Morgan WTP system
[5] Port Lincoln system supplied by Lincoln Basin, Uley Wanilla and Uley South borefields
[6] Renmark WTP – includes supply to Cooltong
[7] Streaky Bay – Robinson Basin bores off-line, system supplied by Eyre South/Morgan WTP system

Metropolitan Adelaide water treatment plant sources (as at 30 June 2013)

The following table presents a listing of metropolitan Adelaide's water treatment plants and their raw water sources.

Water treatment plant	Supply sources										
	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

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	
Adelaide Desalination Plant	Seawater			✔ (AA)	✔		✔			✔

AA Operated by Adelaide Aqua

Metropolitan Adelaide water quality systems and treatment (as at 30 June 2013)

The metropolitan Adelaide water quality system boundaries were redefined commencing 1 April 2013, taking into account the new North South Interconnection System which has enhanced the transfer capabilities across the metropolitan network.

Eight new metropolitan systems were created, reflecting areas that are supplied by particular sources. Some systems receive water from only one source and others from a mix of sources. The map on page 17 shows the sources and boundaries for each of the eight new systems. Water quality performance data for metropolitan Adelaide systems are now reported in line with the new metropolitan water quality systems (see pages 49-52).

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 Metro	Res/RM	✔ (AW)					✔			✔
Barossa Metro	Res/RM	✔ (AW)					✔			✔
Central Metro	Res/RM/ADP	✔ (AW)					✔			✔
East Metro	Res/RM/ADP	✔ (AW)					✔			✔
Myponga Metro	Res	✔ (AW)					✔			✔
North Metro	Res/RM/ADP	✔ (AW)					✔			✔
South Metro	Res/RM/ADP	✔ (AW)					✔			✔
West Metro	Res/RM/ADP	✔ (AW)					✔			✔

ADP Adelaide Desalination Plant
AW Operated by Allwater
Cl_2 Chlorine
MIEX® Magnetic Ion Exchange
NH_2Cl Chloramine
Res Reservoir
RM River Murray
UV Ultraviolet

Country drinking water supply systems and towns supplied (as at 30 June 2013)

Water supply system	Towns supplied
Barmera WTP	Barmera, Cobdogla
Barossa WTP#	Avon, Barabba, Erith, Dublin, Hamley Bridge, Kangaroo Flat, Lewiston, Lower Light, Mallala, Owen, Port Parham, Redbanks, Roseworthy, Two Wells, Wasleys, Wild Horse Plains, 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, Warramboo, Wirrulla, Wudinna, Yaninee, Yantanabie
Geranium	Geranium
Glossop WTP	Glossop, Monash
Happy Valley WTP#	Chandlers Hill, Cherry Gardens, Clarendon, Coromandel East, Ironbank
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, Hampden, 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, Sutherland, 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 Kilkerra, Stansbury, Wallaroo, Wool Bay, Yorketown

Supplies both country and metropolitan systems

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	Monarto, Monteith, Murray Bridge
Mypolonga WTP	Mypolonga, Wall Flat
Myponga WTP[#]	Carrickalinga, Goolwa, Hayborough, Hindmarsh Island, Middleton, Myponga, Normanville, Port Elliot, Victor Harbor, Yankalilla
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
Summit WTP	Aldgate, Balhannah, Blakiston, Bridgewater, Birdwood, Brukunga, Charleston, Clayton, Crafers, Crafers West, Dawesley, Forest Range, Gumeracha, Hahndorf, Heathfield, Ironbank, Kersbrook, Langhorne Creek, Lenswood, Littlehampton, Lobethal, Milang, Mount Barker, Mount Barker Springs, Mount Torrens, Nairne, Oakbank, Piccadilly, Stirling, Strathalbyn, Upper Sturt, Willyaroo, Wistow, Woodside, Verdun
Swan Reach WTP	Angaston, Cambrai, Freeling, Greenock, Kapunda, Keyneton, Lyndoch, Marrabel, Moculta, Nuriootpa, Riverton, Rowland Flat, Rhynie, Saddleworth, Sedan, Seppeltsfield, Shea-oak 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	Point Turton, Warooka
Wilmington	Wilmington
Woolpunda WTP	Mantung, Woolpunda, Wunkar

[#] Supplies both country and metropolitan systems

Managing our water supplies

We use our Drinking Water Quality Management System (DWQMS) 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 reduce hazards along the chain from the catchment to the customer's tap. The focus is on preventing and minimising hazards at the earliest point in the water quality management process and not relying solely on downstream controls.

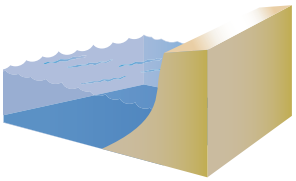
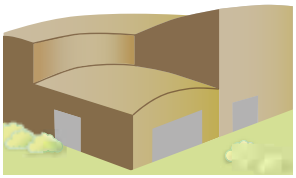
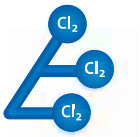
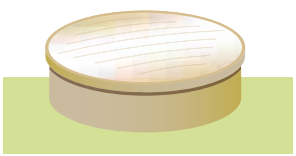
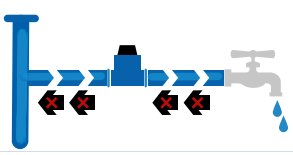
Hazards in the water can take many forms and are generally categorised into three types – biological, physical or chemical.

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

- Biological – algal metabolites (by-products) and pathogens (e.g. *Cryptosporidium, Giardia, E. coli)*
- Physical – sediments (turbidity) and colour
- Chemical – pesticides, hydrocarbons, iron and manganese.

We have identified potential water quality hazards and the associated level of risk for each of our water supply systems using our water quality risk management methodology. Water quality improvements identified during this process are incorporated into our WQH&RR. The WQH&RR is used to capture, assess, prioritise, manage and report water quality risks and preventive actions. It is also used to capture the actions for planning our water quality improvements (including operational and capital improvements), monitoring, procedures, training and verification. This improved risk assessment process will also be integrated with other business areas of SA Water.

The following table shows the barriers, water quality management objectives and preventive measures 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	• Assessed the 'catchment barrier status' for all supply catchments in the Mount Lofty Ranges watershed and catchments recharging SA Water's groundwater supply systems • Forecasted pollutant influx into reservoirs from specific catchment streams and develop targeted mitigation measures • Improved knowledge of bore aquifers • Assessed the casing integrity of aging bores and drilled replacement bores • Collaborated proactively with South Australian natural resource management and land-use planning agencies to achieve adequate protection of drinking water supply areas.
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 bloom dynamics in specific reservoirs • Operated thermistor chains and aerators in key reservoirs • Modelled hydrodynamic water quality • Operated 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 operational changes, for example altering tank levels and taking tanks offline to reduce water age in the distribution systems, leading to improved maintenance of disinfection residuals.
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.

* Barriers collectively known as distribution system

Backflow prevention

Backflow refers to the undesirable reversal of flow within drinking water supply pipes. Backflow may occur due to certain circumstances arising from the cross-connection of pipes. Back-siphonage or back-pressure may then allow contaminated water to flow back into the drinking water network. Under some circumstances (back-pressure or back-siphonage) gases, water, liquids or chemicals can flow back into the drinking water supply system. A measure of control within a consumer's premises is essential to maintain a safe drinking water supply. SA Water's statutory responsibility to prevent backflow was transferred to the Office of the Technical Regulator for Plumbing on 1 January 2013.

Our ongoing commitment to backflow prevention during 2012–13 included:

- Using meters with an inbuilt, dual-check device to prevent backflow into mains water in all new 20 mm water services laid
- Giving specific instruction in all applications for new or enlarged (above 20 mm) metered or non-metered services that a suitable backflow prevention device is required to meet the level of hazard posed by the on-site activity
- Maintaining a database for recording the installation and testing of high and medium hazard backflow prevention devices until 1 January 2013
- Auditing recycled water supply schemes for cross connections prior to activation of recycled water.

Water Quality 2012–13

SA Water continued to enhance water quality management strategies for our catchment areas, reservoirs, groundwater systems and the River Murray during 2012–13. This included working collaboratively with South Australian and interstate government agencies, such as the Department of Environment, Water and Natural Resources (DEWNR), the Environment Protection Authority (EPA) and the Murray Darling Basin Authority (MDBA). The following sections provide an outline of SA Water's key strategies and new initiatives relating to water quality and our progress during 2012–13.

Catchments, land management and source water

Catchment management

The first barrier for source water protection is the drinking water supply catchment. Most SA Water catchment areas are privately owned, intensively developed and co-managed by other agencies. To protect our source waters, SA Water works closely with planning and natural resource management agencies to lobby for suitable land-use policies in our supply catchments and encourage the adoption of best practice land management techniques. Through the initiation of, and participation in, collaborative projects and water quality improvement initiatives we aim to achieve additional, mutual water quality outcomes for both SA Water and other Government agencies. This approach ensures that we effectively and efficiently achieve our obligations under the ADWG. During 2012–13, we have focused on specific catchment water quality improvement projects that were identified as critical, in particular projects to mitigate our pathogen risks. We are using our working relationships with other government agencies to ensure that water quality improvement measures can be delivered in a pragmatic, on-ground manner as well as at the higher policy and planning level. The latter is under carriage of other natural resources agencies.

Key initiatives launched or enhanced in 2011-12 are summarised 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 surface and groundwater drinking water supply catchments – are assessed using a combination of field investigations and semi-quantitative and quantitative risk analysis methods. The first two-year review of our 'catchment barrier status' report was conducted, which included several drinking water supply catchments in the Mount Lofty Ranges watershed. The reports are a key knowledge resource of catchment flows and pollutant export. As such, they are used to effectively communicate water quality risks from a drinking water supply perspective to internal and external stakeholders. This, in turn, helps other natural resource management agencies to prioritise whole-of-government water quality improvement initiatives.

Public access to reservoir reserves	Around 90% of land in South Australia's natural drinking water supply catchments is privately owned, with the exception of Eyre Peninsula where SA Water owns significant land around its borefields. As a result, only narrow buffer zones exist around infrastructure, for example reservoir reserves. In recognition of the role played by these buffer zones in the multi-barrier approach to water quality protection, SA Water has developed a public access and land-use policy. The policy is regularly reviewed and balances the basic principle of water quality protection against providing some limited access for the public benefit. Access permits were approved for a variety of low impact purposes including scientific research, film production, biological surveys, police training and education. For the 2012–13 period, 19 requests for access to reservoir reserves were received for the Outer Metro region. Three were denied based on the access policy principles. There were no negative impacts from any of the approved permits.
***Cryptosporidium* risk in our drinking water supply catchments**	The catchment management team has been a key driver to implement pathogen mitigation works in SA Water's source water catchments, based on SA Water's *Cryptosporidium* risk assessment across all barriers for our key water supply systems. Mitigation measures include fencing and juvenile stock removal near water courses as well as testing the effectiveness of these measures. Pathogen mitigation projects have been underway in those catchments delivering source water to Anstey Hill and Hope Valley water treatment plants.
Waste control program	The recent review of the ten year waste control project in the Mount Lofty Ranges watershed has concluded that the septic audit and upgrade services project has been successful in reducing pathogen inputs into the drinking water supply catchments. This multi-agency collaborative project has now been re-badged as an ongoing program. SA Water continues to be a strong driver and contributor to this project.
Monitoring and assessment of impacts of acidified sediments (acid sulfate soils) near raw water offtakes	The assessment of the potential impact of acid sulfate soil-derived pollution at SA Water's River Murray off-takes continued during 2012-13. As a contributing partner in an interagency working group, SA Water provided specific expertise in water quality risk assessment and water quality modelling. Modelling was conducted to assess the impact of pollutant input from acidified floodplain wetlands in the Lower Murray Reclaimed Irrigation Area (LMRIA) and its salt drains into the River Murray. SA Water's forecasting model (hydrodynamic and water quality model for the River Murray – Estuary, Lake and Coastal Ocean Model/Computational Aquatic Ecosystem Dynamics Model (ELCOM/CAEDYM)) was primarily used to evaluate the potential for degraded water quality at SA Water's offtakes along the river. The major efforts of this work have now concluded, but the MDBA and SA Water will continue to fund selected monitoring and modelling for an additional year to ensure the ongoing validity of the modelling results.
Cox Creek mitigation	One of the key nutrient mitigation wetland systems in the Cox Creek catchment of the Happy Valley supply system has been operating for six years now. SA Water continues its maintenance program to reduce nutrient inputs into the Happy Valley Reservoir to ultimately reduce the risk of algal blooms. The frequency of the maintenance cycle (dredging of sediments every two to three years and annual harvesting of macrophytes to remove excess nutrients) was supported by research outlined in a 2011 PhD thesis. The Brookes Bridge sedimentation basin was partially dredged in 2012–13.
Mount Lofty Ranges watershed – water quality improvement program	The EPA continued a process of involving relevant stakeholders in developing environmental values for the Adelaide and Mount Lofty Ranges Natural Resources Management region and a water quality improvement program for the Mount Lofty Ranges watershed. SA Water is a key collaborator in the project.

eWater Ltd; National Hydrological Modelling Platform	SA Water remained an active member of South Australia's contribution to eWater Ltd, the continuation of the former eWater CRC. The rollout of the National Hydrological Modelling Platform (a National Water Initiative) in SA is lead by DEWNR, with SA Water contributing where required. Catchment water quality models are being trialled to contribute to SA Water's catchment risk assessment as per the ADWG.
Bushfires and prescribed burns on SA Water land	SA Water continued to implement a risk-based fire management program in partnership with other public land management agencies (DEWNR, CFS, ForestrySA). SA Water successfully achieved its prescribed burn targets on SA Water land, taking into consideration a due diligence environmental and water quality risk assessment approach.

In addition to these 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 was provided through levies based on SA Water's water allocation.

Reservoirs and the River Murray

During 2012-13, we continued with improvements to existing source water quality management strategies and the implementation of new initiatives for our reservoirs and the River Murray. Water quality at our 23 River Murray sampling locations improved in 2012-13, following the flood related blackwater events in the previous two years when water was characterised by elevated levels of naturally occurring dissolved organic carbon, low dissolved oxygen and high colour.

