

South Australian Water Monitoring Investment Framework and Strategy

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*An initiative by the South Australian Water Information
Program Board*

The South Australian Water Monitoring Investment Framework and Strategy

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Foreword

Water is often referred to as the foundation for life. It enables societies to prosper. A reliable and secure supply of water is critical to ensure the future health, well-being and prosperity of South Australia.

Monitoring of water resources provides fundamental data and information required to inform policy and management decisions, and subsequently evaluate the effectiveness of these decisions over time.

South Australia's monitoring requirements are changing because of increasingly diverse water sources, a growing population and emerging industries such as mining, which rely on sound information to make investment decisions. This is occurring within the context of rapidly evolving technology and the need for immediate and accurate data and information.

It is unlikely that the total amount of investment available for monitoring will increase at the same rate as the need for more information, and therefore future monitoring activities need to ensure that investments are well targeted and opportunities for investment leverage are identified and realised.

In order to achieve the significant number of integrated outcomes and targets set in the State's strategic plans, South Australia needs to develop a shared, State-wide view of the purpose and priorities for water monitoring and a commitment from all stakeholders to work collaboratively.

This Water Monitoring Investment Framework & Strategy sets out a clear framework with principles and priorities for future investment. It offers a common approach for those involved in water monitoring to work with individually and collaboratively to ensure that monitoring activities continue to provide relevant, accurate and integrated data to inform decisions and ultimately enable South Australia to achieve its goals and aspirations.

Context

Water monitoring activities provide information that describes the quantity, quality, distribution and variability of the State's water resources and underpin informed decisions about how water is managed and used.

South Australia, through a number of organisations, invests significant resources in its water monitoring activities.

Each of these entities has its own drivers and budgets for monitoring water resources but there is currently no holistic overview of all monitoring activity and investment for the State as a whole.

This is not a unique situation in South Australia. Other States and countries are in a similar position, and many are currently formulating equivalent strategies to this document in order to gain a more integrated and holistic view of activities and investments. Examples include:

- [NSW State Water Monitoring Strategy](#);
- [Victoria: Gippsland Sustainable Water Strategy Submission](#);
- [Illinois EPA Water Monitoring Strategy](#);
- [Tasmanian Surface Water Quality monitoring strategy](#);
- [Agforce Queensland: Coal Seam Gas Underground Water Impact report](#); and
- [Relevant State Strategic Water Information and Monitoring Plans \(SWIMPs\) across the Nation](#).

The advent of the **Water Act 2007**, and its associated **Regulations**, which require relevant water information and data from a large number of 'Named Persons' to be delivered to the Bureau of Meteorology (BoM), have highlighted the diversity and disaggregation of water data collection and custodianship across Australia.

At the same time, the emergence of State, Basin and National policy frameworks and strategic plans increasingly require the coordination of activities and integration of information sources in order to achieve important social, economic and environmental outcomes.

The need for collaboration towards the achievement of joint outcomes is reflected in a significant number of targets in South Australia's *State Strategic Plan*, *Strategic Infrastructure Plan*, *30 year Plan for Greater Adelaide* and the *Draft*

State Natural Resources Management Plan for South Australia.

Water for Good has two specific Actions that relate to water resource monitoring:

Action 45: Strategically review and, where required, expand or upgrade the water resources monitoring network.

Action 46: Increase the regularity of state-wide data collation, assessment, and reporting, where required.

In support of the Government's strategic plans, its ICT strategy, *Ask Just Once*, also drives the coordination, integration and sharing of information and technology, through its fundamental principles:

"Information is shared"

"Infrastructure is shared"

Consistent with its mission to:

- Take a whole-of-state approach to dealing with related water information;
- Work to engender strategic coordination, collaboration, investment and governance;
- Drive the strategic direction of the Water Information Program;
- Coordinate decisions about the State's investment in water information; and
- Coordinate the delivery of strategic initiative outcomes and benefits.

and supported through funding by the BoM, the [South Australian Water Information Program Board](#) has commissioned the development of this monitoring investment framework and strategy for South Australia.

