

Attachment F.2

# SA Water High-level Asset Management System

SA Water  
**Regulatory Business  
Proposal 2013**



# High Level Asset Management System

**August 2012**

## Foreword

This document consists of an executive summary and four chapters. The chapters are:

- **Introduction** offers a high level overview of services provided by SA Water; its asset base as at June 2011; a brief description of the asset management system and its architecture used throughout the document to further detail the system's main components.
- **Corporate** outlines the SA Water Strategic Plan and the drivers under one of the Key Strategies, Asset Stewardship to achieve organisational goals; the other corporate management systems; the corporate risk based approach; SA Water's organisational structure and the relationship with external stakeholders.
- **Asset Management System Architecture** is the main body of the document and it explores in more detail each of the components of the Asset Management System: *Asset Management Policy, Asset Strategy, Planning & Decision Making, Lifecycle Delivery, Risk & Review, Asset Information and People, Skills & Processes.*
- **Asset Management Documentation** describes at high level the asset management documentation hierarchy.

The Asset Management Unit's Strategic Team is responsible for maintaining, updating and publishing the High Level AMS document.

The figure below shows the documents that are currently considered to be key to describing the main components of SA Water's AMS and the relationship with this document.

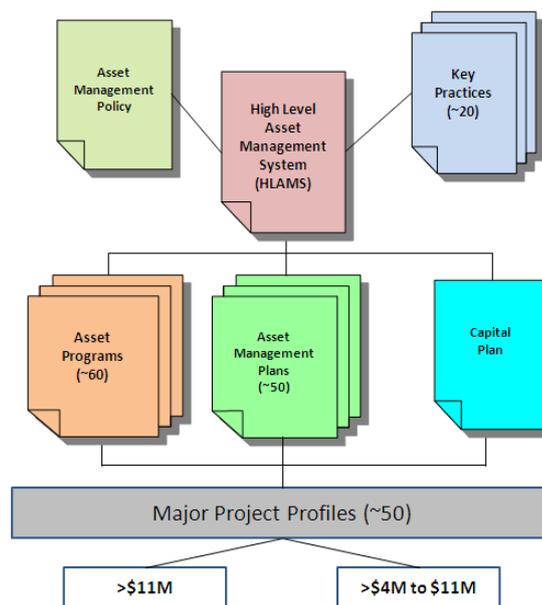


Figure 1: Key Document and their relationships

## Version History

Version	Date	Author(s)	Comments
1.0	31 August 2012	Paul Cooledge	Initial version replacing previous, related documents

## Reviewers

Name	Title	Date
Kym Wallent	Manager Assset Managment	30 August 2012
Richard Cawley	Manager Regulation	30 August 2012

## Table of Acronyms

Acronym	Meaning	Explanatory Notes
<b>ACAD</b>	Asset Condition Assessment Database	A database used by United water to store asset condition assessment information
<b>AMLT</b>	Asset Management Leadership Team	Manager Asset Management plus his 8 reports. The leadership team of <b>AMU</b>
<b>AMU</b>	Asset Management Business Unit	The unit that is run by Manager Asset Management and comprises about 70 FTE's on Level 7 SA Water House
<b>AMP</b>	Asset Management Plans	A plan that relates to a specific facilities or network. About 50 of these documents exist
<b>ANCOLD</b>	Australian National Committee on Large Dams	ANCOLD guideline s built into legislation in other States, but not in SA, although we operate as if it was
<b>CSIS</b>	Customer Service Information System	Where the customer records and billing is generated and stored
<b>DWQMS</b>	Drinking Water Quality Management System	One of four of SA Water management systems
<b>EMS</b>	Environmental Management System	One of four of SA Water management systems
<b>FAR</b>	Fixed Asset Register	The software application where the asset values are calculated and stored for the organisation
<b>GIS</b>	Geographic Information System	The software application where spatial information around pipelinesand other assets are stored
<b>GRV</b>	Gross Replacement Value	Accounting term used for valuing assets
<b>HLAMS</b>	High Level Asset Management System	The contents of this document essentially
<b>IMD</b>	Infrastructure Management & Delivery	An SA Water organisational Group
<b>Maximo</b>	Maximo	The works management software application for SA Water's infrastructure assets
<b>MCA</b>	Multi-criteria analysis	A means by which future capital spend is evaluated covering just more than financial criteria eg Social & Enviromental
<b>NPV</b>	Net present value	Part of capital evaluation analysis criteria that accounts for the cost of capital and time value of money
<b>OHSMS</b>	Occupations Health & Safety Managaement System	One of four of SA Water management systems
<b>PMP</b>	Project Management & Procurement	An organisation that provides capital construction services to SA Water in the Metro area
<b>SCADA</b>	Supervisory Control & Data Aquisition	SCADA system is the means by which data is captured from remote sites and in some cases asets are remotely controlled
<b>SMT</b>	Senior Managment Team	CEO and direct reports

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## Executive Summary

### 1 - Introduction

- SA Water primarily provides services for two products: Water and Wastewater covering over half a million properties in South Australia. The first involves sourcing and providing safe drinking water and the second removal, treatment and disposal of waste water.
- The provision of these services requires assets with a gross replacement value (GRV) of over \$17 billion.
- A systematic approach of managing the assets is used to ensure that the service is provided in an efficient and effective manner optimising costs at an acceptable level of risk.
- SA Water Asset Management System (AMS) comprises a policy and strategic direction, specific asset management plans, decision making mechanisms, asset information and risk and review activities. It is fully integrated with SA Water Corporate Business and Strategic plans.
- The scope of asset management can be represented diagrammatically. Its architecture shows how the various components fit together.