Key reservoir and River Murray initiatives launched or enhanced in 2012–13 are summarised in the following table:

Water quality monitoring in the River Murray	Algal blooms can potentially occur when there are available nutrients, low flows and suitable temperatures in a water body. Some cyanobacteria (blue-green algae) produce by-products such as taste and odour compounds that, when present in high concentrations, can cause health concerns unless appropriate treatment is carried out. SA Water continued with its comprehensive River Murray water quality monitoring program at 23 key locations, including a wide range of water quality parameters. Specific monitoring to detect algal blooms includes weekly sampling at our monitoring locations. We also use water quality probes fitted with special sensors for the determination of *in situ* cyanobacterial biomass. This enables early detection of algal blooms in the river and implementation of appropriate management and operational actions. At SA Water's Murray Bridge and Tailem Bend offtakes, *in situ* on-line monitoring equipment provides information on water temperature, dissolved oxygen, salinity, turbidity and pH, enabling us to monitor trends in these water quality parameters in real-time.
Floating algal scum booms	Floating algal scum booms were installed some years ago at Renmark, Loxton, Cobdogla, Swan Reach and Blanchetown water treatment plants to prevent the accumulation of cyanobacterial surface scum around these SA Water off-takes. The condition of these existing booms was reviewed and the decision made to replace these with a new, sturdier type of boom. The project was completed in June 2013. The installation of a new algal scum boom also occurred at the Tailem Bend off-take. Swan Reach town, Cowirra and Cadell offtakes are expected to be equipped with algal booms in 2013–14.

Exclusion zone buoys at River Murray offtakes	Exclusion zone buoys were installed at all 17 SA Water River Murray offtakes to keep boats and houseboats clear of the inlets to our water treatment plants.
SA Water Field Response Team	The SA Water Field Response Team is a specialist on-call team with the expertise to identify and investigate potential water quality issues and provide immediate on-ground assessments of areas of elevated water quality risk in our reservoirs, catchments and along the South Australian reaches of the River Murray. This response ensures early detection of any emerging water quality issues 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 for key water quality parameters such as cyanobacteria, dissolved oxygen, pH, conductivity and turbidity. Rapid test kits for detecting specific metabolites produced by certain cyanobacteria are also used by the field team.
Water quality modelling of the lower River Murray	In conjunction with the EPA, we continued to apply and refine our hydrodynamic and water quality model for the lower River Murray. This model helps to forecast potential water quality impacts from the rewetting of wetlands and pumping of drain water from irrigation areas in the lower River Murray on SA Water's drinking water supply offtakes.
Flow meters at reservoir inlets	The installation of telemetry-linked flow meters at key reservoirs was completed in 2012–13. This included the upgrade 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 entering our reservoirs. Flow data is accessible in real-time via SA Water's Supervisory Control and Data Acquisition (SCADA) system.
Management of cyanobacteria in reservoirs	We continued to manage cyanobacterial (blue-green algal) blooms in Myponga and Little Para Reservoirs without the need to apply copper sulphate. This was achieved through an alternative management strategy, which included *in situ* field measurements of key water quality parameters, optimised management of the multiple offtake and enhanced water treatment plant processes which included the application of powdered activated carbon (PAC) to remove cyanobacteria-derived taste and odour compounds.
River Murray sample pumps	We commenced a project to install 11 new sample pumps at our River Murray offtakes. Each of our 17 River Murray off-takes will be equipped with a sample pump on completion of this project (end October 2013). This will enable more efficient sample collection for water quality analysis.
Control of algae in reservoirs	The control of certain types of algae in reservoirs is an ongoing operational issue for water utilities worldwide. The traditional control method is to apply algaecides based upon copper and although these are safe and economical they can vary in effectiveness. SA Water has completed a successful small scale field trial using stabilised hydrogen peroxide to remove cyanobacteria from wastewater treatment plant lagoon water with a full scale trial planned for the 2013–14 summer. SA Water is also involved as a partner in a fundamental research project to evaluate the effect of ultrasound on algae with the ultimate goal of non-chemical algal control. This project is in its final year and has generated promising results.

Groundwater supplies

During 2012–13, we continued with our program to secure the volume and quality of groundwater available for town water supplies.

Key groundwater initiatives launched or enhanced in 2012–13 are summarised in the following table:

Groundwater risk assessment methodology	A groundwater risk assessment methodology was developed to manage the risk to groundwater supplies. This method is based on a multi-barrier approach and considers the potential hazards associated with land use above the aquifer. An important barrier considered in the method is the type and design of well construction as well as its integrity. This methodology was applied to Eyre Peninsula groundwater basins and risk levels were categorised according to new risk assessment tables in SA Water's DWQMS. This work completes the groundwater risk assessments for most of SA Water's groundwater supplies.
Bore assessment and replacement	The casing integrity assessment program for aging bores continued with drilling of 11 replacement bores: one in the Eyre region, four in the Northern region and six in the South East region.
Study and monitoring of groundwater sources and resource assessment	A number of studies were undertaken including: • Recharge estimation for southern Eyre Peninsula groundwater basins using a variety of methodologies • Salinity profiling in Uley South, Lincoln, Coffin Bay, Polda and Streaky Bay groundwater basins • Continued assessment of coastal salinity in the Uley South Basin to track the seawater/freshwater interface • A comprehensive study on Uley South Basin's hydrogeology was completed • Two Master's theses were completed on aspects of the Blue Lake and provided key management inputs. The first thesis investigated the stratigraphy and identification of fracture pathways to the Blue Lake, while the second thesis explored modelling of surface run-off directly into the aquifer through 400 drainage wells.
Bore upgrades	Measures to improve the status of 23 bore systems have been completed or are currently underway.

Water treatment and distribution

In 2012–13, we commenced or completed a number of projects to improve the quality of water delivered to our customers across the state.

Key water treatment and distribution projects in 2012–13 are summarised in the following table:

Upgrade of water treatment plant filters	Progressive rebuilding of filters at Happy Valley and Hope Valley water treatment plants, with updated media support systems and new filtration media. This will significantly improve the efficiency and robustness of the filtration step in the treatment process.
Proactive water quality management strategies	Implementation of a number of proactive initiatives for reducing disinfection by-products and improving disinfection residual management. These included the installation of aerators, distribution system modifications and strategies to reduce water age across a number of SA Water's drinking water supply systems.
Happy Valley water treatment plant	Continuation of infrastructure modifications and control system enhancements at Happy Valley water treatment plant to ensure optimal blending of desalinated water with Happy Valley water.
Adelaide Desalination Plant	The addition of desalinated water into the metropolitan Adelaide drinking water systems has improved the water quality. This is due to better penetration of the disinfection residual and reducing the amount of dissolved organic matter present in the network, which decreases the likelihood of disinfection by-products forming.
North South Interconnection System Project	The completion of the North South Interconnection System Project (NSISP) has given SA Water new levels of flexibility in supplying the metropolitan drinking water systems from various metropolitan water treatment plants, including desalinated water from the Adelaide Desalination Plant. This flexibility enables us to supply the best quality water mix to the various metropolitan drinking water systems, optimising all of Adelaide's water assets. The NSISP involved the construction of three new pump stations and approximately 32km of water mains.
New bores	A large number of new bores have been commissioned in the South East and Northern regions of the state. These new bores significantly improve water quality to our regional customers.
Upgrade of water treatment plant process control equipment	The process control equipment at Kangaroo Island's Middle River water treatment plant is being upgraded.
Replacement of instrumentation	Instrumentation as well as plant control and communication systems are being replaced at Anstey Hill water treatment plant. A program of trialling innovative process control applications is also in place.
In-sourcing of United Group Infrastructure water treatment plants	On 1 February 2013, SA Water took control of the ten water treatment plants that were built five years ago under the Country Water Quality Improvement Program Stage 3. The plants were originally built and operated for SA Water by United Group Infrastructure (UGI) during the height of the drought, when water quality in the River Murray was deteriorating. Five of the plants are located in the Northern Region at Cadell, Woolpunda, Blanchetown, Moorook and Glossop. The other five plants at Palmer, Kanmantoo, Cowirra, Mypolonga and Swan Reach are located in the Outer Metro Region.

Water quality monitoring and testing

To ensure the quality of our product, 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 SA Water's 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 2012–13.

Number of samples and tests – metropolitan and country drinking water supply systems (2012–13)

	Metropolitan	Country	Total
Drinking water supply systems	8	62	70
Customer taps	193	322	515
Total sample taps	368	1 007	1 375
Total number of routine samples*	18 545	92 368	110 913
Total number of routine tests	45 261	256 943	302 204

* Includes distribution networks and water treatment plants

Drinking water quality and performance

During 2012-13, SA Water demonstrated robust management of water quality by consistently providing clean, safe drinking water to our customers in a complex operational environment. This included the commissioning of the North South Interconnection System Project (NSISP) and the Adelaide Desalination Plant (ADP) providing 16% of South Australian's drinking water in 2012–13 financial year.

The following table and graph provide a summary of our performance for health and aesthetic-related parameters of routine samples at customer taps during 2012–13.

Metropolitan and country drinking water supply systems health related performance (2012–13)

Health related parameters	Metropolitan systems (number of samples)	Country systems (number of samples)
% Samples free from *E. coli*	99.96% (2 463)	99.91% (8 096)
% Samples compliant with ADWG health parameters *	99.97% (11 151) 2012–13 target: 100%	99.92% (31 809) 2012–13 target: 99.80%

* Includes performance against *E. coli* and total/soluble metals. Note that direct exceedances of the *Australian Drinking Water Guidelines* were used to calculate this and not the 95th percentiles for compliance of individual chemical parameters.

We collected a total of 42 960 routine samples from our drinking water supplies throughout South Australia to determine health-related compliance.

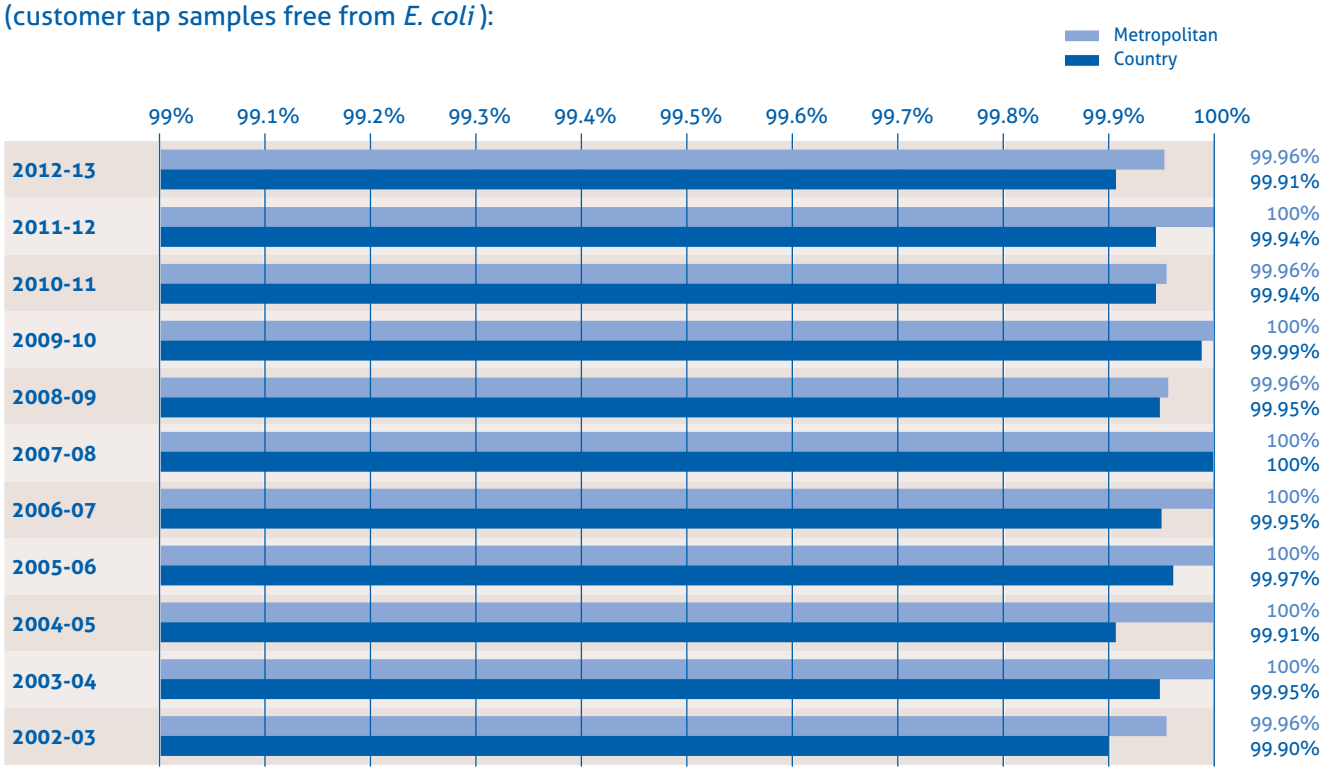
- We achieved 99.96% *E. coli* compliance at all customer taps in metropolitan Adelaide for the 2012-13 financial year across 2 463 samples taken from our eight metropolitan supply systems (i.e. 2 462 samples out of the 2 463 collected were free of *E. coli*)
- We achieved 99.91% *E. coli* compliance at all customer taps in regional South Australia for the 2012-13 financial year across 8 096 samples taken from our 62 country supply systems (i.e. 8 089 samples out of the 8 096 collected were free of *E. coli*).

The ADWG recognise that occasional *E. coli* detections may occur in drinking water. In accordance with the guidelines and the interagency *Water/ Wastewater Incident Notification and Communication Protocol*, all detections were immediately communicated to SA Health, investigated by SA Water and corrective actions implemented as agreed with SA Health. All follow-up samples were clear of *E. coli*, verifying minimal risk to customers.

Compliance with the ADWG health-related parameters was 99.97% for metropolitan Adelaide and 99.92% in the country areas.