The development of this document builds on the foundations provided through the South Australian Strategic Water Information and Monitoring Plan and is informed by the considerable knowledge and intelligence gained through interviews and workshops with a selection South Australian and interstate monitoring agents and stakeholders.

During the final stages of development of this document, the South Australian Government announced the merger of the Department for Water (DFW) with the Department of Environment and Natural Resources (DENR) to form a new Department for Environment, Water and Natural Resources from July 1 2012.

References to DENR and DFW should be read in this context.

Water Monitoring In South Australia

Until the 1990's, water monitoring was undertaken predominantly by a small number of government agencies.

Today, as a result of new legislative bodies, machinery of government changes and increased focus on water resources, there is a much larger and more diverse number of **organisations** involved in monitoring. They include:

- Department for Water (DFW);
- Bureau of Meteorology (BoM);
- South Australian Water Corporation (SA Water);
- Natural Resource Management (NRM) Boards;
- Environment Protection Authority (EPA);
- Department for Environment and Natural Resources (DENR);
- Murray Darling Basin Authority (MDBA);
- Local Government;
- Industries such as Mining and Energy Companies; and
- Irrigation Trusts;

Depending on the drivers for their monitoring activities, these organisations collect data on a wide range of water-related qualitative and quantitative **parameters**, including:

- Rainfall;
- Climatic conditions;
- River flows and surface and groundwater levels;
- Water quality, including salinity, pH, turbidity and presence of chemicals and pathogens; and
- Ecological indicators such as macro invertebrates, etc.

In addition to the diversity of data types, there is also a diversity of monitoring **types**, including:

- *State and condition* monitoring (long-term view);
- *Operational* monitoring (management actions);
- *Project* monitoring (short-term/special purpose); and
- *Compliance* monitoring (water use, license conditions etc),

using a number of different collection **methods**, ranging from manual to telemetered, metering to remote sensing and in-sourced to out-sourced

and, in some instances, community based monitoring.

Data collected from these activities has variable spatial and temporal coverage and resides in many different systems, based on a number of technology platforms.

Collectively, this monitoring activity is driven by a range of **purposes** and informs:

- Planning for future water needs and assessing long term sustainability (demand/supply);
- State-wide and regional policy development;
- Making operational and management decisions;
- Enforcement and compliance activities;
- Legislative compliance and reform;
- Providing public information;
- Understanding specific or time limited issues and events (drought/flood/riverbank collapse);
- Interstate trade; and
- National reporting activities, including Water Accounting and Water Resource Assessment.

Current and Future Challenges

As a result of the large array of activities undertaken, the monitoring landscape in South Australia is highly complex and somewhat disaggregated.

At present, there is no easily accessible or holistic picture of all monitoring programs in the State. Consequently, it is difficult for organisations to gain visibility of potentially related or synergistic activities undertaken by other organisations.

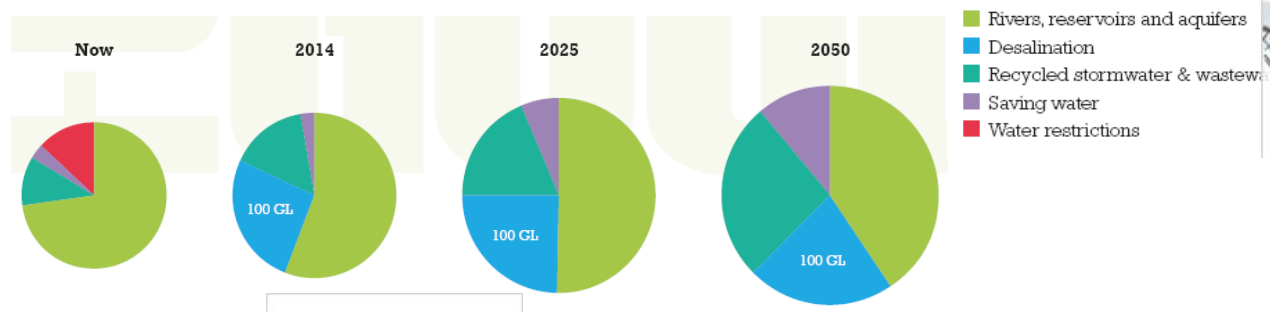
In addition, there is no mechanism to ascertain whether the sum of all monitoring programs provides the level of coverage, priority focus, integration and adaptability required to support the joint achievement of long term local, regional, State, Basin and National strategies.