### 2 - Corporate Perspective

- SA Water's Strategic Plan and associated Corporate Business Plan establish the organisation's key performance outcomes and strategic priorities.
- The current and future Asset Management capabilities of the organisation are influenced by the objectives, expected outcomes and specific performance in the corporate plans.
- SA Water has corporate management systems that work in harmony to deliver the corporate objectives. The AMS is one of the four such systems (the other three are OHSMS, EMS, and DWQMS).
- A corporate risk management methodology is used to provide consistency across the organisation approach.
- The Asset Management Business Unit (AMU) is part of the Infrastructure Management & Delivery (IMD) Group and is responsible for the AMS and its effectiveness.
- All Groups in SA Water contribute to the management of its asset base in various degrees with IMD and Operations Groups primarily responsible for the delivery component
- SA Water uses numerous partnering and contracting arrangements to deliver its services with the two major ones being Allwater and PMP.
- Relationships are actively managed with a number of key external stakeholders as part of delivering the corporate wide strategies.

### 3 - Asset Management System Architecture

- SA Water Asset Management System (AMS) comprises a policy and strategic direction, specific asset management plans, decision making mechanisms, asset information, risk and review activities and roles and responsibilities. It is fully integrated with SA Water Corporate Business and Strategic plans. The Asset Management System's architecture illustrates how all components fit together.

#### 3.1 - Asset Management Policy

- The Asset Management Policy translates the corporate strategic objectives into top level asset management strategies which in turn align the planning and decision making to the corporate objectives.

#### 3.2 - Asset Management Strategy, Planning and Decision Making

- SA Water has a top level Asset Management Strategy that ensures that the overall asset management activity is fit for purpose in meeting the Asset Management Policy and organisational strategic plan.

- Asset planning sets out how physical infrastructure assets will be managed, over a specific period of time, to achieve asset management objectives.
- Asset management planning activity generally covers a 25-year horizon with a higher degree of detail and certainty in the early years.
- Asset Programs and Asset Management Plans are the outcome of asset planning activity that is applied directly to the asset base and is aligned with the Asset Management Policy.
- Asset Programs are asset plans developed to manage specific themes or asset classes. They ensure clear risk based strategies are in place for each program and they detail forward capital investment requirements.
- Asset Management Plans (AMPs) bring together the relevant information from the Asset Programs and present a view of a particular facility or network in terms of the service that it delivers currently and into the future.
- A key impact on asset planning is population growth which can lead to increased demand for the product or service being produced. The organisation feed demand projections into its long-term planning.
- The Capital Plan is developed using both a bottom up and top down approach
- Asset management decisions are made with the aim of optimising whole life value given any underlying constraints, statutory legislation or regulatory obligations.
- Reliability Centred Maintenance, Condition & Performance Assessments and Criticality models are some that are used to differentiate in the treatment of the assets and obtain the best use of available resources..

### 3.3 - Assets Lifecycle Delivery

- SA Water has specific procedures and processes in place for each of the lifecycle activities (acquire, operate, maintain and dispose) to ensure optimal outcomes are achieved.
- Acquire stage is covered by a corporate project management methodology
- Capital planning is undertaken considering asset degradation and trading off capital costs, maintenance costs, risks and their probabilities in order to optimise a capital investment decision, both in terms of timing and in terms of the choice of asset.
- Prioritisation occurs at the different stages and levels, ultimately determining an overall capital plan from the ground up.
- Operation of assets is undertaken by Operations in accordance with standards set by IMD.
- Maintenance is determined based on cost effectiveness & criticality and delivered by Operations
- Disposal where possible is carried out in conjunction with acquisition to minimise costs.

### 3.4 - Risk & Review

- Risk management relating to assets is conducted in line with the corporate risk management methodology
- Risk assessments are conducted at various stages of the asset's lifecycle to assist in decision making.
- A number of asset specific risk matrices (Heatmaps) are used in addition to the corporate one to ensure maximum effectiveness
- SA Water regularly reviews its asset management practices and implements improvements
- SA Water is made aware of best practice through research and information sharing with national and international water agencies
- SA Water has an AMS improvement process incorporated with the periodic updates of the key AMS documents

### **3.5 - Asset Information**

- **Asset hierarchies are used to group assets together to enable effective and different considerations to be taken into account at the appropriate hierarchy.**
- **There are nine major classes of assets: water pipe networks, water treatment plants, water pump stations, large dams, water storage tanks, bores & wells, wastewater pipe networks, wastewater treatment plants, wastewater pump stations and these are considered as a group of assets and individually as appropriate.**
- **Data is captured in various applications and made available in a form to support the decision making.**

### **3.6 - People, Skills & Processes**

- AMU is structured around four (4) key functional teams and four (4) major support teams contributing together to successful asset management.
- AMU uses a consistent performance processes to align individuals with the goals of the organisation
- Asset management processes are designed to deliver the desired customer outcome. The processes involve all parts of SA Water to varying degrees and the way these are managed varies to suit the circumstances and to manage the risks effectively.