The minimum ADWG requirements for health-related parameters is 95% overall compliance. SA Water targets a higher percentage than this – 100% in metropolitan Adelaide and 99.8% for country areas – as we are continuously striving to achieve zero exceedences in all our drinking water systems. During 2012–13 we identified distribution systems where we were below target and proactively implemented management strategies to address these situations, including working with SA Health. Immediate corrective action was taken to investigate any potential risks to public health. Such measures included flushing of systems, additional disinfection, immediate follow-up sampling and close communication with SA Health.

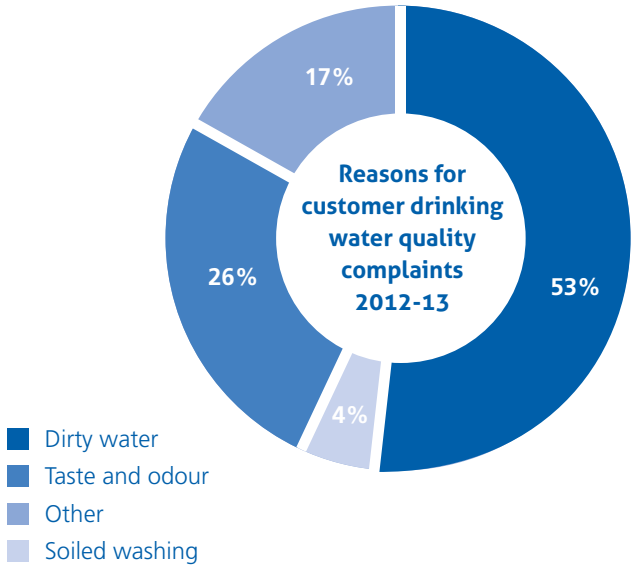
E. coli compliance at metropolitan and country drinking water supply system customer taps since 2002 (customer tap samples free from *E. coli*):



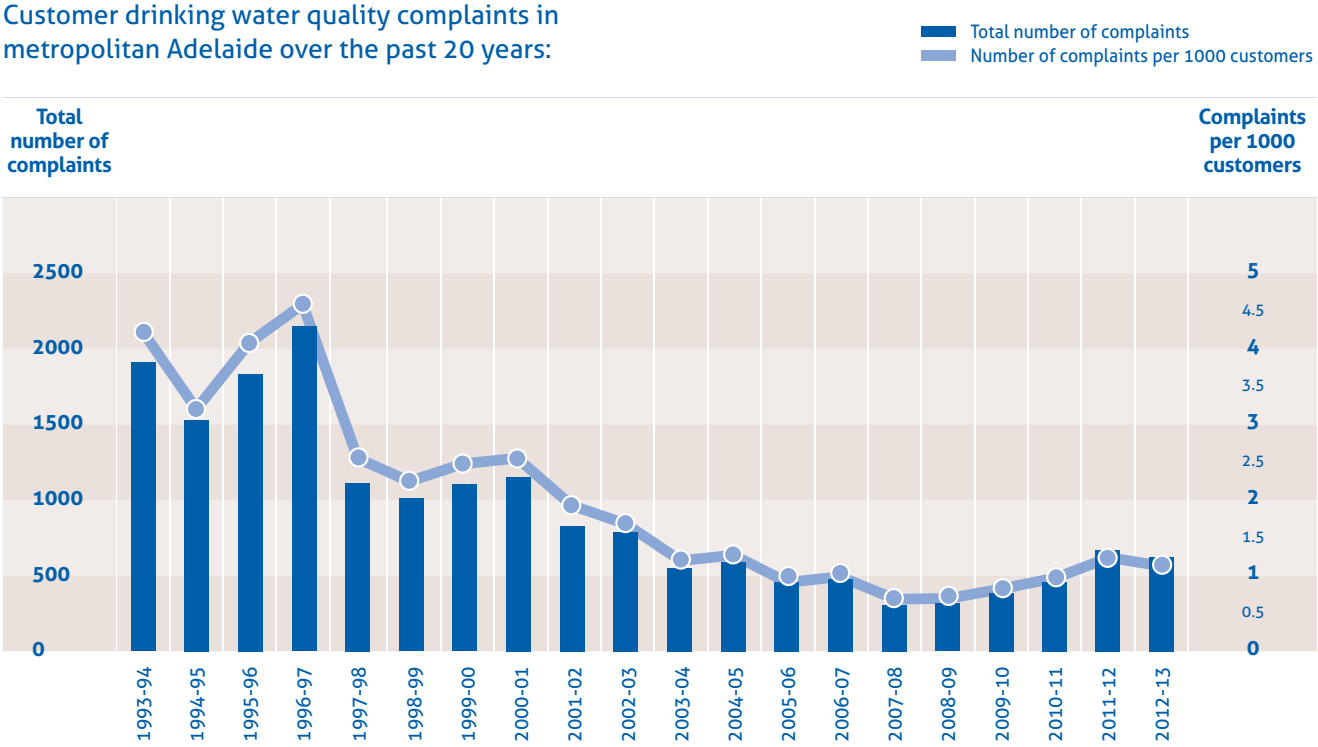
Customer satisfaction

A total of 638 customer complaints relating to drinking water in the metropolitan region were received during 2012–13.

We have achieved better water quality outcomes in the distribution system and a dramatic decrease in customer complaints since the mid-1990s by focusing on water quality impacts in the network and continually improving our knowledge of the system operation and causes of water quality problems.



Customer drinking water quality complaints in metropolitan Adelaide over the past 20 years:



Incident management

SA Water is committed to the application of the *Australian Drinking Water Guidelines* (ADWG 2011) *Framework for Management of Drinking Water Quality* which includes two components for the management of incidents and emergencies: communication and incident and emergency response protocols.

SA Water has a *Water Quality Incident and Emergency Management Protocol* in place and a web-based incident management system to record and generate notification of water quality incidents. These are in line with the SA Health interagency *Water/Wastewater Incident Notification and Communication Protocol* and are maintained to adopt the principles of ADWG 2011 and to satisfy requirements of the *Safe Drinking Water Act 2011* and Safe Drinking Water Regulations 2012.

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. Procedures for Type 1 incident notifications also apply
- 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.

A comparative summary of the Priority Type 1, Type 1 and Type 2 incident notifications reported against the interagency *Water/Wastewater Incident Notification and Communication Protocol.*

Reporting period	Priority Type 1	Type 1	Type 2
2012–13	**4**	**67**	**89**
2011-12	2	88	121
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 N/A: not applicable.

All Priority Type 1 and Type 1 notifications were immediately reportable to SA Health, while all Type 2 notifications were reportable within 24 hours, in line with the interagency *Water/Wastewater Incident Notification and Communication Protocol*.

We had a significant decrease in incident notifications in 2012–13. This was mainly due to a reduced number of disinfection by-product notifications as targeted operational strategies and initiatives, such as optimisation of systems, were implemented. Improved River Murray water quality during 2012–13 also contributed to the decrease in incident notifications as there were no blackwater events or cyanobacteria issues reported in the River Murray.

Changes in the reporting criteria issued by SA Health in the interagency *Water/Wastewater Incident Notification and Communication Protocol* also contributed to a change in reporting requirements.

The continual review and improvement of our incident management processes has positively impacted on our water quality incident response and overall performance. The proactive water quality management of targeted individual water supply systems and detection and management of risks continued during 2012–13. Our diligence in actively managing these risks continued, as reflected in the improvement of our Incident Response Index (IRI, see following page).

During 2012–13 we continued our focus on early detection and reporting to external agencies, rapid corrective action and preventing and addressing the causes of preventable Type 1 notifications, such as disinfection failures or inadequate treatment facilities of groundwater. Strategies employed to achieve this include capital improvements and improving the robust operation of water supply systems.

Incident Response Index (IRI)

The purpose of the IRI is to drive and guide correct responses when a Type 1 or Priority 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 2012–13 strategic target for the IRI is at least 82% compliance.

Criteria used in the Incident Response Index (based on total reportable SA Health Priority Type 1 and Type 1 incident notifications)

Incident reported to relevant agencies by phone immediately (less than one hour)	Overall strategic 2012–13 target: at least 82%
Incident entered into the incident management system (IMS) in less than two hours	
Initial effective response taken within three hours	
Written report to Minister for Water by 3pm next business day	
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 2012-13, compared to 2011–12.

System	Incident response index (IRI) 2012–13 financial year	Incident response index (IRI) 2011–12 financial year
Country	92%	95%
Metropolitan	98%	84%
Overall (weighted combined country and metropolitan)	**94%**	**93%**

Into 2013–14, we will:

- Confirm our compliance with requirements of the *Safe Drinking Water Act* and regulations relating to incident identification, notification and response procedures
- Continue to work collaboratively with SA Health in the review and update of the interagency *Water/ Wastewater Incident Notification and Communication Protocol*
- Progress the integration of 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 on the *Water Quality Incident and Emergency Management Protocol* for regional and metropolitan incident managers
- Increase the IRI target to 83%.

Research and Innovation

SA Water, through its Research and Innovation (R&I) group has developed a national and international reputation for high-quality water science and engineering research and technical innovation.

We continue to strengthen collaborations that help us to apply better ways to manage our business. The Australian water industry recognises SA Water's R&I group as a leader in strategic and operationally-focused research. This is evident at SA Water's R&I annual forum where more than 100 people attend. External guests include state and national representatives from the Goyder Institute, Department of Environment, Water and Natural Resources (DEWNR), SA Health, Water Services Association of Australia, CSIRO, Water Research Australia, Melbourne Water and Allwater (Suez Environnement, Degrémont and Transfield Services). This high-level engagement demonstrates the significant interest in the knowledge generated and the outcomes delivered by our research and innovation portfolio.

SA Water strategic direction and business alignment

SA Water through the R&I group, undertake research to: generate, broker and implement new knowledge, drive business efficiency and innovation and provide high-level technical advice in the areas of:

- Customers and community – water quality, public health and risk issues
- Quality and delivery – water and wastewater treatment and distribution management
- Planning for the future – environment, sustainability and climate variability
- Business success – asset management, energy efficiency and infrastructure investment.

Research is focused on delivering targeted outputs that improve business efficiency, reduce risk and continue to provide improved services to our customers. This involves reviewing, developing and facilitating the transfer of new knowledge and technologies developed both inside and outside of SA Water into operational outcomes to improve business performance and underpin innovation.

Key research projects

SA Water's research portfolio is diverse and addresses key business and strategic priorities across the entire water cycle. One project where research investigations have successfully translated to beneficial operational outcomes is the water quality investigations associated with the Adelaide Desalination Project (ADP). Water from the ADP supply is blended with treated water from the Happy Valley water treatment plant in different proportions depending upon demand. However, the blending of these two supplies that differ significantly in water quality can influence drinking water characteristics, particularly chlorine decay and formation of disinfection by-products. SA Water's R&I group investigated the risks and developed management systems to minimise adverse water quality impacts. The development of a practical, blended water chlorine decay model for chlorine dose control at the Happy Valley water treatment plant was a key outcome. This model is currently being trialled in order to minimise chlorine residual changes at customer taps.

Water utilities spend considerable resources cleaning and flushing distribution systems as this is the major reactive response to distribution system issues at the customer tap. The impact of improving water quality at the head of the system, using four different treatment processes on distribution system performance, was assessed over 18 months. The important operational outcome of this project has been to identify the extent that water quality improvements affect distribution system performance and to identify water quality parameters and analytical tools that are most suited to monitoring and predicting water quality deterioration.

SA Water has undertaken innovative research assessing and managing risks associated with waterborne contaminants, including *Cryptosporidium* and cyanobacteria (blue-green algae), thereby addressing impending health regulation requirements. *Cryptosporidium* is a human infectious pathogen that causes diarrhoea. Although it is transferred mainly from person to person, it is also a common contaminant in stormwater and in the run-off from catchments that go into our reservoirs after rainfall. This makes *Cryptosporidium* a risk to water quality and public health. A major initiative in 2012–13 involved developing innovative tools for measuring *Cryptosporidium* infectivity in our water sources and providing better information on the level of risk posed by rainfall run-off. The R&I group is helping to evaluate online monitoring system performance and develop predictive coagulation control systems in SA Water's treatment plants as well as comparing the latter with commercially-available systems.

Alliances and partnerships

SA Water's R&I group has had significant achievements in the national and international arena. This includes receiving competitive funding grants from a wide range of funding bodies such as the Australian Research Council Linkage Grants Scheme, Water Research Australia, the Water Research Foundation (USA) and more recently the Premier's Research and Industry Fund. Such success has enabled us to forge and enhance alliances with new and existing collaborative partners.

Members of SA Water's R&I group are well represented on many of the decision-supporting committees of our collaborative partners, highlighting our impact and influence. SA Water also supports the SA Water Centre for Water Management and Reuse at the University of South Australia with an agreement extending until 2014, ensuring that SA Water invests in building capacity in the local education sector. Furthermore, SA Water has recently signed memorandums of understanding with the University of Arizona and the Vienna University of Technology to initiate joint research programs in areas of common interest and of mutual benefit to the respective organisations.

Highlights

- The Source, Wastewater and Environment Research team won the 2012–13 Australian Water Association (AWA) SA Research Innovation Award for a program that established techniques for the detection and enumeration of viruses in wastewater, recycled water and stormwater. The outputs from this research have been incorporated into the Australian Guidelines for Water Recycling.
- SA Water joined the Global Water Quality Research Centre with the National Cheng Kung University (NCKU), Taiwan and China Steel Corporation, a Taiwanese company with strong expertise and business interest in water and wastewater management. SA Water currently has several collaborative projects with NCKU and the new centre provides an excellent opportunity to leverage an existing relationship and develop research work aligned with SA Water needs as well as offering potential business development and reputational opportunities in Asia.
- The Water Treatment and Distribution Research team won the AWA 'Guy Parker Award' for best paper published in the Association journal in 2012.
- Mike Burch, Senior Manager R&I, was the recipient of the inaugural AWA Research and Development Award (given in honour of Emeritus Professor Nancy Millis) at the Ozwater'13 Conference in Perth. The judges were of the opinion that Mike was an outstanding recipient of this prestigious award through his significant contributions to water-related research and development in Australia, as well as internationally.