Compounding these challenges is a growing expectation by communities, governments and industry that water information be available in a timely manner, and form that is easily accessible, accurate and usable.

Due to the increasing diversification of water resources (stormwater, desalination, etc), emergence of new industries, impacts of climate change and the effects of population growth, monitoring requirements are constantly changing

while competition for budgets and other resourcing is intensifying.

Diagram 1: Greater Adelaide's changing water supplies as outlined in Water for Good



A State-wide Water Monitoring Investment Framework & Strategy

The ability for South Australia to meet and address these challenges and to achieve the joint long-term objectives expected by the State, Basin and Nation will require the development of a coordinated, integrated and strategic approach.

Building on the foundations established by the State's SWIMP and based on extensive literature review and consultation with South Australian and interstate stakeholders, this document formulates both a Water Monitoring Investment **Framework** and **Strategy** for South Australia, where:

- The **Framework** formulates a set of **guiding principles** to inform the State's water monitoring activities, programs and investments, both jointly and individually, and
- The **Strategy** identifies a number of **priority activities**, to support each principle.

All of the principles can be applied by individual organisations through undertaking identified activities, however, the collective benefit increases significantly when activities are coordinated.

Underpinning both the Framework and the Strategy is the proposed establishment of a **State-wide Monitoring Coordination Group** consisting of monitoring experts from representative organisations, with the role to:

- support the mission of the South Australian Water Information Program Board in the monitoring domain;
- increase transparency and visibility of monitoring activities amongst stakeholders; and
- ensure that monitoring activities are continuously aligned with strategic outcomes.

State Water Monitoring Investment Framework

Guiding Principles

The following eight guiding principles have been formulated to inform all monitoring activities and investment decisions across the State:

1. **Monitoring is coordinated across the State**

Monitoring organisations in the State proactively engage in information exchange and coordinate efforts to ensure optimal alignment of resources and activities.

"Many monitoring sites are historical and have been established independently without broader consideration for a holistic approach to monitoring that is designed to achieve mutually beneficial outcomes."- AGT 2011:9

2. **Monitoring is fit for purpose**

The supply side of monitoring data and information is cognisant of the needs and priorities of the demand side – that is, monitoring activities have a line of sight to management, strategic and policy decisions they inform and, in turn, can be used to evaluate the effectiveness of these decisions over time. Monitoring activities are aligned with the long-term objectives of the State, in particular, they support the achievement of the following key outcomes:

Outcome 1 Safe Reliable Water Supplies

Ensuring that all South Australians have access to safe, reliable and fit for purpose water for economic, social and cultural pursuits.

Outcome 2- Sustainable Environments

Improving our ability to effectively manage and protect our water environments and water- dependent ecosystems.

Outcome 3- Economic & Industry Growth

South Australia having ready, reliable and sustainable water for industry growth and development.

Outcome 4- Resilient Communities

Building resilient and engaged communities including being prepared for and able to respond to droughts and floods.

3. **Monitoring is adaptive**

As monitoring priorities change, new resources and industries emerge and impacts of population growth and climate change emerge, monitoring activities are regularly reviewed and adapted.

4. **Monitoring is consistent**

Monitoring organisations actively participate in the evaluation of emerging standards and implement relevant standards as appropriate, to

ensure the long term consistency, quality and interoperability of data and information.

“The adoption of best practice standards for data collection, analysis and reporting will ensure the availability of timely, relevant and accurate information to inform critical strategic and policy decisions”. - High Performance Framework

5. Monitoring information is accessible

Monitoring information and data is amongst the least restricted and most re-usable data available. Monitoring organisations actively engage in making their data available to government, industry and communities in a cost-effective and sustainable way.