### **4.0 - Asset Management Documentation**

- Improvement of AMS documentation has recently been identified as a priority.
- There are a suite of documents that are considered to be key in describing SA Water's AMS including this document, Asset Management Plans, Asset Programs and Asset Management Key Practices.

# 1 Introduction

- SA Water primarily provides services for two products: Water and Wastewater covering over half a million properties in South Australia. The first involves sourcing and providing safe drinking water and the second removal, treatment and disposal of waste water.
- The provision of these services requires assets with a gross replacement value (GRV) of over \$17 billion.
- A systematic approach of managing the assets is used to ensure that the service is provided in an efficient and effective manner optimising costs at an acceptable level of risk.
- SA Water Asset Management System (AMS) comprises a policy and strategic direction, specific asset management plans, decision making mechanisms, asset information and risk and review activities. It is fully integrated with SA Water Corporate Business and Strategic plans.
- The scope of asset management can be represented diagrammatically. Its architecture shows how the various components fit together.

## 1.1 SA Water Services

SA Water is a State government owned agency that provides water and wastewater services to communities across South Australia.

It is constituted under the *South Australian Water Corporation Act 1994* and is required to deliver, monitor and report on its primary functions:

- supply of water by reticulated systems
- storage, treatment and supply of bulk water
- removal and treatment of wastewater

SA Water reports against customer service, water quality and other system performance indicators in its annual report, which also details the Corporation's financial statements and corporate governance structure.

SA Water key activities include:

- Water and wastewater quality, transport and treatment;
- Constructing, managing, maintaining and operating water and wastewater networks;
- Water quality research and development;
- Project management;
- Engineering;
- Asset management;
- Customer service;
- Information systems.

By nature, water utilities are “infrastructure rich” requiring heavy investment in management of fixed pipes networks, treatment plants, etc.

The schematic below is a simplified view of the infrastructure assets that are required to provide the different product services to SA Water customers: **water** (raw and treated water),

**wastewater and recycled water** (stormwater and wastewater). These products are supplied via dedicated facilities, networks and supply zones.

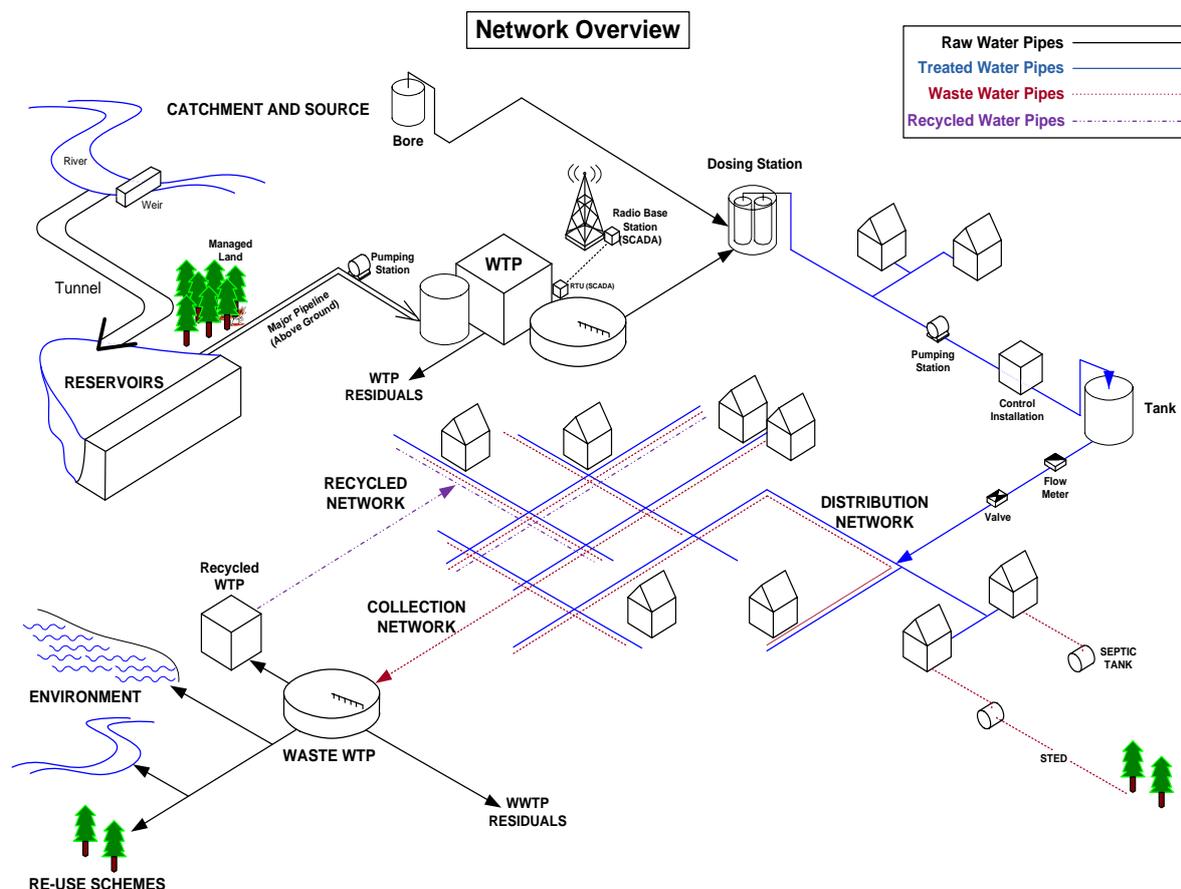


Figure 2: Network Overview

**Water service** is the delivery of safe drinking water to customer taps from water sources such as the River Murray, surface catchments and groundwater aquifers through pipes, pumps, tanks, treatment plants, dosing stations, water connections and water meters.