Employee Awareness and Training

The skills of the water industry workforce must adapt to manage Australia's highly variable rainfall, frequent water shortages and floods.

Efficient use of limited water resources is essential for South Australia's long-term sustainability and commercial viability. SA Water staff receive internal training to fulfil statutory and legislative requirements but also to ensure that safe drinking water and safe sanitation services are provided efficiently.

The training is either nationally accredited or SA Water specific and is mainly driven by ADWG requirements, nationally consistent training regimes, environmental sustainability policies and integrated water management.

Training undertaken during 2012–13 is summarised below:

Internal, competency-based training

- Overview of water quality awareness
- Integrated incident management procedures, water quality, environmental, Work Health and Safety (WHS), operational and security
- Odours in drinking water supplies
- Disinfection of mains
- Integrated root cause analysis
- Introduction to water quality awareness
- Introduction to recycled water
- Native vegetation guidelines
- Best practice operating procedure
- Environmental management for project managers
- Environmental management awareness
- Disinfection system awareness
- Incident management system awareness

Nationally accredited, competency-based training

- Water sampling (NWP 218B)
- Field testing (NWP 210B)
- Disinfection for operators
- Optimisation of water quality in distribution networks (NWP 317B)
- Monitor, operate and control granular media filtration processes (NWP 354B)
- Demonstrate knowledge of the risk management principles of the *Australian Drinking Water Guidelines* (NWP 279)
- Monitor, operate and control wastewater treatment processes (NWP 346B)

The national certification strategy is aimed at ensuring employees within the water industry are professionally trained and certified accordingly. SA Water embraces the certification initiative and is working towards training and upskilling of employees in partnership with South Australian based training organisations.

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.

Aluminium (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 fresh water (known as groundwater), any water that is stored naturally underground or that follows 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 2011. 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. The AWQC also 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.

Blackwater
Blackwater events in rivers occur naturally when extensive areas of floodplains and wetlands with large amounts of organic matter (e.g. a significant build-up of leaf litter and other organic material during prolonged drought) are inundated during floods and the organic matter makes its way into the river system. This has a significant effect on source water quality in the river as the breakdown of the organic matter through microbial activity results in water with substantially reduced dissolved oxygen (DO) levels, increased dissolved organic carbon (DOC) levels and a distinctive dark colour (produced by tannins leaching out of the organic matter).

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 water storage. The run-off 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)
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 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 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)
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)
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 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 zero to 14. A pH greater than seven is alkaline, less than seven is acidic and seven 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, water 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 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 (UV)
Natural 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 water bodies (e.g. oceans and lakes) and the atmosphere. Water evaporates 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 groundwater aquifers or flow as surface runoff into water bodies and the cycle begins again.

Water Quality Hazard and Risk Register (WQH&RR)
A web based register that centrally manages water quality hazard identification, risk assessment and risk mitigation.

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.

Water Quality Data 2012-13

Water quality data and fact sheets on SA Water's website

We are actively enhancing the way we provide water quality information to our customers.

As of 2012–13 we provide the following water quality information on our website *www.sawater.com.au:*

- Performance data for our drinking water supply systems, including data on the quality of drinking water supplied to individual suburbs and towns
- Fact sheets that provide easy-to-read descriptions about the nature of key water quality parameters, the factors that may influence their presence in water and the effects that they can have on water quality.

This report covers the period of 1 July 2012 to 30 June 2013

Table 1

2012-13 Metropolitan Adelaide source water quality (inlets to Water Treatment Plants)

	Anstey Hill WTP					Hope Valley WTP				
	Samples	Min	Max	Ave	Median	Samples	Min	Max	Ave	Median
Colour - True [456nm] [HU]*	13	10	34	19	19	11	4	34	18	19
Dissolved Organic Carbon [mg/L]	52	5.1	10.2	7.6	7.4	42	4.4	8.9	7.3	7.6
Fluoride [mg/L]*	13	<0.10	0.22	0.16	0.18	11	0.28	0.43	0.33	0.33
Hardness - Total [mg/L]	13	101	124	111	109	13	145	180	159	159
Nitrate as Nitrogen [mg/L]	26	<0.005	0.191	0.083	0.075	26	<0.005	0.148	0.033	0.039
pH Units*	13	7.3	7.9	7.6	7.6	11	7.4	8.4	7.9	8
Phosphorus - Total [mg/L]	26	0.023	0.216	0.055	0.037	26	0.010	0.747	0.095	0.032
Total Dissolved Solids [mg/L]	13	100	360	234	250	11	360	440	395	390
Turbidity [NTU]*	13	4.2	72.0	32.9	39.0	11	0.1	2.9	1.6	1.8

	Barossa WTP					Little Para WTP				
	Samples	Min	Max	Ave	Median	Samples	Min	Max	Ave	Median
Colour - True [456nm] [HU]*	13	15	26	20	20	9	14	26	19	18
Dissolved Organic Carbon [mg/L]	52	7.9	10.6	9.6	9.6	36	6.4	8.1	7.2	7.1
Fluoride [mg/L]*	13	0.26	0.35	0.29	0.28	9	0.22	0.29	0.24	0.24
Hardness - Total [mg/L]	13	100	134	116	116	13	111	140	126	124
Nitrate as Nitrogen [mg/L]	26	<0.005	0.048	0.018	0.016	26	0.034	0.222	0.116	0.105
pH Units*	13	7.2	8	7.7	7.8	10	7.4	8.4	7.8	7.8
Phosphorus - Total [mg/L]	26	0.010	0.374	0.040	0.018	26	0.021	0.231	0.062	0.036
Total Dissolved Solids [mg/L]	13	330	400	372	380	10	280	370	325	325
Turbidity [NTU]*	13	0.3	1.0	0.6	0.6	9	7.4	18.0	11.0	8.0

	Happy Valley WTP					Myponga WTP				
	Samples	Min	Max	Ave	Median	Samples	Min	Max	Ave	Median
Colour - True [456nm] [HU]*	13	19	61	44	49	13	39	74	53	49
Dissolved Organic Carbon [mg/L]	50	6.6	9.7	8.2	8.4	52	10.9	13.9	12.3	12.3
Fluoride [mg/L]*	13	0.21	0.32	0.28	0.29	13	0.16	0.25	0.19	0.18
Hardness - Total [mg/L]	13	114	131	123	123	13	114	138	128	129
Nitrate as Nitrogen [mg/L]	26	<0.005	0.216	0.068	0.069	52	0.005	0.219	0.109	0.101
pH Units*	13	7.2	8.3	7.9	7.9	13	6.9	7.8	7.4	7.3
Phosphorus - Total [mg/L]	26	0.024	0.118	0.049	0.043	52	0.024	0.403	0.073	0.058
Total Dissolved Solids [mg/L]	13	290	340	313	310	13	360	440	396	400
Turbidity [NTU]*	13	1.9	18	5.7	4.4	13	1.3	3.6	2.4	2.2

* Water Treatment Plant data source: Allwater

Table 2

2012-13 Metropolitan Adelaide distribution system customer tap water quality against 2011 ADWG

	Anstey Hill Metro System							
Parameter	**Health Guideline**	**Aesthetic Guideline**	**Samples**	**Min**	**Max**	**Ave**	**Median**	**% Compliance**
***E. coli* [per 100 mL]**	++	-	201	0	0	0	0	100
Coliforms [per 100 mL]	95% free from coliforms*	-	201	0	3	0	0	98
Chlorine Residual - Free [mg/L]	≤ 5 mg/L	-	240	<0.1	1.6	0.4	0.2	100
Chlorine Residual - Free [mg/L]		≤ 0.6 mg/L	240	<0.1	1.6	0.4	0.2	74.2
Colour -True [HU]		≤ 15 HU	51	<1	3	2	1	100
Fluoride [mg/L]	≤ 1.5 mg/L	-	8	0.28	0.96	0.80	0.87	100
Hardness - Total [mg/L]		≤ 200 mg/L	8	66	124	101	109	100
Iron - Total [mg/L]		≤ 0.3 mg/L	26	<0.0005	0.0361	0.0099	0.0084	100
Manganese - Total [mg/L]	≤ 0.5 mg/L	-	26	0.0001	0.0034	0.0010	0.0007	100
Manganese - Total [mg/L]		≤ 0.1 mg/L	26	0.0001	0.0034	0.0010	0.0007	100
pH Units		6.5 - 8.5	53	7.1	8.1	7.5	7.5	100
Total Dissolved Solids [mg/L]		≤ 600 mg/L	53	140	400	267	280	100
Turbidity [NTU]		≤ 5 NTU	51	<0.10	0.30	0.14	0.13	100
Trihalomethanes - Total [µg/L]	≤ 250 µg/L	-	20	47	199	124	122	100

	Barossa Metro System							
Parameter	**Health Guideline**	**Aesthetic Guideline**	**Samples**	**Min**	**Max**	**Ave**	**Median**	**% Compliance**
***E. coli* [per 100 mL]**	++	-	67	0	0	0	0	100
Coliforms [per 100 mL]	95% free from coliforms*	-	67	0	0	0	0	100
Chlorine Residual - Free [mg/L]	≤ 5 mg/L	-	89	<0.1	1.4	0.3	0.1	100
Chlorine Residual - Free [mg/L]		≤ 0.6 mg/L	89	<0.1	1.4	0.3	0.1	91
Colour -True [HU]		≤ 15 HU	13	<1	2	2	2	100
Fluoride [mg/L]	≤ 1.5 mg/L	-	2	0.84	0.86	0.85	0.85	100
Hardness - Total [mg/L]		≤ 200 mg/L	2	134	152	143	143	100
Iron - Total [mg/L]		≤ 0.3 mg/L	10	<0.0005	0.0444	0.0175	0.0150	100
Manganese - Total [mg/L]	≤ 0.5 mg/L	-	10	0.0006	0.0069	0.0018	0.0014	100
Manganese - Total [mg/L]		≤ 0.1 mg/L	10	0.0006	0.0069	0.0018	0.0014	100
pH Units		6.5 - 8.5	13	7.0	7.6	7.3	7.3	100
Total Dissolved Solids [mg/L]		≤ 600 mg/L	13	340	450	408	410	100
Turbidity [NTU]		≤ 5 NTU	13	0.13	0.66	0.28	0.21	100
Trihalomethanes - Total [µg/L]	≤ 250 µg/L	-	13	98	193	153	158	100

	Central Metro System							
Parameter	**Health Guideline**	**Aesthetic Guideline**	**Samples**	**Min**	**Max**	**Ave**	**Median**	**% Compliance**
***E. coli* [per 100 mL]**	++	-	1120	0	2	0	0	99.9
Coliforms [per 100 mL]	95% free from coliforms*	-	1120	0	100	0	0	98.3
Chlorine Residual - Free [mg/L]	≤ 5 mg/L	-	1305	<0.1	1.6	0.4	0.3	100
Chlorine Residual - Free [mg/L]		≤ 0.6 mg/L	1305	<0.1	1.6	0.4	0.3	75.9
Colour -True [HU]		≤ 15 HU	203	<1	3	1	1	100
Fluoride [mg/L]	≤ 1.5 mg/L	-	26	0.26	0.94	0.77	0.86	100
Hardness - Total [mg/L]		≤ 200 mg/L	26	76	141	107	112	100
Iron - Total [mg/L]		≤ 0.3 mg/L	102	<0.0005	0.1385	0.0112	0.0070	100
Manganese - Total [mg/L]	≤ 0.5 mg/L	-	102	0.0002	0.0073	0.0012	0.0009	100
Manganese - Total [mg/L]		≤ 0.1 mg/L	102	0.0002	0.0073	0.0012	0.0009	100
pH Units		6.5 - 8.5	316	7.1	8.0	7.5	7.6	100
Total Dissolved Solids [mg/L]		≤ 600 mg/L	549	110	420	258	260	100
Turbidity [NTU]		≤ 5 NTU	206	<0.10	8.40	0.18	0.12	99.5
Trihalomethanes - Total [µg/L]	≤ 250 µg/L	-	245	19	202	117	117	100

* SA Water internal guideline value
Data source: Allwater

++ *E. coli* should not be detected in samples of drinking water. Although we aim for 100% compliance, the ADWG recognise that occasional detections may occur. In accordance with the guidelines any detection is immediately investigated and corrective action implemented as agreed with SA Health.