Monitoring systems adopt and implement, where possible and available, open standards to facilitate information exchange with other systems.

“Information is shared”

“Infrastructure is shared”- Ask Just Once

6. Monitor once, use many times

Data and information collected at monitoring sites is leveraged to the greatest extent possible. This can only occur if the relevant data is made available to others. Data sharing is supported by relevant metadata and licensing information.

7. Existing investment is leveraged

New investment in monitoring is cognisant of existing investment and relevant information systems are leveraged where appropriate, instead of creating individual, stand alone data collections.

8. Collaborative partnership opportunities are realised

Monitoring organisations pro-actively identify and act upon collaborative partnership opportunities. This is particularly relevant where new monitoring needs arise and existing resources to maintain and support monitoring networks become scarcer.

With the advent of the Murray Darling Basin Plan, additional joint and individual monitoring requirements will arise for both the MDBA and the State. Given the interconnectedness of the river system, collaborative partnership opportunities need to be identified early.

The guiding principles formulated above are scaleable, that is, they can be applied by individual organisations as well as by relevant coordinating

bodies. Their purpose is to provide a framework to inform and guide decision-making related to monitoring.

Diagram 2: Water monitoring plays a key role in informing the decision making process.



State Water Monitoring Investment Strategy

Based on the framework of guiding principles outlined above, this section provides an overview of priority activities, as identified by South Australian and interstate stakeholders.

The suite of proposed activities is consistent with those recommended in other jurisdiction's strategies and, in recognition of South Australia's current fiscal constraints, leverages a number of existing and proposed programs.

Priority Activities

1. Monitoring is coordinated across the State

▶ **Establish a formal Water Monitoring Coordination Committee**, reporting to the SAWIPB. The committee should build upon and expand existing governance arrangements, including the State Water Monitoring Network Optimisation Program's cross agency steering committee and the SAWIPB Reference Group. Ensure inclusion of relevant information/data experts and demand-side representatives.

▶ Develop, publish and maintain a **list of all State monitoring programs** (who, what, where, when, why, how often, etc.) in order to raise visibility of monitoring activities across the State. Identify any potential gaps, duplications or opportunities, where relevant.

▶ Develop, publish and maintain a **list of all State monitoring sites** (who, what, where, when, why, how often, etc.) in order to raise visibility of monitoring locations across the State. Identify any potential gaps, duplications or opportunities, where relevant. The 2009 SWIC data collection, about to be published as an interactive Web tool by the BoM, could be leveraged for this purpose.

2. Monitoring is fit for purpose

▶ **Ensure monitoring programs are aligned with current and future demands and requirements**, including relevant legislative, operational, short and long-term priorities. As highlighted in the principles section, monitoring data forms the basis for an information value chain that leads to the formulation of management decisions, policies and strategies. Monitoring activities

therefore need to ensure that there is a clear line of sight between supply of and demand for information.

▶ **Identify measures and processes for effective monitoring data use**, that is, establish mechanisms to trace the chain of evidence used to create models, reports and policies back to relevant monitoring programs.

▶ Based on an assessment of the various monitoring programs and the location of monitoring sites, **develop a 5 year, State-wide monitoring plan through the Coordination Committee** to inform both individual and possible joint investments.

3. Monitoring is adaptive

▶ Adopt an 'adaptive management' approach to monitoring which includes the monitoring and evaluation of monitoring programs themselves. **Conduct at least 5 yearly¹ reviews of monitoring priorities and investments** and their continued alignment relevant goals and strategies to ensure continued fitness for purpose.

▶ Identify and **integrate any new monitoring needs** (stormwater) **or organisations** (mining/energy) into coordinated monitoring activities.

▶ **Include requirements for event-monitoring** into overall activity and investment planning (flood, drought, riverbank collapse etc.)

▶ **Consider uses for modelling** into monitoring plans. Modelling is currently widely used for predictive purposes, but with the advent of new tools, such as ArcHydro for Groundwater, modelling may also be used to for instance interpolate water quantities underground, potentially enabling organisations to re-prioritise monitoring focus on key indicator sites.