**Wastewater service** is the collection of sewage/wastewater from customers' premises, transporting it to wastewater treatment plant(s), treating it and managing the various products in a safe and environmentally sustainable way. Gravity flow is utilised as much as possible in the wastewater networks, until depth, groundwater, ground conditions and/or topography require pump stations and rising mains to be used.

**Recycled water service** is usually developed in accordance with EPA requirements and in partnership with external stakeholders such as land developers, the SA Government and local government. It involves taking treated water from the outlet of a wastewater treatment plant, further treating it to a standard fit for its intended use, and delivering the product to customers. The schemes developed to date demonstrate the feasibility of water recycling and integrate the recycled water into the built urban environment. In doing so, traditional sources of drinking water such as the River Murray benefit by reduced extraction. Reducing treated wastewater and



At a high level, the infrastructure assets can be categorised to reflect the services provided as follows:

- Water supply assets: pipe networks, pumping stations, tanks, large dams treatment plants, bores and wells, chemical dosing stations
- Wastewater assets: pipe networks, pumping stations, treatment plants

As at June 2011 SA Water utilised over 26,000km of water pipes and 8,000km of wastewater mains. In total, the asset base had gross replacement value (GRV) of \$17.5 billion and a written down value (WDV) of \$10.3 billion. The assets are categorised in accordance with a Fixed Asset Register (FAR) as shown below:

Asset Category	Assets		
	Total	Adelaide	Country
Water Mains	24,209 km	8,853 km	15,355 km
Major Pipelines	2,353 km	247 km	2,106 km
Water Pump Stations	252	54	198
Water Storage Tanks	514	136	378
Water Treatment Plants	41	6	35
Large Dams	18	11	7
Bores & Wells	145	0	145
Connections (inc. Meters)	660,891	462,196	198,695
Water Dosing Stations	78	8	70
Wastewater Mains	8,686 km	7,252 km	1,434 km
W/w Treatment Plants	24	5	19
W/w Pump Stations	575	350	225
W/w Connections	502,683	438,321	64,362

Table 1: SA Water Infrastructure Assets (June 2011)

### 1.3 Asset Management System

Asset Management is the systematic and structured process of managing the whole life of infrastructure assets with the objective of supporting the delivery of services to customers while minimising costs and managing risk effectively.

SA Water has evolved and established effective ways of managing its assets successfully for over 120 years and in doing so has provided good outcomes for its owner and customers.

In order to deliver effective asset management SA Water has evolved and continues to develop an Asset Management System (AMS). The AMS ensures the many aspects of asset management are addressed, risks are identified and managed, asset management activity is integrated with other business planning functions and review and improvement are organised and ongoing.

**Key elements** of the AMS are explained in this document:

- Strategic asset management documentation that includes a corporate asset management policy and a high level asset management system (this document).
- Comprehensive management of asset information.
- Specific strategies for managing all classes of assets and all operating environment issues (including renewal, strategic intent issues and demand growth).
- The specific asset management outputs to be delivered including asset management plans and sponsorship of infrastructure investment projects (both capital and operating).
- A risk assessment and management process.
- Systemised relationship management to ensure asset management activity integrates fully with other SA Water business unit activity.
- Effective management of life-cycle delivery mechanisms.
- Work process documentation including provision for review and improvement.

**Diagrammatically**, SA Water’s Asset Management System architecture can be represented by the figure below. This representation is in line with good industry practice as contained in documentation including PAS55, WSAA, IIMM and the Institute of Asset Management (UK).

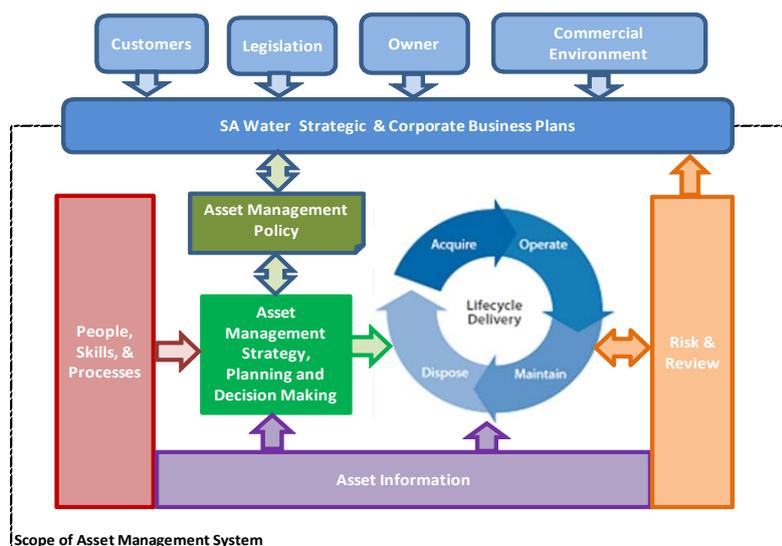


Figure 4: Asset Management System Architecture

As shown the AMS architecture is designed to integrate asset management activity into SA Water’s strategic and business plans and asset delivery, operations and maintenance functions. It also emphasises the critical issue that Asset Management is there to serve the goals of the organisation.