Table 2

2012-13 Metropolitan Adelaide distribution system customer tap water quality against 2011 ADWG *continued*

	East Metro System							
Parameter	**Health Guideline**	**Aesthetic Guideline**	**Samples**	**Min**	**Max**	**Ave**	**Median**	**% Compliance**
***E. coli* [per 100 mL]**	++	-	312	0	0	0	0	100
Coliforms [per 100 mL]	95% free from coliforms*	-	312	0	29	0	0	99
Chlorine Residual - Free [mg/L]	≤ 5 mg/L	-	400	<0.1	1.5	0.3	0.2	100
Chlorine Residual - Free [mg/L]		≤ 0.6 mg/L	400	<0.1	1.5	0.3	0.2	86
Colour -True [HU]		≤ 15 HU	62	<1	3	1	1	100
Fluoride [mg/L]	≤ 1.5 mg/L	-	6	0.12	1.00	0.71	0.79	100
Hardness - Total [mg/L]		≤ 200 mg/L	6	73	118	98	98	100
Iron - Total [mg/L]		≤ 0.3 mg/L	29	<0.0005	0.0633	0.0107	0.0068	100
Manganese - Total [mg/L]	≤ 0.5 mg/L	-	29	0.0002	0.0073	0.0011	0.0008	100
Manganese - Total [mg/L]		≤ 0.1 mg/L	29	0.0002	0.0073	0.0011	0.0008	100
pH Units		6.5 - 8.5	69	7.1	8.0	7.6	7.6	100
Total Dissolved Solids [mg/L]		≤ 600 mg/L	165	130	420	256	260	100
Turbidity [NTU]		≤ 5 NTU	69	<0.10	0.70	0.15	0.13	100
Trihalomethanes - Total [µg/L]	≤ 250 µg/L	-	29	56	238	129	124	100

	Myponga Metro System							
Parameter	**Health Guideline**	**Aesthetic Guideline**	**Samples**	**Min**	**Max**	**Ave**	**Median**	**% Compliance**
***E. coli* [per 100 mL]**	++	-	65	0	0	0	0	100
Coliforms [per 100 mL]	95% free from coliforms*	-	65	0	2	0	0	93.8
Chlorine Residual - Free [mg/L]	≤ 5 mg/L	-	92	<0.1	1.0	0.2	0.1	100
Chlorine Residual - Free [mg/L]		≤ 0.6 mg/L	92	<0.1	1.0	0.2	0.1	90.2
Colour -True [HU]		≤ 15 HU	66	<1	3	2	1	100
Fluoride [mg/L]	≤ 1.5 mg/L	-	10	0.80	0.97	0.88	0.90	100
Hardness - Total [mg/L]		≤ 200 mg/L	10	119	143	133	134	100
Iron - Total [mg/L]		≤ 0.3 mg/L	41	<0.0005	0.0468	0.0101	0.0074	100
Manganese - Total [mg/L]	≤ 0.5 mg/L	-	41	0.0002	0.0110	0.0022	0.0012	100
Manganese - Total [mg/L]		≤ 0.1 mg/L	41	0.0002	0.0110	0.0022	0.0012	100
pH Units		6.5 - 8.5	67	7.1	7.7	7.4	7.4	100
Total Dissolved Solids [mg/L]		≤ 600 mg/L	67	420	480	445	450	100
Turbidity [NTU]		≤ 5 NTU	66	<0.10	0.62	0.14	0.12	100
Trihalomethanes - Total [µg/L]	≤ 250 µg/L	-	20	167	257	208	212	95

* SA Water internal guideline value

++ *E. coli* should not be detected in samples of drinking water. Although we aim for 100% compliance, the ADWG recognise that occasional detections may occur. In accordance with the guidelines any detection is immediately investigated and corrective action implemented as agreed with SA Health.

Data source: Allwater

Table 2

2012-13 Metropolitan Adelaide distribution system customer tap water quality against 2011 ADWG *continued*

	North Metro System							
Parameter	**Health Guideline**	**Aesthetic Guideline**	**Samples**	**Min**	**Max**	**Ave**	**Median**	**% Compliance**
***E. coli* [per 100 mL]**	++	-	359	0	0	0	0	100
Coliforms [per 100 mL]	95% free from coliforms*	-	359	0	32	0	0	97.5
Chlorine Residual - Free [mg/L]	≤ 5 mg/L	-	418	<0.1	1.4	0.3	0.2	100
Chlorine Residual - Free [mg/L]		≤ 0.6 mg/L	418	<0.1	1.4	0.3	0.2	82.5
Colour -True [HU]		≤ 15 HU	193	<1	4	1	1	100
Fluoride [mg/L]	≤ 1.5 mg/L	-	22	0.26	0.98	0.84	0.87	100
Hardness - Total [mg/L]		≤ 200 mg/L	22	82	169	131	135	100
Iron - Total [mg/L]		≤ 0.3 mg/L	89	<0.0005	0.0511	0.0120	0.0091	100
Manganese - Total [mg/L]	≤ 0.5 mg/L	-	89	0.0002	0.0093	0.0011	0.0007	100
Manganese - Total [mg/L]		≤ 0.1 mg/L	89	0.0002	0.0093	0.0011	0.0007	100
pH Units		6.5 - 8.5	205	7.0	8.0	7.4	7.4	100
Total Dissolved Solids [mg/L]		≤ 600 mg/L	200	140	460	335	340	100
Turbidity [NTU]		≤ 5 NTU	202	<0.10	0.93	0.16	0.14	100
Trihalomethanes - Total [µg/L]	≤ 250 µg/L	-	87	67	232	145	140	100

	South Metro System							
Parameter	**Health Guideline**	**Aesthetic Guideline**	**Samples**	**Min**	**Max**	**Ave**	**Median**	**% Compliance**
***E. coli* [per 100 mL]**	++	-	64	0	0	0	0	100
Coliforms [per 100 mL]	95% free from coliforms*	-	64	0	1	0	0	96.9
Chlorine Residual - Free [mg/L]	≤ 5 mg/L	-	77	<0.1	0.5	0.1	0.1	100
Chlorine Residual - Free [mg/L]		≤ 0.6 mg/L	77	<0.1	0.5	0.1	0.1	100
Colour -True [HU]		≤ 15 HU	24	<1	3	1	1	100
Fluoride [mg/L]	≤ 1.5 mg/L	-	2	0.46	0.86	0.66	0.66	100
Hardness - Total [mg/L]		≤ 200 mg/L	2	121	137	129	129	100
Iron - Total [mg/L]		≤ 0.3 mg/L	12	0.0031	0.0115	0.0067	0.0065	100
Manganese - Total [mg/L]	≤ 0.5 mg/L	-	12	0.0003	0.0014	0.0008	0.0007	100
Manganese - Total [mg/L]		≤ 0.1 mg/L	12	0.0003	0.0014	0.0008	0.0007	100
pH Units		6.5 - 8.5	34	7.2	7.9	7.6	7.7	100
Total Dissolved Solids [mg/L]		≤ 600 mg/L	34	150	410	279	280	100
Turbidity [NTU]		≤ 5 NTU	24	<0.10	0.32	0.14	0.13	100
Trihalomethanes - Total [µg/L]	≤ 250 µg/L	-	18	78	169	124	127	100

* SA Water internal guideline value

++ *E. coli* should not be detected in samples of drinking water. Although we aim for 100% compliance, the ADWG recognise that occasional detections may occur. In accordance with the guidelines any detection is immediately investigated and corrective action implemented as agreed with SA Health.

Data source: Allwater

Table 2

2012-13 Metropolitan Adelaide distribution system customer tap water quality against 2011 ADWG *continued*

	West Metro System							
Parameter	**Health Guideline**	**Aesthetic Guideline**	**Samples**	**Min**	**Max**	**Ave**	**Median**	**% Compliance**
***E. coli* [per 100 mL]**	++	-	275	0	0	0	0	100
Coliforms [per 100 mL]	95% free from coliforms*	-	275	0	66	0	0	99.3
Chlorine Residual - Free [mg/L]	≤ 5 mg/L	-	399	<0.1	1.5	0.4	0.3	100
Chlorine Residual - Free [mg/L]		≤ 0.6 mg/L	399	<0.1	1.5	0.4	0.3	81.2
Colour -True [HU]		≤ 15 HU	91	<1	3	1	1	100
Fluoride [mg/L]	≤ 1.5 mg/L	-	10	0.27	0.88	0.68	0.74	100
Hardness - Total [mg/L]		≤ 200 mg/L	10	72	157	122	118	100
Iron - Total [mg/L]		≤ 0.3 mg/L	48	<0.0005	0.0611	0.0148	0.0114	100
Manganese - Total [mg/L]	≤ 0.5 mg/L	-	48	0.0002	0.0076	0.0015	0.0011	100
Manganese - Total [mg/L]		≤ 0.1 mg/L	48	0.0002	0.0076	0.0015	0.0011	100
pH Units		6.5 - 8.5	91	7.1	8.0	7.5	7.5	100
Total Dissolved Solids [mg/L]		≤ 600 mg/L	645	110	450	296	290	100
Turbidity [NTU]		≤ 5 NTU	91	<0.10	0.46	0.14	0.13	100
Trihalomethanes - Total [µg/L]	≤ 250 µg/L	-	50	57	240	143	140	100

	Metropolitan Adelaide - Total Distribution System							
Parameter	**Health Guideline**	**Aesthetic Guideline**	**Samples**	**Min**	**Max**	**Ave**	**Median**	**% Compliance**
***E. coli* [per 100 mL]**	++	-	2463	0	2	0	0	99.9
Coliforms [per 100 mL]	95% free from coliforms*	-	2463	0	100	0	0	98.2
Chlorine Residual - Free [mg/L]	≤ 5 mg/L	-	3020	<0.1	1.6	0.4	0.2	100
Chlorine Residual - Free [mg/L]		≤ 0.6 mg/L	3020	<0.1	1.6	0.4	0.2	80.1
Colour -True [HU]		≤ 15 HU	703	<1	4	1	1	100
Fluoride [mg/L]	≤ 1.5 mg/L	-	86	0.12	1.00	0.79	0.86	100
Hardness - Total [mg/L]		≤ 200 mg/L	86	66	169	118	119	100
Iron - Total [mg/L]		≤ 0.3 mg/L	357	<0.0005	0.1385	0.0116	0.0082	100
Manganese - Total [mg/L]	≤ 0.5 mg/L	-	357	0.0001	0.0110	0.0013	0.0008	100
Manganese - Total [mg/L]		≤ 0.1 mg/L	357	0.0001	0.0110	0.0013	0.0008	100
pH Units		6.5 - 8.5	848	7.0	8.1	7.5	7.5	100
Total Dissolved Solids [mg/L]		≤ 600 mg/L	1726	110	480	290	280	100
Turbidity [NTU]		≤ 5 NTU	722	<0.10	8.40	0.16	0.13	99.9
Trihalomethanes - Total [µg/L]	≤ 250 µg/L	-	482	19	257	132	129	99.8

* SA Water internal guideline value

++ *E. coli* should not be detected in samples of drinking water. Although we aim for 100% compliance, the ADWG recognise that occasional detections may occur. In accordance with the guidelines any detection is immediately investigated and corrective action implemented as agreed with SA Health.

Data source: Allwater

Table 3
2012-13 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	330	490	376	216	236	224	0.4	0.6	0.5	7.4	7.8	7.6
Elliston	560	970	764	260	356	309	0.5	0.5	0.5	7.2	7.4	7.4
Eyre South[1]	420	670	510	216	314	260	0.5	0.8	0.6	7.4	7.9	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
Morgan WTP	96	320	191	42	106	75	6.0	9.3	7.5	7.5	9.0	8.1
Port Lincoln[3]	420	670	510	216	314	260	0.5	0.8	0.6	7.4	7.9	7.6
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	1.3	0.1	<1	2	1	0.177	0.987	0.645	0.010	0.012	0.011
Elliston	<0.1	0.1	0.1	<1	3	1	2.960	3.990	3.475	0.006	0.008	0.007
Eyre South[1]	<0.1	2.8	0.2	<1	4	1	3.240	5.980	4.385	<0.005	0.010	0.007
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
Morgan WTP	34.0	84.0	54.1	11	40	21	<0.005	0.335	0.039	0.040	0.285	0.150
Port Lincoln[3]	<0.1	2.8	0.2	<1	4	1	3.240	5.980	4.385	<0.005	0.010	0.007
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	98	330	185	39	105	74	5.1	7.6	6.5	7.2	8.2	7.9
Berri WTP	87	270	173	44	108	74	5.0	7.5	6.4	7.2	8.4	7.8
Blanchetown WTP	93	290	191	44	109	77	5.2	7.9	6.5	7.4	8.2	7.9
Cadell WTP	95	310	192	41	104	75	4.9	7.5	6.4	7.2	8.4	8.0
Glossop WTP	87	270	173	44	108	74	5.0	7.5	6.4	7.2	8.4	7.8
Hawker IRP	2100	2500	2320	863	1030	933	0.6	0.7	0.6	7.1	7.3	7.2
Loxton WTP	95	280	196	39	104	73	5.0	8.2	6.5	7.4	8.5	8.0
Melrose	1200	1800	1450	283	403	341	0.6	0.7	0.7	7.2	7.5	7.4
Moorook WTP	95	340	184	43	105	74	5.1	7.7	6.4	7.2	8.4	7.9
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	96	320	191	42	106	75	6.0	9.3	7.5	7.5	9.0	8.1
Orroroo	1800	2200	1954	680	740	707	0.5	0.6	0.6	7.1	7.3	7.2
Parachilna	790	830	813	293	324	308	0.3	0.4	0.4	7.5	7.7	7.6
Quorn	1000	1400	1213	488	503	494	0.8	1.0	0.9	6.8	7.2	7.0
Renmark WTP	84	250	160	36	98	70	4.9	8.1	6.5	6.9	8.2	7.7
Waikerie WTP	93	310	192	44	105	75	5.1	7.8	6.5	7.1	8.7	8.0
Warooka	680	770	728	306	307	307	1.0	1.0	1.0	7.4	7.6	7.5
Wilmington	280	320	300	94	130	111	<0.3	1.3	0.8	6.2	6.9	6.5
Woolpunda	92	320	188	42	104	74	5.1	7.8	6.5	7.4	8.4	7.9

[1] Morgan / Swan Reach WTP system supplied from either Morgan WTP or Swan Reach WTP
N/A - Not applicable

Table 3
2012-13 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	37.0	110.0	54.5	11	41	22	<0.005	0.311	0.038	0.013	0.299	0.163
Berri WTP	36.0	120.0	55.2	11	40	22	<0.005	0.341	0.057	0.060	0.413	0.178
Blanchetown WTP	18.0	68.0	47.6	10	36	21	<0.005	0.136	0.023	0.064	0.243	0.165
Cadell WTP	26.0	87.0	49.4	10	42	21	<0.005	0.336	0.038	0.048	0.308	0.157
Glossop WTP	36.0	120.0	55.2	11	40	22	<0.005	0.341	0.057	0.060	0.413	0.178
Hawker IRP	3.5	15.0	10.3	<1	3	1	<0.005	0.008	0.007	0.012	0.013	0.013
Loxton WTP	24.0	130.0	55.3	11	43	22	<0.005	0.271	0.060	0.062	0.477	0.171
Melrose	<0.1	2.1	0.5	<1	2	1	0.304	0.586	0.445	0.012	0.016	0.014
Moorook WTP	24.0	120.0	57.8	11	42	22	<0.005	0.286	0.044	0.041	0.280	0.169
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	34.0	84.0	54.1	11	40	21	<0.005	0.335	0.039	0.040	0.285	0.150
Orroroo	<0.1	0.4	0.1	<1	1	1	0.033	0.043	0.038	0.012	0.014	0.013
Parachilna	<0.1	18.0	2.0	<1	2	1	1.360	1.380	1.370	<0.005	0.008	0.007
Quorn	<0.1	0.9	0.2	<1	2	1	0.104	0.112	0.108	0.020	0.022	0.021
Renmark WTP	36.0	150.0	62.3	11	40	22	<0.005	0.142	0.040	0.044	0.278	0.163
Waikerie WTP	28.0	100.0	50.5	10	42	21	<0.005	0.270	0.030	0.056	0.289	0.167
Warooka	<0.1	0.2	0.1	<1	3	1	3.460	3.460	3.460	0.015	0.015	0.015
Wilmington	<0.1	2.6	0.4	<1	3	1	0.079	0.214	0.147	0.066	0.089	0.078
Woolpunda	29.0	110.0	54.5	11	39	22	<0.005	0.278	0.031	0.045	0.260	0.163