4. Monitoring is consistent

▶ **Identify and implement consistent standards** and classifications through leverage of the State Water Monitoring Network Optimisation Program, the SAWIPB Reference Group, the SAWIPB itself and the National Water Information

¹ A 5 yearly cycle is suggested to align with State of Environment Reporting frequency.

Standards Business Forum. Monitoring standards currently under consideration include standards for the establishment, calibration and maintenance of sites. These standards have a direct impact on data quality and also on the State's ability to compare and integrate data with a degree of confidence.

▶ **Identify key monitoring sites** for the State, i.e. sites that are highly representative, or of priority importance to a monitoring purpose, require longitudinal consistency (e.g. continuous monitoring without interruptions) or high availability (e.g. flood monitoring sites). Investment decisions will then need to reflect and prioritise the ongoing maintenance and integrity of these sites.

▶ **Identify and maintain State-wide authoritative data sources.** South Australia has a number of potential candidates, with DFW's Hydstra for surface water, DMITRE's SA Geodata for Groundwater, EPA's EnviroSys for Water Quality and DFW's WILMA for water use. Unless these data repositories are identified and continuously maintained and updated as *authoritative sources* or recognised as *State-wide registers*, with relevant catchments of information from all sources, fragmentation will occur over time.

5. **Monitoring information is accessible**

▶ **Continue to expand and leverage WaterConnect** as South Australia's integrated reference site for water information and data. Consistent with the current work program of the SAWIPB, this activity is concerned with providing a single gateway for all publicly available water data and information in South Australia through deep linkages to relevant published resources.

▶ **Promote the publication and open licensing of monitoring information across the State.**

Continue to work with the Reference Group and other relevant bodies on the public release of information and the adoption of the most open licensing arrangement possible (preference of AusGOAL CC BY licence). In order to be valuable in the long term, the publication of data needs to be an integral part of the organisation's business, and be sustainable, current and regular.

▶ Internal to Government, continue to **leverage and expand the Spatial Data Sharing Initiative** to

ensure that relevant monitoring data and information can be integrated with the most current spatial layers.

6. **Monitor once, use many times**

▶ **Leverage 'category data'** provided to the BoM under the Water Regulations to ensure the widest possible re-use. The MDBA has already indicated its intent to leverage this data for its purposes, with the BoM set to enable data downloads from all providers through AWRIS in the near future.

▶ **Monitor to the optimal scale and coverage** in order to inform decisions at relevant levels of granularity – Local, Regional, State, Basin and National, noting the risks inherent in aggregating and/or disaggregating data to other levels.

▶ **Trial innovative approaches**. The concept of multi-purpose sites has been identified in other documents as an opportunity. Multi-purpose sites are sites equipped to measure multiple parameters at the one site, utilising the same communication infrastructure to transmit data. An example would be a stream flow gauge, combined with a pluviometer. A number of organisations, including the *Water Industry Alliance* may be interested in conducting a trial of a multi-purpose site.

7. **Existing investment is leveraged**

▶ **Explore the leverage and re-use of AWRIS capabilities** with the BoM. AWRIS already represents an integrated collection of the State's Water Regulations Category data. However, this collection is not currently accessible to the State. While the publication of data through AWRIS is planned, it would be useful to explore if, in addition to the data holdings, the wider ICT capability of AWRIS can be leveraged for other, State-based purposes (concept of AWRIS SA).

▶ **Explore the leverage and re-use of MDBA data and capabilities** with the MDBA under joint programs. The MDBA has significant data holdings and ICT capabilities, which have been established over recent years. It would be useful to assess, in collaboration with the MDBA, if any of these data sources or ICT capabilities could be leveraged for mutual benefit.

8. Collaborative partnership opportunities are realised

▶ Explore opportunities for joint investments.