The system and its components are described in more detail in later sections.

## 2 Corporate Perspective

- SA Water's Strategic Plan and associated Corporate Business Plan establish the organisation's key performance outcomes and strategic priorities.
- The current and future Asset Management capabilities of the organisation are influenced by the objectives, expected outcomes and specific performance in the corporate plans.
- SA Water has corporate management systems that work in harmony to deliver the corporate objectives. The AMS is one of the four such systems (the other three are OHSMS, EMS, and DWQMS).
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- All Groups in SA Water contribute to the management of its asset base in various degrees with IMD and Operations Groups primarily responsible for the delivery component
- SA Water uses numerous partnering and contracting arrangements to deliver its services with the two major ones being Allwater and PMP.
- Relationships are actively managed with a number of key external stakeholders as part of delivering the corporate wide strategies.

### 2.1 Overview

This part of the document shows the key elements at the corporate level into which effective asset management activity must integrate. The key components are: corporate strategy, corporate management systems, high level risk management, the SA Water organisation structure and major external service providers and stakeholders.

SA Water is subject to more than 120 Federal and State Acts, along with regulations, codes, industry guidelines, internal policies and operating procedures. Key legislation guiding SA Water includes:

- *Public Corporations Act 1993* - subject to this Act, SA Water is a commercial entity, striving to provide a commercial return to Government.
- *South Australian Water Corporation Act 1994* - establishes SA Water's primary functions, including:
  - Supply of water by means of reticulated systems
  - Storage, treatment and supply of bulk water
  - Removal and treatment of wastewater by means of sewerage systems.
- *Water Industry Act 2012* - includes the provision for independent regulation of water and sewerage pricing, ensuring the safety and quality of services and ongoing technical regulation.
- *Environment Protection Act 1993* - establishes the framework for the protection of South Australia's land, air and water environments.
- *Safe Drinking Water Act 2011* - requires drinking water to be fit for purpose.

In line with the requirements of the *Water Industry Act 2012*, SA Water needs to comply with a Water Retail Code that specifies obligations between SA Water and its customers. A published Customer Charter provides information on SA Water's customer service commitments and

processes for managing customer issues in relation to water, sewerage and other services, in addition to setting out customer rights and obligations in relation to these services.

## 2.2 SA Water Strategic & Corporate Business Plans

SA Water's Strategic Plan 2012-16 (the Strategic Plan) and the associated SA Water Corporate Business Plan 2012-16 (the Corporate Business Plan) are internal SA Water documents.

The Strategic Plan describes at the highest level SA Water's Purpose, Values, Key Performance Outcomes and Strategic Priorities. The Corporate Business Plan details the more specific year by year outcomes that SA Water needs to achieve in order to implement the Strategic Plan.

SA Water's four strategic priorities, together with its key performance outcomes are represented below:

### SA Water Strategic Priorities

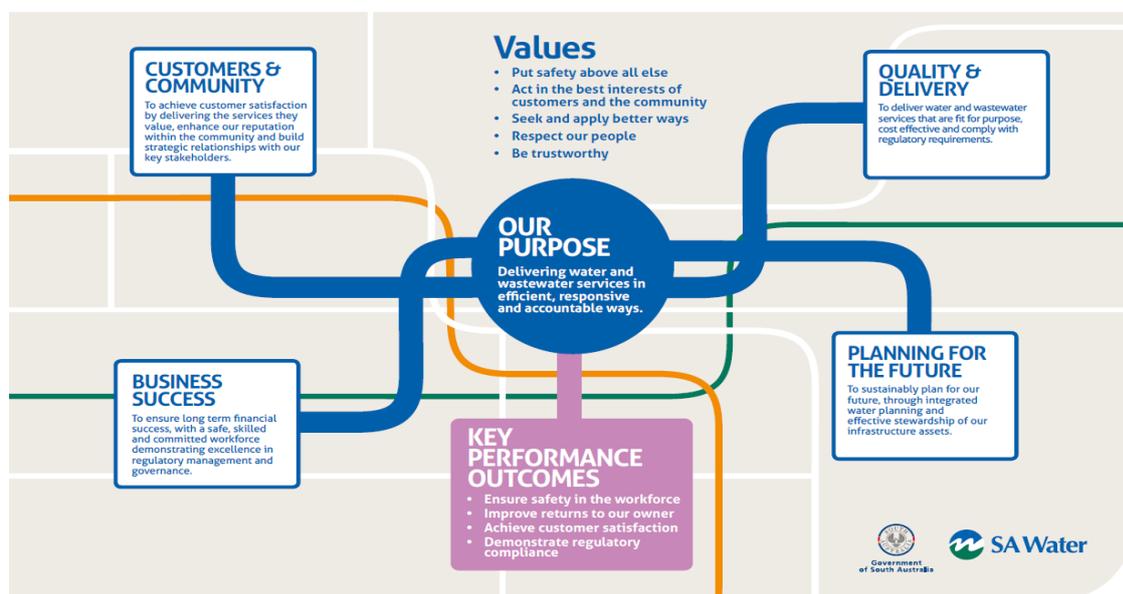


Figure 5: Strategic Priorities

In addition to the legislation listed in 2.1, key State-wide strategic documents that provide input into the corporation's strategic plans include:

- [South Australia's State Strategic Plan](#)
- [Water for Good](#)
- [30-Year Plan for Greater Adelaide](#)
- [State Natural Resources Management Plan 2006](#)
- [Strategic Infrastructure Plan for SA 2004/5-2014/15](#)
- [SA Water Customer Charter](#)

The key strategies, Strategy Aims, Key Results Areas and Key Result Indicators for each of the four strategic priorities are shown in the table below:

*Delivering water and wastewater services in efficient, responsive and accountable ways*

## The SA Water Strategic Priorities and Key Strategies

Strategic Priority	Key Strategy	Strategy Aim	Key Result Areas	Key Result Indicators
Customers & Community	Customer Services	To engage with our customers in understanding their expectations and deliver valued services that enhance customer satisfaction	<ul style="list-style-type: none"> <li>✓ Customer Participation</li> <li>✓ Service Standards &amp; Capability</li> <li>✓ Customer Service Interface</li> </ul>	<ul style="list-style-type: none"> <li>➤ Customer Satisfaction</li> <li>➤ Customer Service Centre Responsiveness</li> <li>➤ Complaints to E&amp;W Ombudsman</li> </ul>
	Stakeholder Engagement	To enhance our reputation and key strategic relationships to ensure the external environment is integrated in setting our strategic priorities	<ul style="list-style-type: none"> <li>✓ Communications</li> <li>✓ Community Involvement</li> <li>✓ Influence &amp; Partnering</li> </ul>	<ul style="list-style-type: none"> <li>➤ Perception Survey</li> <li>➤ Communications Effectiveness</li> <li>➤ Community Engagement Feedback</li> </ul>
Quality & Delivery	Water & Wastewater Services	To deliver water and wastewater services that are fit for purpose, cost effective and comply with regulatory requirements	<ul style="list-style-type: none"> <li>✓ Product Quality</li> <li>✓ Maintain &amp; Extend Supply</li> <li>✓ Residuals &amp; Emissions</li> <li>✓ Government Policy Initiatives</li> </ul>	<ul style="list-style-type: none"> <li>➤ Water Quality Compliance</li> <li>➤ Attendance/Restoration/Clean Up</li> <li>➤ Extensions/Connections to Supply</li> <li>➤ EPA Licence Compliance</li> <li>➤ Net Greenhouse Gas Emissions</li> <li>➤ Operating Cost per connection</li> </ul>
Business Success	Regulation & Governance	To attain excellence in regulatory management, governance and systems that enables prudent and efficient decision making and ensures compliance	<ul style="list-style-type: none"> <li>✓ Economic Regulation</li> <li>✓ Strategy, Risk &amp; Compliance</li> <li>✓ Business Systems &amp; Technology</li> </ul>	<ul style="list-style-type: none"> <li>➤ Regulatory Compliance (ESCOSA)</li> <li>➤ Systems Accreditation/Certification</li> <li>➤ Core Systems Availability</li> </ul>
	Financial Management	To ensure long term financial success and competitiveness through prudent and efficient commercial practices and targeted growth opportunities	<ul style="list-style-type: none"> <li>✓ Financial Sustainability &amp; Accountability</li> <li>✓ Business Efficiency &amp; Control</li> <li>✓ Non Regulated Business Opportunities</li> </ul>	<ul style="list-style-type: none"> <li>➤ Profit Before Tax</li> <li>➤ Return on Assets</li> <li>➤ Credit Rating</li> <li>➤ Profit from Non-Regulated Business</li> </ul>
	Workforce & Culture	To attract and retain the best people by fostering a culture that encourages capability development, innovation and a commitment to safety in the workplace	<ul style="list-style-type: none"> <li>✓ Workforce Optimisation</li> <li>✓ Capability, Culture and Values</li> <li>✓ Continuous Improvement &amp; Innovation</li> <li>✓ Workplace Safety &amp; Wellbeing</li> </ul>	<ul style="list-style-type: none"> <li>➤ Staff Satisfaction</li> <li>➤ Staff Turnover</li> <li>➤ Workforce Diversity</li> <li>➤ SIFR</li> </ul>
Planning for the Future	Integrated Water Planning	To plan and manage our water resources to ensure a sustainable and secure water supply and sufficient infrastructure capacity to support future growth	<ul style="list-style-type: none"> <li>✓ Water Resource Security</li> <li>✓ Stormwater &amp; Recycled Water</li> <li>✓ System Capacity</li> </ul>	<ul style="list-style-type: none"> <li>➤ Water Security</li> <li>➤ Water Licence Compliance</li> <li>➤ System Capacity for Reuse</li> <li>➤ Long Term System Capacity Plans</li> </ul>
	Asset Stewardship	To plan and manage our infrastructure to meet required standards of service, asset reliability and growth at the lowest cost and acceptable level of risk over the lifetime	<ul style="list-style-type: none"> <li>✓ Accountability, Direction &amp; Asset Information</li> <li>✓ Asset Lifecycle Planning</li> <li>✓ Service Level Delivery</li> </ul>	<ul style="list-style-type: none"> <li>➤ Asset Management Plans approved by ESCOSA</li> <li>➤ Asset Reliability - Failure Rates</li> <li>➤ Capital Delivery – Time/Budget/Outcome</li> </ul>

Table 2: Strategic Priorities

The full versions of the Strategic and Business plans are embedded as follows:

High Level AMS Aug 2012



### 2.2.1 Key Corporate Strategy - Asset Stewardship

Asset Management activity forms an integral part of both the SA Water Strategic Plan and the Business Plan. While asset management activity links to all of the strategic priorities, the strongest link is under 'Planning for the future' priority and its key strategy of *Asset Stewardship*.