[1] Morgan / Swan Reach WTP system supplied from either Morgan WTP or Swan Reach WTP
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]	53	340	182	36	113	75	3.4	10.4	6.7	6.5	9.0	7.9

	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]	12.0	270.0	56.9	9	46	22	<0.005	0.401	0.045	0.010	0.543	0.160

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

Table 3
2012-13 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
Barossa WTP#	290	500	376	100	134	116	8.9	10.0	9.3	6.9	8.4	7.8
Cowirra WTP	98	270	192	41	108	75	4.9	7.4	6.5	7.3	8.1	7.7
Happy Valley WTP#	180	390	321	114	131	123	6.8	9.2	8.1	7.3	8.8	8.1
Kanmantoo WTP	100	270	193	45	107	78	5.8	10.4	7.6	7.1	7.8	7.5
Mannum WTP	100	280	191	41	106	75	5.3	7.6	6.5	7.3	8.4	7.7
Middle River WTP	280	590	433	44	92	66	9.7	21.1	12.5	6.6	7.5	7.1
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	96	320	191	42	106	75	6.0	9.3	7.5	7.5	9.0	8.1
Mt Compass	91	270	193	36	76	53	<0.3	<0.3	<0.3	6.0	7.0	6.4
Mt Pleasant WTP	100	280	191	41	106	75	5.3	7.6	6.5	7.3	8.4	7.7
Murray Bridge WTP	100	270	193	45	107	78	5.8	10.4	7.6	7.1	7.8	7.5
Mypolonga WTP	100	280	193	45	108	77	4.9	8.0	6.6	6.5	7.9	7.5
Myponga WTP#	370	420	397	114	138	128	10.7	14.3	12.2	7.0	8.6	7.8
Palmer WTP	100	280	191	41	106	75	5.3	7.6	6.5	7.3	8.4	7.7
Penneshaw WTP	32000	38000	33961	N/A	N/A	N/A	N/A	N/A	N/A	6.7	7.6	6.9
Summit WTP	100	270	193	45	107	78	5.8	10.4	7.6	7.1	7.8	7.5
Swan Reach Town WTP	94	290	193	40	109	75	5.1	7.6	6.5	7.3	8.4	7.9
Swan Reach WTP	95	280	193	41	110	75	5.0	8.3	6.5	7.3	8.2	7.9
Tailem Bend WTP	100	300	198	45	113	78	5.0	9.0	6.5	7.2	8.0	7.6

	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
Barossa WTP#	0.3	7.1	0.6	15	28	21	<0.005	0.048	0.018	0.010	0.374	0.040
Cowirra WTP	25.0	74.0	46.7	11	42	20	<0.005	0.076	0.038	0.040	0.235	0.128
Happy Valley WTP#	1.9	18.0	5.8	19	75	45	<0.005	0.459	0.080	0.023	0.118	0.051
Kanmantoo WTP	20.0	77.0	52.6	11	41	20	<0.005	0.202	0.086	0.023	0.510	0.157
Mannum WTP	35.0	75.0	49.7	10	38	20	0.006	0.213	0.057	0.035	0.225	0.146
Middle River WTP	4.0	47.0	10.0	126	230	152	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
Morgan WTP	34.0	84.0	54.1	11	40	21	<0.005	0.335	0.039	0.040	0.285	0.150
Mt Compass	<0.1	6.6	0.5	<1	2	1	0.052	0.052	0.052	0.012	0.012	0.012
Mt Pleasant WTP	35.0	75.0	49.7	10	38	20	0.006	0.213	0.057	0.035	0.225	0.146
Murray Bridge WTP	20.0	77.0	52.6	11	41	20	<0.005	0.202	0.086	0.023	0.510	0.157
Mypolonga WTP	15.0	71.0	43.3	11	38	20	<0.005	0.150	0.063	0.072	0.305	0.141
Myponga WTP#	0.7	21.0	2.5	38	85	54	0.005	0.219	0.109	0.007	1.240	0.065
Palmer WTP	35.0	75.0	49.7	10	38	20	0.006	0.213	0.057	0.035	0.225	0.146
Penneshaw WTP	0.1	1.4	0.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Summit WTP	20.0	77.0	52.6	11	41	20	<0.005	0.202	0.086	0.023	0.510	0.157
Swan Reach Town WTP	29.0	67.0	47.2	11	38	20	<0.005	0.092	0.021	0.046	0.249	0.173
Swan Reach WTP	30.0	66.0	49.7	11	36	20	<0.005	0.139	0.042	0.048	0.355	0.192
Tailem Bend WTP	12.0	85.0	45.4	12	39	21	<0.005	0.222	0.113	0.010	0.242	0.136

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
2012-13 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	630	670	650	274	284	280	0.8	0.9	0.9	7.2	7.5	7.4
Bordertown	390	630	484	232	308	262	0.7	0.8	0.7	6.6	7.6	7.3
Geranium	1300	1500	1392	574	578	577	0.8	0.9	0.9	7.0	7.2	7.0
Kalangadoo IRP	500	530	522	350	364	355	1.2	1.2	1.2	7.0	7.1	7.1
Kingston SE IRP	800	1400	1059	217	232	224	0.7	1.1	0.9	7.3	7.5	7.4
Lameroo IRP	910	1100	947	237	242	239	0.5	0.6	0.6	7.5	7.6	7.6
Lucindale IRP	780	820	800	297	317	305	2.2	2.2	2.2	7.3	7.5	7.4
Millicent	510	720	587	331	379	350	0.9	1.2	1.0	7.4	7.8	7.5
Mt Burr	470	490	480	338	338	338	0.7	0.7	0.7	7.1	7.1	7.1
Mt Gambier	340	360	350	170	201	185	0.8	1.3	0.9	8.0	8.4	8.3
Nangwarry	540	690	612	325	453	393	1.0	1.1	1.1	7.0	7.2	7.1
Naracoorte	1200	1300	1215	315	382	343	1.5	1.8	1.6	7.6	7.9	7.7
Padthaway	1300	1500	1423	571	615	598	0.8	0.8	0.8	6.9	7.2	7.0
Parilla IRP	610	670	636	180	188	183	0.5	0.6	0.6	7.4	7.8	7.6
Penola IRP	630	660	640	307	339	324	1.4	2.8	1.9	7.0	7.5	7.3
Pinnaroo IRP	640	1400	842	252	516	310	0.5	0.6	0.6	7.1	7.6	7.4
Port MacDonnell	680	720	705	11	13	12	1.3	1.3	1.3	8.3	8.4	8.3
Robe IRP	700	1100	871	70	132	93	1.0	1.1	1.1	7.5	7.8	7.7
Tailem Bend WTP	100	300	198	45	113	78	5.0	9.0	6.5	7.2	8.0	7.6
Tarpeena IRP	610	720	667	374	438	410	0.9	1.2	1.1	7.1	7.4	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	1.7	4.9	3.0	<1	6	2	<0.005	0.010	0.008	0.013	0.033	0.023
Bordertown	<0.1	2.5	0.3	<1	1	1	0.031	0.389	0.128	0.005	0.013	0.009
Geranium	<0.1	0.1	0.1	<1	2	1	0.034	0.071	0.053	0.036	0.051	0.044
Kalangadoo IRP	0.9	6.1	4.2	<1	5	1	<0.005	<0.005	<0.005	0.013	0.019	0.016
Kingston SE IRP	8.9	43.0	15.8	<1	4	1	0.005	0.006	0.006	0.006	0.007	0.007
Lameroo IRP	1.4	4.5	3.2	<1	3	1	<0.005	<0.005	<0.005	0.050	0.053	0.052
Lucindale IRP	0.2	34.0	6.8	<1	5	2	0.011	0.013	0.012	0.022	0.028	0.025
Millicent	0.1	29.0	2.2	<1	10	3	0.038	0.099	0.058	0.012	0.014	0.013
Mt Burr	0.2	0.2	0.2	<1	<1	<1	1.350	1.350	1.350	0.030	0.030	0.030
Mt Gambier	<0.1	0.4	0.2	<1	2	1	3.340	3.710	3.537	<0.005	0.011	0.008
Nangwarry	<0.1	6.8	0.8	<1	10	2	0.329	2.610	1.470	0.009	0.020	0.015
Naracoorte	0.2	0.9	0.4	3	6	5	<0.005	0.016	0.009	0.050	0.067	0.057
Padthaway	0.1	1.4	0.6	<1	16	2	0.024	0.110	0.067	0.015	0.028	0.022
Parilla IRP	0.8	3.0	2.3	<1	2	1	<0.005	<0.005	<0.005	0.032	0.082	0.057
Penola IRP	6.3	14.0	10.3	<1	4	3	<0.005	<0.005	<0.005	0.021	0.027	0.025
Pinnaroo IRP	1.7	36.0	5.2	<1	3	1	<0.005	<0.005	<0.005	0.046	0.048	0.047
Port MacDonnell	<0.1	1.8	0.5	4	14	8	<0.005	<0.005	<0.005	0.287	0.287	0.287
Robe IRP	0.2	1.5	0.6	<1	4	2	<0.005	<0.005	<0.005	0.035	0.043	0.039
Tailem Bend WTP	12.0	85.0	45.4	12	39	21	<0.005	0.222	0.113	0.010	0.242	0.136
Tarpeena IRP	0.2	18.0	7.3	<1	3	1	<0.005	0.036	0.021	0.033	0.054	0.044

Table 4

2012-13 Country drinking water distribution systems – customer tap water quality against 2011 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		> 95% free^		++				≤ 5 100%				≤ 4.5 100%
Coffin Bay	64	100	64	100	0.7	1.6	1.1	100	N/A	N/A	N/A	-
Elliston	101	100	101	100	0.9	2.1	1.2	100	N/A	N/A	N/A	-
Eyre South	282	100	282	100	0.7	2.0	1.2	100	N/A	N/A	N/A	-
Eyre South / Morgan WTP	297	100	297	100	0.5	3.2	1.4	100	N/A	N/A	N/A	-
Morgan WTP	970	99.5	970	100	N/A	N/A	N/A	-	<0.1	3.9	2.6	100
Port Lincoln	103	100	103	100	0.9	2.0	1.4	100	N/A	N/A	N/A	-
Streaky Bay	52	100	52	100	0.7	1.9	1.2	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				≤ 600 100%				≤ 15				≤ 5
Coffin Bay	360	430	380	100	<1	2	1	100	<0.1	0.2	0.1	100
Elliston	820	840	833	0	<1	2	1	100	<0.1	0.1	0.1	100
Eyre South	500	540	529	100	<1	1	1	100	<0.1	0.2	0.1	100
Eyre South / Morgan WTP	370	470	430	100	<1	3	1	100	<0.1	1.8	0.3	100
Morgan WTP	70	320	245	100	<1	5	2	100	<0.1	26.0	0.2	99.8
Port Lincoln	490	550	523	100	<1	3	1	100	<0.1	0.3	0.1	100
Streaky Bay	410	460	435	100	<1	2	1	100	<0.1	0.4	0.2	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	7.4	7.9	7.7	100	5	7	6	100	1.1	1.3	1.2	100
Elliston	7.5	7.9	7.7	100	7	8	7	100	0.6	0.7	0.7	100
Eyre South	7.2	7.7	7.6	100	13	26	17	100	0.4	1.0	0.5	100
Eyre South / Morgan WTP	7.6	8.2	7.9	100	81	278	185	88.5	0.6	0.6	0.6	100
Morgan WTP	7.0	9.3	8.7	17.1	59	259	142	96.2	0.7	0.9	0.8	100
Port Lincoln	7.3	7.9	7.5	100	7	8	7	100	0.4	0.5	0.4	100
Streaky Bay	7.8	8.2	7.9	100	165	220	193	100	0.6	0.6	0.6	100

* Chlorinated systems only
** Chloraminated systems only
^ SA Water internal guideline value
N/A - Not applicable

++ *E. coli* should not be detected in samples of drinking water. Although we aim for 100% compliance, the ADWG recognise that occasional detections may occur. In accordance with the guidelines any detection is immediately investigated and corrective action implemented as agreed with SA Health.