With the implementation of the Water Regulations and the supply of data to the BoM and also imminently with the implementation of the Murray-Darling Basin Plan, other organisations are becoming increasingly reliant on South Australian monitoring investment continuity. Given this reliance, joint investment opportunities and priorities should be identified, both in terms of ensuring ongoing support for key existing sites and potential future sites of mutual interest.

▶ Explore opportunities under relevant legislation (NRM Act or Water Industry Act) to increase monitoring data coverage by obtaining data dynamically from private sector organisations, such as resource and energy companies. A number of these organisations collect water monitoring information but currently do not share it, or share it in a static or highly aggregated form only (reports). On the Federal level, the latest amendment to the *Water Regulations* caters for a new category of person (category J) to capture possible additional significant water data custodians. This provision, and possible provisions under State legislation, may be able to be leveraged to increase the coverage and completeness of the State's water monitoring data by including information from additional sources.

▶ Conduct a trial of remote sensing for compliance monitoring in collaboration with Geoscience Australia (GA) and the Department of Sustainability, Environment, Water, Population and Communities (SEWPaC). As part of the National Framework for Compliance and Enforcement program, GA/SEWPaC are looking to establish the usefulness of remote sensing information to inform compliance activities. Intelligence gathered through the use of these technologies has National coverage and has the potential to inform targeted compliance activities, where State-wide or in-person intelligence gathering is otherwise cost prohibitive.

▶ Conduct a trial of community monitoring for voluntary compliance, by establishing a pilot for self-meter readings. With the adoption of a risk based approach to compliance monitoring and the

roll out of water licenses throughout the Mount Lofty Ranges comes the need for land owners to install meters. This expansion will pose a significant challenge for water use monitoring unless alternate methods for monitoring are examined. One such potential option is the conduct of a trial of community based monitoring, possibly through the use of an iphone application (allows geo-locating and photography).

A South Australian Water Monitoring Coordinating Committee

Since its establishment, the South Australian Water Information Program Board has recognised and emphasised the importance of *coordination* as a significant value adding activity designed to ensure visibility, transparency and alignment of activities between various stakeholders.

Equally, the BoM established a coordination role in each jurisdiction to support activities under the *Modernisation & Extension Fund* and the MDBA has approached jurisdictions with a view to establishing coordination roles to provide a point of contact for the data and information requirements associated with the reporting aspects of the implementation of the Murray-Darling Basin Plan.

Coordination requires a concerted effort and benefits from the establishment of a specific body tasked to coordinate.

One of the key recommendations of this strategy is for the SAWIPB to establish a **State Monitoring Coordination Committee**, with relevant representation from monitoring organisations, data consumers and information experts, with the role to:

- support the mission of the South Australian Water Information Program Board in the monitoring domain;
- increase transparency and visibility of monitoring activities amongst stakeholders; and
- ensure that monitoring activities are continuously aligned with strategic outcomes.

Based on the above suite of activities under the Monitoring Strategy, the Committee would be responsible for the:

- Establishment, maintenance and operation of a comprehensive list of monitoring activities and sites;
- Development of a 5 year plan for monitoring across the State based on the analysis of the list of monitoring activities and sites;
- 5 yearly review of monitoring activities according to the principles outlined in the framework;

- Coordination of activities and leverage of investment, identification of collaborative opportunities, as relevant;
- Acting as a conduit between individual monitoring organisations, the Committee, and ultimately the SAWIPB; and
- Other activities to progress the implementation of this framework and strategy.

Membership of this Committee should build on existing cross-organisational governance bodies, including the State Water Monitoring Network Optimisation Program's Steering Committee and the SAWIPB Reference Group.

The establishment of this governance body is consistent with activities in other jurisdictions for similar reasons – cf. [NSW State Water Monitoring Strategy](#).

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Internet Links:

[NSW State Water Monitoring Strategy](#)

[Victoria: Gippsland Sustainable Water Strategy Submission](#)

[Illinois EPA Water Monitoring Strategy](#)

[Tasmanian Surface Water Quality monitoring strategy](#)

[Agforce Queensland: Coal Seam Gas Underground Water Impact report](#)