The key performance indicators and outcomes stated in the *Asset Stewardship* section of the *SA Water Corporate Business Plan 2012-2016* are key drivers for asset management strategies planning and decision making activities over that period. The current and future Asset Management capabilities of the organisation, i.e. its processes, information, systems, tools, resources etc. are influenced by the objectives, expected outcomes and specific performance in the Asset Stewardship section of the plan. The aims, key result areas and key performance indicators for Asset Stewardship are shown in the two tables below:

**Key Strategy:** Asset Stewardship

**Aim:** To plan and manage our infrastructure to meet required standards of service, asset reliability and growth at the lowest cost and acceptable level of risk over the lifetime

**Lead SMT Accountability:** Head of Infrastructure Management & Delivery

Asset Stewardship			
Key Result Areas	Accountability, Direction & Asset Information	Asset Lifecycle Planning	Service Level Delivery
<b>Objectives</b>	<p>To ensure the asset management framework, systems and processes enable the development of robust consolidated asset management plans</p> <p>To ensure infrastructure standards are up to date and inform the design and operation of infrastructure assets</p> <p>To ensure systems, applications and processes are effectively managed and meet asset information requirements</p>	<p>To establish plans and directions for the management of all infrastructure assets through each phase of their lifecycle</p> <p>To ensure asset management planning for all infrastructure assets is supported by well developed processes, systems, models and methodologies</p>	<p>To update the SA Water 25 year capital works program on an annual basis and provide input to the regulatory business proposal submission to ESCOSA</p> <p>To build assets that support growth and reliability of services and deliver product quality to customers</p> <p>To develop and maintain preventive maintenance regimes that ensure SA Water assets reach their useful lives</p>
<b>Outcomes</b>	<p>Asset management methods and processes are well documented and their application is understood across the business and supported by ESCOSA</p> <p>Water Services Association of Australia Asset Management Benchmarking process scores SA Water above the industry average</p> <p>Effective IT systems and applications are employed in order to support asset planning activity</p>	<p>Robust asset management plans and strategies with clearly articulated stakeholder outcomes are developed and maintained</p> <p>Well defined and scoped capital projects and ongoing project sponsorship that enables efficient project development and delivery</p>	<p>Portfolio spend recommendations are endorsed and supported by monitoring and reporting on the delivery of the approved portfolio</p> <p>Capital delivery models achieve efficiency in capital delivery and portfolio outcomes</p> <p>Preventative maintenance schedules are developed and maintained for infrastructure assets which achieve satisfactory reliability whilst minimising whole-of-life cost</p>

Figure 6: Asset Stewardship Key Result Areas

Key Performance Indicators:	Performance Targets			
	12-13	13-14	14-15	15-16
<i>Asset maintenance score in WSAA asset management benchmarking (reported annually)</i>	60%	63.6%	67.2%	71%
<b>Number of properties with 3+ unplanned water interruptions per year (reported monthly)</b>	< 2,300	< 2,300	< 2,300	< 2,300
<b>Number of properties with an internal sewer overflow caused by a sewer mains choke per year (reported monthly)</b>	< 78	< 77	< 76	< 75
<i>Percentage of capital projects delivered within specified timeframes (reported monthly)</i>	85%	85%	85%	85%
<i>Percentage of capital projects delivered within specified cost (reported monthly)</i>	85%	85%	85%	85%

1. Performance targets for 2012-13 are consistent with the existing SA Water Draft Customer Charter.

□ Beyond 2012-13, customer service standards will be determined by ESCOSA, expected to be published in 2013.

**Bold** = KPIs to be regularly reported to the Senior Management Team and SA Water Board

*Italics* = KPIs to be regularly reported to the Senior Management Team but the SA Water Board only on an exception basis

Figure 7: Asset Stewardship KPI

## 2.3 Corporate Management Systems

In addition to the AMS, SA Water has three officially documented management systems: Environmental Management System, Drinking Water Quality Management System and OHSW Management System. These three management systems, work in harmony with this AMS, to deliver the corporate objectives.

A management system is a framework of interrelated elements which include policy, processes and procedures, that are documented to ensure that an organisation:

- establishes and meets its internal performance objectives,
- complies with external (regulatory) requirements, and
- Satisfies customers' expectations.

The contents of a management system are typically based on some form of standard. For SA Water' three corporate systems, these are:

- The Australian Drinking Water Guidelines' Framework for Management of Drinking Water Quality
- AS/NZS ISO 14001:2004 (Environmental Management Systems)
- WorkCover Performance Standards for self-insured employers (OHS&W)

The existence of these management systems facilitates the identification of issues and sets specific targets which may require asset management planning input. They are valuable input tools. Information specific to each system is available on the SA Water intranet.

## 2.4 Corporate Risk Management

SA Water's approach to risk management is laid out in three key documents '**Risk Management Policy**', '**Risk Management Framework**' and the '**Corporate Heatmap**'. These documents are supported by standard templates and tools that are all available on intranet at the risk management website.