Table 4

2012-13 Country drinking water distribution systems – customer tap water quality against 2011 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	0.0012	0.0063	0.0025	100	<0.0001	0.0007	0.0003	100	100	215	229	224	0
Elliston	<0.0005	0.0008	0.0006	100	<0.0001	<0.0001	<0.0001	100	100	303	328	313	0
Eyre South	<0.0005	0.0073	0.0011	100	<0.0001	0.0006	0.0001	100	100	242	285	266	0
Eyre South / Morgan WTP	0.0012	0.0112	0.0045	100	0.0002	0.0021	0.0009	100	100	162	245	205	50.0
Morgan WTP	<0.0005	0.1266	0.0085	100	0.0004	0.0167	0.0016	100	100	42	117	84	100
Port Lincoln	<0.0005	0.0005	0.0005	100	<0.0001	<0.0001	<0.0001	100	100	263	275	268	0
Streaky Bay	<0.0005	0.0036	0.0019	100	0.0003	0.0008	0.0005	100	100	191	220	207	50.0

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		> 95% free^		++				≤ 5 100%				≤ 4.5 100%
Barmera WTP	100	100	100	100	0.6	3.3	1.8	100	N/A	N/A	N/A	-
Berri WTP	91	98.9	91	100	<0.1	2.1	1.2	100	N/A	N/A	N/A	-
Blanchetown WTP	51	98.0	51	100	1.0	1.6	1.3	100	N/A	N/A	N/A	-
Cadell WTP	52	100	52	100	0.5	1.4	1.0	100	N/A	N/A	N/A	-
Glossop WTP	103	100	103	100	0.3	2.1	1.2	100	N/A	N/A	N/A	-
Hawker IRP	52	100	52	100	0.4	2.0	1.2	100	N/A	N/A	N/A	-
Loxton WTP	76	97.4	76	100	N/A	N/A	N/A	-	2.4	4.1	3.4	100
Melrose	48	100	48	100	0.9	2.0	1.5	100	N/A	N/A	N/A	-
Moorook WTP	99	97.0	99	100	<0.1	2.5	1.3	100	N/A	N/A	N/A	-
Morgan / Swan Reach WTP	542	99.6	542	99.6	N/A	N/A	N/A	-	<0.1	4.2	2.1	100
Morgan WTP	970	99.5	970	100	N/A	N/A	N/A	-	<0.1	3.9	2.6	100
Orroroo	52	100	52	100	1.0	1.9	1.5	100	N/A	N/A	N/A	-
Parachilna	52	100	52	100	0.1	2.7	0.6	100	N/A	N/A	N/A	-
Quorn	52	100	52	100	0.5	1.9	1.3	100	N/A	N/A	N/A	-
Renmark WTP	215	98.6	215	100	<0.1	2.3	0.9	100	N/A	N/A	N/A	-
Waikerie WTP	76	97.4	76	100	<0.1	2.4	0.6	100	N/A	N/A	N/A	-
Warooka	51	100	51	100	<0.1	1.5	1.1	100	N/A	N/A	N/A	-
Wilmington	51	98.0	51	100	0.2	1.9	1.1	100	N/A	N/A	N/A	-
Woolpunda	76	90.8	76	100	N/A	N/A	N/A	-	<0.1	2.3	0.4	100

* Chlorinated systems only
** Chloraminated systems only
^ SA Water internal guideline value
N/A - Not applicable

++ *E. coli* should not be detected in samples of drinking water. Although we aim for 100% compliance, the ADWG recognise that occasional detections may occur. In accordance with the guidelines any detection is immediately investigated and corrective action implemented as agreed with SA Health.

Table 4

2012-13 Country drinking water distribution systems – customer tap water quality against 2011 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				≤ 600 100%				≤ 15				≤ 5
Barmera WTP	140	310	217	100	<1	3	1	100	<0.1	0.2	0.2	100
Berri WTP	140	280	217	100	<1	2	1	100	<0.1	0.7	0.2	100
Blanchetown WTP	130	270	220	100	<1	2	1	100	<0.1	0.3	0.1	100
Cadell WTP	120	280	208	100	<1	2	1	100	<0.1	0.4	0.1	100
Glossop WTP	120	260	202	100	<1	2	1	100	<0.1	0.2	0.1	100
Hawker IRP	2300	2300	2300	0	<1	2	1	100	<0.1	0.2	0.1	100
Loxton WTP	140	310	220	100	<1	4	3	100	<0.1	0.2	0.1	100
Melrose	1400	1600	1500	0	<1	2	1	100	<0.1	7.8	0.8	92.3
Moorook WTP	130	300	213	100	<1	2	1	100	<0.1	0.2	0.1	100
Morgan / Swan Reach WTP	150	300	246	100	<1	4	2	100	<0.1	2.3	0.2	100
Morgan WTP	70	320	245	100	<1	5	2	100	<0.1	26.0	0.2	99.8
Orroroo	1900	2000	1950	0	<1	2	1	100	<0.1	0.2	0.1	100
Parachilna	800	830	818	0	<1	2	1	100	<0.1	0.9	0.3	100
Quorn	1200	1200	1200	0	<1	2	1	100	<0.1	0.2	0.1	100
Renmark WTP	120	270	203	100	<1	2	1	100	<0.1	5.4	0.2	99.0
Waikerie WTP	120	300	210	100	<1	2	1	100	0.1	0.3	0.2	100
Warooka	740	740	740	0	<1	2	1	100	<0.1	0.2	0.1	100
Wilmington	300	310	305	100	<1	2	1	100	<0.1	0.8	0.2	100
Woolpunda	140	280	238	100	<1	3	2	100	<0.1	3.6	0.5	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%
Barmera WTP	7.1	8.1	7.7	100	67	195	141	100	0.8	0.9	0.9	100
Berri WTP	7.5	8.0	7.7	100	71	195	135	100	0.9	0.9	0.9	100
Blanchetown WTP	7.5	8.0	7.7	100	72	151	120	100	<0.1	0.1	0.1	100
Cadell WTP	7.1	7.8	7.6	100	61	159	120	100	<0.1	0.2	0.1	100
Glossop WTP	7.2	8.0	7.7	100	68	186	132	100	<0.1	0.2	0.1	100
Hawker IRP	7.1	7.4	7.3	100	37	51	45	100	0.7	0.8	0.7	100
Loxton WTP	8.4	9.3	9.0	10.3	9	39	24	100	0.9	0.9	0.9	100
Melrose	7.2	7.8	7.4	100	<4	7	5	100	1.0	1.0	1.0	100
Moorook WTP	7.6	8.2	7.9	100	95	181	132	100	<0.1	0.2	0.1	100
Morgan / Swan Reach WTP	7.9	9.3	8.8	12.1	9	128	35	100	0.8	0.9	0.8	100
Morgan WTP	7.0	9.3	8.7	17.1	59	259	142	96.2	0.7	0.9	0.8	100
Orroroo	7.4	7.6	7.5	100	4	7	5	100	1.2	1.3	1.3	100
Parachilna	7.7	8.1	7.9	100	N/A	N/A	N/A	-	0.6	0.7	0.6	100
Quorn	6.8	7.3	7.1	100	<4	6	5	100	0.6	0.6	0.6	100
Renmark WTP	7.3	9.9	8.1	80.9	70	274	166	95.0	0.8	0.9	0.9	100
Waikerie WTP	7.6	8.0	7.8	100	111	178	151	100	0.8	0.9	0.9	100
Warooka	7.4	7.6	7.5	100	23	34	27	100	0.9	1.1	1.0	100
Wilmington	6.1	7.0	6.5	30.8	5	21	12	100	0.1	0.2	0.2	100
Woolpunda*	7.9	9.2	8.5	57.7	33	73	50	100	<0.1	0.2	0.1	100

*WTP outlet data for Trihalomethanes
N/A - Not applicable

Table 4

2012-13 Country drinking water distribution systems – customer tap water quality against 2011 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	<0.0005	0.0122	0.0070	100	0.0017	0.0050	0.0033	100	100	47	99	75	100
Berri WTP	0.0058	0.0114	0.0085	100	0.0014	0.0036	0.0028	100	100	47	101	78	100
Blanchetown WTP	0.0070	0.0093	0.0081	100	0.0005	0.0007	0.0006	100	100	43	100	80	100
Cadell WTP	0.0007	0.0100	0.0044	100	0.0004	0.0025	0.0011	100	100	41	110	78	100
Glossop WTP	0.0057	0.0141	0.0104	100	0.0002	0.0004	0.0003	100	100	44	99	76	100
Hawker IRP	0.0042	0.0081	0.0062	100	0.0001	0.0003	0.0002	100	100	858	955	894	0
Loxton WTP	<0.0005	0.0023	0.0011	100	0.0006	0.0015	0.0011	100	100	41	101	70	100
Melrose	0.0023	0.0078	0.0046	100	<0.0001	0.0001	0.0001	100	100	303	414	353	0
Moorook WTP	0.0044	0.0125	0.0082	100	0.0003	0.0009	0.0005	100	100	43	99	73	100
Morgan / Swan Reach WTP	0.0010	0.0104	0.0044	100	0.0005	0.0053	0.0014	100	100	54	112	86	100
Morgan WTP	<0.0005	0.1266	0.0085	100	0.0004	0.0167	0.0016	100	100	42	117	84	100
Orroroo	0.0018	0.0102	0.0061	100	0.0001	0.0003	0.0002	100	100	679	718	695	0
Parachilna	0.0052	0.0147	0.0086	100	0.0002	0.0008	0.0005	100	100	300	330	310	0
Quorn	<0.0005	0.0009	0.0006	100	<0.0001	<0.0001	<0.0001	100	100	486	542	522	0
Renmark WTP	<0.0005	0.0209	0.0058	100	0.0009	0.0035	0.0021	100	100	39	100	76	100
Waikerie WTP	0.0131	0.0187	0.0161	100	0.0019	0.0062	0.0035	100	100	43	107	76	100
Warooka	<0.0005	0.0113	0.0049	100	<0.0001	<0.0001	<0.0001	100	100	308	348	332	0
Wilmington	0.0186	0.0382	0.0275	100	0.0002	0.0005	0.0004	100	100	108	120	115	100
Woolpunda	0.0025	0.0366	0.0179	100	0.0006	0.0017	0.0010	100	100	56	111	88	100

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		> 95% free^		++				≤ 5 100%				≤ 4.5 100%
Barossa WTP#	406	97.3	406	100	<0.1	1.5	0.4	100	N/A	N/A	N/A	-
Cowirra WTP	77	100	77	100	<0.1	1.6	0.7	100	N/A	N/A	N/A	-
Happy Valley WTP	63	100	63	100	<0.1	1.3	0.2	100	N/A	N/A	N/A	-
Kanmantoo WTP	76	100	76	100	0.5	2.1	1.1	100	N/A	N/A	N/A	-
Mannum WTP	117	100	117	100	0.2	2.4	1.6	100	N/A	N/A	N/A	-
Middle River WTP	114	93.9	114	100	<0.1	1.4	0.4	100	N/A	N/A	N/A	-
Morgan / Swan Reach WTP	542	99.6	542	99.6	N/A	N/A	N/A	-	<0.1	4.2	2.1	100
Morgan WTP	970	99.5	970	100	N/A	N/A	N/A	-	<0.1	3.9	2.6	100
Mt Compass	64	100	64	100	0.8	1.6	1.3	100	N/A	N/A	N/A	-
Mt Pleasant WTP	127	100	127	100	<0.1	1.8	0.9	100	N/A	N/A	N/A	-
Murray Bridge WTP	156	99.4	156	100	<0.1	3.1	1.4	100	N/A	N/A	N/A	-
Mypolonga WTP	76	93.4	76	96.1	<0.1	2.3	1.0	100	N/A	N/A	N/A	-
Myponga WTP#	218	99.1	218	100	<0.1	3.3	0.2	100	N/A	N/A	N/A	-
Palmer WTP	117	99.1	117	100	<0.1	2.1	1.2	100	N/A	N/A	N/A	-
Penneshaw WTP	76	100	76	100	0.4	3.1	1.7	100	N/A	N/A	N/A	-
Summit WTP	536	99.8	536	100	N/A	N/A	N/A	-	0.1	3.9	2.4	100
Swan Reach Town WTP	63	100	63	100	0.6	2.0	1.2	100	N/A	N/A	N/A	-
Swan Reach WTP	491	99.6	491	99.8	N/A	N/A	N/A	-	0.5	3.8	2.4	100
Tailem Bend WTP	295	99.7	295	100	N/A	N/A	N/A	-	0.1	3.8	2.4	100

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

++ *E. coli* should not be detected in samples of drinking water. Although we aim for 100% compliance, the ADWG recognise that occasional detections may occur. In accordance with the guidelines any detection is immediately investigated and corrective action implemented as agreed with SA Health.

Table 4

2012-13 Country drinking water distribution systems – customer tap water quality against 2011 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				≤ 600 100%				≤ 15				≤ 5
Barossa WTP#	280	470	420	100	<1	4	1	100	<0.1	1.3	0.2	100
Cowirra WTP	140	280	230	100	<1	2	1	100	<0.1	0.2	0.1	100
Happy Valley WTP	240	280	263	100	<1	2	1	100	0.1	0.6	0.2	100
Kanmantoo WTP	140	280	240	100	<1	2	1	100	0.1	2.6	0.5	100
Mannum WTP	150	280	233	100	<1	1	1	100	<0.1	0.2	0.1	100
Middle River WTP	430	600	500	100	<1	4	1	100	<0.1	0.6	0.2	100
Morgan / Swan Reach WTP	150	300	246	100	<1	4	2	100	<0.1	2.3	0.2	100
Morgan WTP	70	320	245	100	<1	5	2	100	<0.1	26.0	0.2	99.8
Mt Compass	190	240	215	100	<1	4	1	100	<0.1	0.4	0.1	100
Mt Pleasant WTP	170	310	249	100	<1	4	1	100	<0.1	0.3	0.1	100
Murray Bridge WTP	140	270	215	100	<1	3	1	100	<0.1	6.4	0.3	99.0
Mypolonga WTP	140	290	213	100	<1	3	1	100	<0.1	1.2	0.2	100
Myponga WTP#	430	470	453	100	<1	7	2	100	<0.1	3.7	0.3	100
Palmer WTP	140	290	218	100	<1	2	1	100	<0.1	0.2	0.1	100
Penneshaw WTP	160	310	226	100	<1	2	1	100	<0.1	17.0	1.5	92.3
Summit WTP	140	320	239	100	<1	7	3	100	<0.1	0.8	0.1	100
Swan Reach Town WTP	150	290	220	100	<1	12	2	100	<0.1	0.2	0.1	100
Swan Reach WTP	130	310	234	100	<1	6	2	100	<0.1	0.4	0.1	100
Tailem Bend WTP	150	330	244	100	<1	5	2	100	<0.1	0.7	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%
Barossa WTP#	7.0	8.7	7.5	98.1	34	261	158	97.1	0.8	1.0	0.9	100
Cowirra WTP	7.6	8.2	7.9	100	90	183	145	100	<0.1	0.2	0.1	100
Happy Valley WTP	7.3	8.6	7.7	96.2	135	184	163	100	0.5	0.9	0.8	100
Kanmantoo WTP	7.4	7.8	7.6	100	80	160	118	100	<0.1	0.2	0.1	100
Mannum WTP	7.1	8.0	7.7	100	78	151	116	100	0.9	1.0	0.9	100
Middle River WTP	7.5	7.8	7.7	100	28	200	116	100	<0.1	<0.10	<0.1	100
Morgan / Swan Reach WTP	7.9	9.3	8.8	12.1	9	128	35	100	0.8	0.9	0.8	100
Morgan WTP	7.0	9.3	8.7	17.1	59	259	142	96.2	0.7	0.9	0.8	100
Mt Compass	6.4	7.0	6.7	94.1	<4	5	5	100	0.2	0.3	0.3	100
Mt Pleasant WTP	7.0	7.8	7.4	100	54	191	123	100	0.9	1.1	1.0	100
Murray Bridge WTP	7.3	8.5	7.8	100	68	216	147	100	0.8	0.9	0.9	100
Mypolonga WTP	7.3	9.0	7.8	82.1	92	176	136	100	0.1	0.1	0.1	100
Myponga WTP#	7.0	7.9	7.5	100	135	275	204	94.8	0.8	1.0	0.9	100
Palmer WTP	7.2	8.5	7.8	100	71	221	129	100	<0.1	0.2	0.1	100
Penneshaw WTP	7.6	8.4	8.0	100	<4	62	19	100	<0.1	<0.10	<0.1	100
Summit WTP*	8.0	9.2	8.7	24.8	6	23	14	100	0.8	0.9	0.8	100
Swan Reach Town WTP	7.5	7.9	7.7	100	72	157	117	100	<0.1	0.2	0.1	100
Swan Reach WTP*	8.0	9.2	8.7	21.5	<4	28	12	100	0.8	1.0	0.9	100
Tailem Bend WTP*	7.5	9.4	8.8	13.3	8	13	11	100	0.7	0.9	0.8	100

Supplies both country and metropolitan systems
*WTP outlet data for Trihalomethanes
N/A - Not applicable

Table 4

2012-13 Country drinking water distribution systems – customer tap water quality against 2011 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
Barossa WTP#	0.0035	0.3021	0.0469	95.7	<0.0001	0.0342	0.0035	100	100	131	182	153	100
Cowirra WTP	0.0025	0.0076	0.0059	100	0.0002	0.0009	0.0005	100	100	48	111	87	100
Happy Valley WTP	0.0040	0.0148	0.0104	100	0.0005	0.0015	0.0008	100	100	107	122	112	100
Kanmantoo WTP	0.0122	0.1909	0.0406	100	0.0002	0.0021	0.0005	100	100	55	110	86	100
Mannum WTP	0.0026	0.0083	0.0052	100	0.0016	0.0032	0.0023	100	100	48	106	78	100
Middle River WTP	0.0351	0.1662	0.0706	100	0.0017	0.0065	0.0030	100	100	60	90	73	100
Morgan / Swan Reach WTP	0.0010	0.0104	0.0044	100	0.0005	0.0053	0.0014	100	100	54	112	86	100
Morgan WTP	<0.0005	0.1266	0.0085	100	0.0004	0.0167	0.0016	100	100	42	117	84	100
Mt Compass	0.0018	0.0100	0.0042	100	0.0002	0.0002	0.0002	100	100	60	78	68	100
Mt Pleasant WTP	<0.0005	0.0076	0.0033	100	0.0003	0.0018	0.0008	100	100	45	107	77	100
Murray Bridge WTP	<0.0005	0.0035	0.0020	100	0.0007	0.0064	0.0030	100	100	47	102	78	100
Mypolonga WTP	0.0054	0.0132	0.0081	100	0.0002	0.0005	0.0004	100	100	48	103	75	100
Myponga WTP#	0.0093	0.1576	0.0623	100	0.0006	0.0073	0.0034	100	100	124	142	135	100
Palmer WTP	0.0053	0.0136	0.0096	100	0.0005	0.0008	0.0006	100	100	43	106	74	100
Penneshaw WTP	<0.0005	0.4581	0.0939	80.0	<0.0001	0.0144	0.0030	100	100	63	84	74	100
Summit WTP	<0.0005	0.0688	0.0095	100	0.0011	0.0071	0.0031	100	100	48	108	83	100
Swan Reach Town WTP	0.0073	0.0323	0.0180	100	0.0004	0.0026	0.0012	100	100	44	104	78	100
Swan Reach WTP	<0.0005	0.0106	0.0023	100	0.0009	0.0062	0.0024	100	100	48	110	81	100
Tailem Bend WTP	<0.0005	0.0060	0.0022	100	0.0003	0.0053	0.0015	100	100	51	115	81	100

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		> 95% free^		++				≤ 5 100%				≤ 4.5 100%
Beachport IRP	65	98.5	65	98.5	0.5	1.6	1.2	100	N/A	N/A	N/A	-
Bordertown	64	96.9	64	100	0.8	1.5	1.1	100	N/A	N/A	N/A	-
Geranium	51	100	51	100	0.7	1.8	1.1	100	N/A	N/A	N/A	-
Kalangadoo IRP	64	100	64	100	0.1	2.6	1.0	100	N/A	N/A	N/A	-
Kingston SE IRP	65	100	65	100	0.5	1.2	0.9	100	N/A	N/A	N/A	-
Lameroo IRP	51	100	51	100	0.5	1.4	1.0	100	N/A	N/A	N/A	-
Lucindale IRP	65	100	65	100	0.2	1.3	0.8	100	N/A	N/A	N/A	-
Millicent	82	100	82	100	0.3	1.2	0.8	100	N/A	N/A	N/A	-
Mt Burr	65	100	65	100	<0.1	2.0	0.7	100	N/A	N/A	N/A	-
Mt Gambier	152	100	152	100	0.6	3.5	1.1	100	N/A	N/A	N/A	-
Nangwarry	64	100	64	100	0.6	2.2	0.9	100	N/A	N/A	N/A	-
Naracoorte	91	97.8	91	100	<0.1	2.0	0.2	100	N/A	N/A	N/A	-
Padthaway	62	98.4	62	100	0.6	1.9	1.1	100	N/A	N/A	N/A	-
Parilla IRP	51	100	51	100	0.7	1.5	1.1	100	N/A	N/A	N/A	-
Penola IRP	76	100	76	100	0.1	1.8	1.0	100	N/A	N/A	N/A	-
Pinnaroo IRP	64	100	64	100	0.4	2.5	1.3	100	N/A	N/A	N/A	-
Port MacDonnell	57	94.7	57	100	N/A	N/A	N/A	-	<0.1	0.7	0.3	100
Robe IRP	64	98.4	64	100	N/A	N/A	N/A	-	0.2	1.9	1.2	100
Tailem Bend WTP	295	99.7	295	100	N/A	N/A	N/A	-	0.1	3.8	2.4	100
Tarpeena IRP	62	98.4	62	100	0.6	2.6	1.0	100	N/A	N/A	N/A	-

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

++ *E. coli* should not be detected in samples of drinking water. Although we aim for 100% compliance, the ADWG recognise that occasional detections may occur. In accordance with the guidelines any detection is immediately investigated and corrective action implemented as agreed with SA Health.

Table 4

2012-13 Country drinking water distribution systems – customer tap water quality against 2011 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				≤ 600 100%				≤ 15				≤ 5
Beachport IRP	640	660	650	0	<1	2	1	100	<0.1	0.2	0.1	100
Bordertown	440	570	483	100	<1	2	1	100	<0.1	0.2	0.1	100
Geranium	1400	1400	1400	0	<1	4	1	100	<0.1	0.2	0.1	100
Kalangadoo IRP	530	570	543	100	<1	5	1	100	<0.1	0.3	0.1	100
Kingston SE IRP	830	1200	1083	0	<1	<1	<1	100	<0.1	0.3	0.1	100
Lameroo IRP	930	980	955	0	<1	1	1	100	<0.1	0.3	0.1	100
Lucindale IRP	780	810	795	0	<1	2	1	100	<0.1	0.2	0.1	100
Millicent	560	610	593	75.0	<1	3	1	100	<0.1	0.5	0.2	100
Mt Burr	420	480	440	100	<1	2	1	100	<0.1	0.3	0.1	100
Mt Gambier	350	360	352	100	<1	2	1	100	<0.1	0.4	0.2	100
Nangwarry	620	660	635	0	<1	1	1	100	<0.1	0.2	0.1	100
Naracoorte	1200	1300	1225	0	2	7	4	100	0.1	1.9	0.3	100
Padthaway	1400	1500	1450	0	<1	1	1	100	0.1	0.3	0.2	100
Parilla IRP	610	660	635	0	<1	2	1	100	<0.1	0.1	0.1	100
Penola IRP	640	710	663	0	<1	2	1	100	<0.1	0.4	0.1	100
Pinnaroo IRP	660	710	680	0	<1	2	1	100	<0.1	0.3	0.1	100
Port MacDonnell	690	710	700	0	<1	5	3	100	0.1	0.9	0.4	100
Robe IRP	770	930	850	0	<1	2	1	100	<0.1	1.1	0.2	100
Tailem Bend WTP	150	330	244	100	<1	5	2	100	<0.1	0.7	0.1	100
Tarpeena IRP	660	680	670	0	<1	2	1	100	<0.1	1.8	0.2	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%
Beachport IRP	7.5	8.0	7.7	100	34	44	39	100	0.2	0.3	0.2	100
Bordertown	6.7	7.5	7.2	100	6	9	7	100	0.3	0.4	0.3	100
Geranium	6.8	7.3	7.0	100	4	5	5	100	1.0	1.0	1.0	100
Kalangadoo IRP	7.1	7.6	7.2	100	26	53	40	100	0.1	0.2	0.1	100
Kingston SE IRP	7.3	7.7	7.5	100	25	39	34	100	0.3	0.4	0.3	100
Lameroo IRP	7.6	8.1	7.8	100	15	25	19	100	0.6	0.6	0.6	100
Lucindale IRP	7.4	7.9	7.6	100	86	107	99	100	0.3	0.3	0.3	100
Millicent	7.4	7.9	7.5	100	40	86	62	100	0.9	1.2	1.0	100
Mt Burr	7.1	7.9	7.7	100	9	13	10	100	<0.1	0.2	0.2	100
Mt Gambier	7.9	8.3	8.2	100	6	26	16	100	0.2	0.9	0.5	100
Nangwarry	7.2	7.8	7.3	100	9	20	14	100	<0.1	0.1	0.1	100
Naracoorte	7.5	8.1	7.8	100	6	165	84	100	1.0	1.2	1.1	100
Padthaway	7.3	7.7	7.4	100	6	11	9	100	0.1	0.1	0.1	100
Parilla IRP	7.4	7.8	7.7	100	13	17	15	100	0.4	0.5	0.5	100
Penola IRP	7.1	7.4	7.3	100	43	88	63	100	0.2	0.2	0.2	100
Pinnaroo IRP	7.0	7.5	7.4	100	8	13	11	100	0.6	0.7	0.7	100
Port MacDonnell	7.9	8.6	8.3	95.2	5	88	46	100	0.8	1.0	0.9	100
Robe IRP	7.6	8.1	7.8	100	<4	5	4	100	0.3	0.3	0.3	100
Tailem Bend WTP*	7.5	9.4	8.8	13.3	8	13	11	100	0.7	0.9	0.8	100
Tarpeena IRP	7.3	8.1	7.6	100	30	49	41	100	0.2	0.2	0.2	100

*WTP outlet data for Trihalomethanes
N/A - Not applicable

Table 4

2012-13 Country drinking water distribution systems – customer tap water quality against 2011 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	<0.0005	0.1055	0.0106	100	<0001	0006	0003	100	100	276	286	281	0
Bordertown	<0.0005	0.0020	0.0009	100	<0001	<0001	<0001	100	100	251	298	265	0
Geranium	0.0108	0.0375	0.0185	100	0002	0005	0003	100	100	548	575	563	0
Kalangadoo IRP	0.0017	0.0327	0.0136	100	<0001	0002	0002	100	100	351	406	369	0
Kingston SE IRP	0.0015	0.0651	0.0076	100	<0001	0004	0002	100	100	231	246	237	0
Lameroo IRP	0.0123	0.0393	0.0252	100	0008	0009	0009	100	100	226	248	238	0
Lucindale IRP	0.0013	0.1567	0.0120	100	<0001	<0001	<0001	100	100	284	325	305	0
Millicent	0.0057	0.1076	0.0347	100	0002	0018	0010	100	100	342	372	354	0
Mt Burr	0.0015	0.0034	0.0024	100	<0001	<0001	<0001	100	100	281	322	294	0
Mt Gambier	<0.0005	0.0046	0.0010	100	<0001	0003	0001	100	100	169	210	184	96.2
Nangwarry	<0.0005	0.0019	0.0010	100	<0001	0001	0001	100	100	382	426	401	0
Naracoorte	0.0390	0.0667	0.0545	100	0075	0097	0086	100	100	335	375	353	0
Padthaway	0.0165	0.0238	0.0186	100	0004	0005	0005	100	100	564	612	585	0
Parilla IRP	0.0012	0.0331	0.0083	100	<0001	0001	0001	100	100	177	189	184	100
Penola IRP	0.0027	0.1096	0.0185	100	<0001	0017	0005	100	100	303	354	322	0
Pinnaroo IRP	0.0037	0.0666	0.0262	100	0003	0017	0008	100	100	217	267	245	0
Port MacDonnell	0.0131	0.1034	0.0456	100	0003	0011	0007	100	100	15	23	19	100
Robe IRP	0.0008	0.1234	0.0159	100	0004	0007	0006	100	100	77	113	96	100
Tailem Bend WTP	<0.0005	0.0060	0.0022	100	0003	0053	0015	100	100	51	115	81	100
Tarpeena IRP	0.0013	0.0418	0.0092	100	0002	0006	0003	100	100	401	436	415	0

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SA Water Corporation

ABN: 69 336 525019

Head Office
250 Victoria Square / Tarntanyangga
Adelaide SA 5000

Postal Address
GPO Box 1751
Adelaide SA 5001

Customer Service Centre
1300 650 950

Website
www.sawater.com.au

Follow us on Twitter,
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Enquiries relating to this report should be directed to our Customer Service Centre.

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