The **Risk Management Policy** is a Board approved statement that defines SA Water's approach to risk management. The policy's purpose is to establish "a uniform approach to SA Water's risk management practices so as to promote an effective risk management culture within SA Water and ensure alignment with risk management standards and guidelines (ISO31000:2009)."



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tPolicy\_newdesign.pc

The **Risk Management Framework** provides SA Water staff with guidance on how to apply consistent and comprehensive risk management. The Framework provides information on how to identify, analyse, evaluate and treat risks.



RiskManagementFra  
mework.pdf

The **Corporate Heatmap** is a 5 by 5 Likelihood/Impact matrix that defines the five impact levels for the various strategic priorities and in this way it provides the mechanism for a consistent approach to risk assessments across the organisation.



CorporateHeatMapJ  
une2012xlsx.pdf

## 2.4.1 Type of Corporate Risk Assessment

From the Corporate perspective, risk assessments must be undertaken in relation to specific matters or applications as shown in the table below.

Type	Criteria
Project Risk Assessment (for Options Endorsement)	(<\$500K) Self risk assessment by Project Manager (desktop review in consultation with key stakeholders)
	(>\$500K & <\$1M) meeting facilitated by the Project Manager and conducted with stakeholders
	(\$1M and over) meeting facilitated by BA&R and conducted by Project Manager with stakeholders
Business Unit Risk Assessment	Conducted six monthly with business unit managers and Senior Management Team (facilitated by BA&R)
Ad Hoc Workshops	For business initiatives, strategic projects, lessons learned, issue and action plans
Capping of Liability Risk Assessment	Specifically completed in the event that a supplier wishes to cap their liability (Procurement process)
Ongoing Project Risk Management	Assistance in the development of project risk register for management by the Project Manager over the life of the project (Develop to Deliver)

Table 3: Type of Risks Assessment

Risk management techniques consistent with the corporate approach are a key part of SA Water's asset management methodology in all stages of asset lifecycle management and are discussed in more detail later in this document.

## 2.5 Organisational Structure

### 2.5.1 Overview

Ultimately SA Water is responsible to a Minister of the SA Government – currently the Minister for Water and the River Murray, the Honourable Paul Caica MP, who is also Minister for Environment and Conservation.

The Minister appoints the members of the SA Water Board which is responsible for the overall corporate governance of the Corporation including approving the strategic direction and values, monitoring performance and evaluating senior management.

The Board meets monthly and is supported by a number of Board committees established to assist it with its responsibilities (covering audit, asset management and remuneration matters). Asset Management Committee (AMC) is the committee of the Board which monitors and guides asset management activities within SA Water.

Under SA Water's organisation structure, the Chief Executive (CE) is accountable for the provision of services to customers. Given that assets exist to provide these services, he is responsible for both customer service and asset management functions.

The figure below shows the Corporate Governance structure.

**Governance structure diagram**

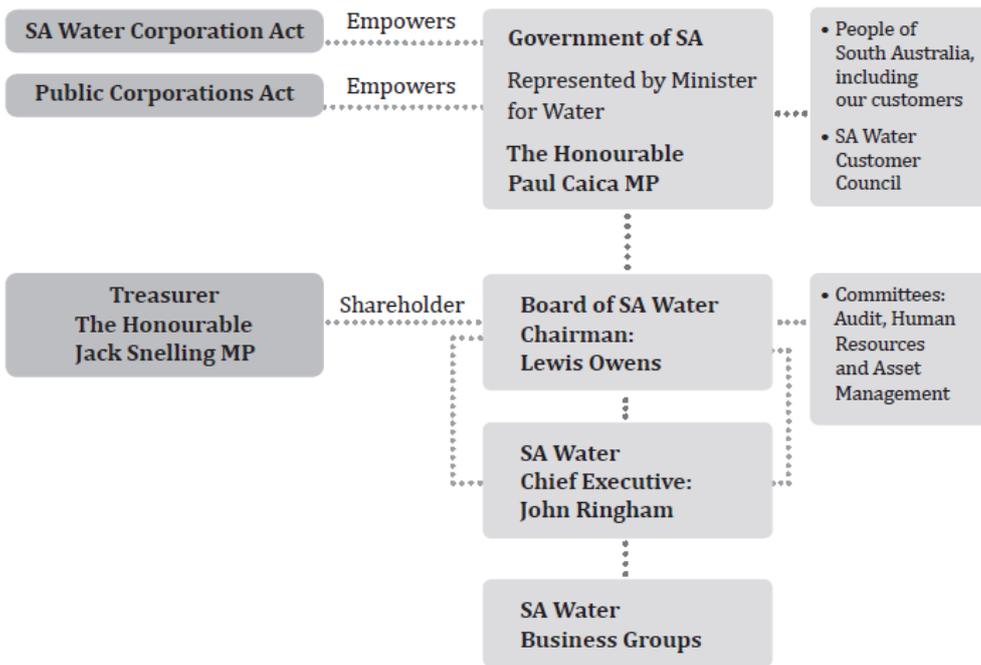


Figure 8: SA Water Governance (June 2012)

The Senior Management Team (SMT) is formed by the Heads of the nine SA Water Business Groups, reporting to the Chief Executive (refer figure below). SMT ensures that the Asset Management Policy is applied and responsibilities for asset management across various business Groups are clearly defined and understood.

*[Deliberately left blank]*

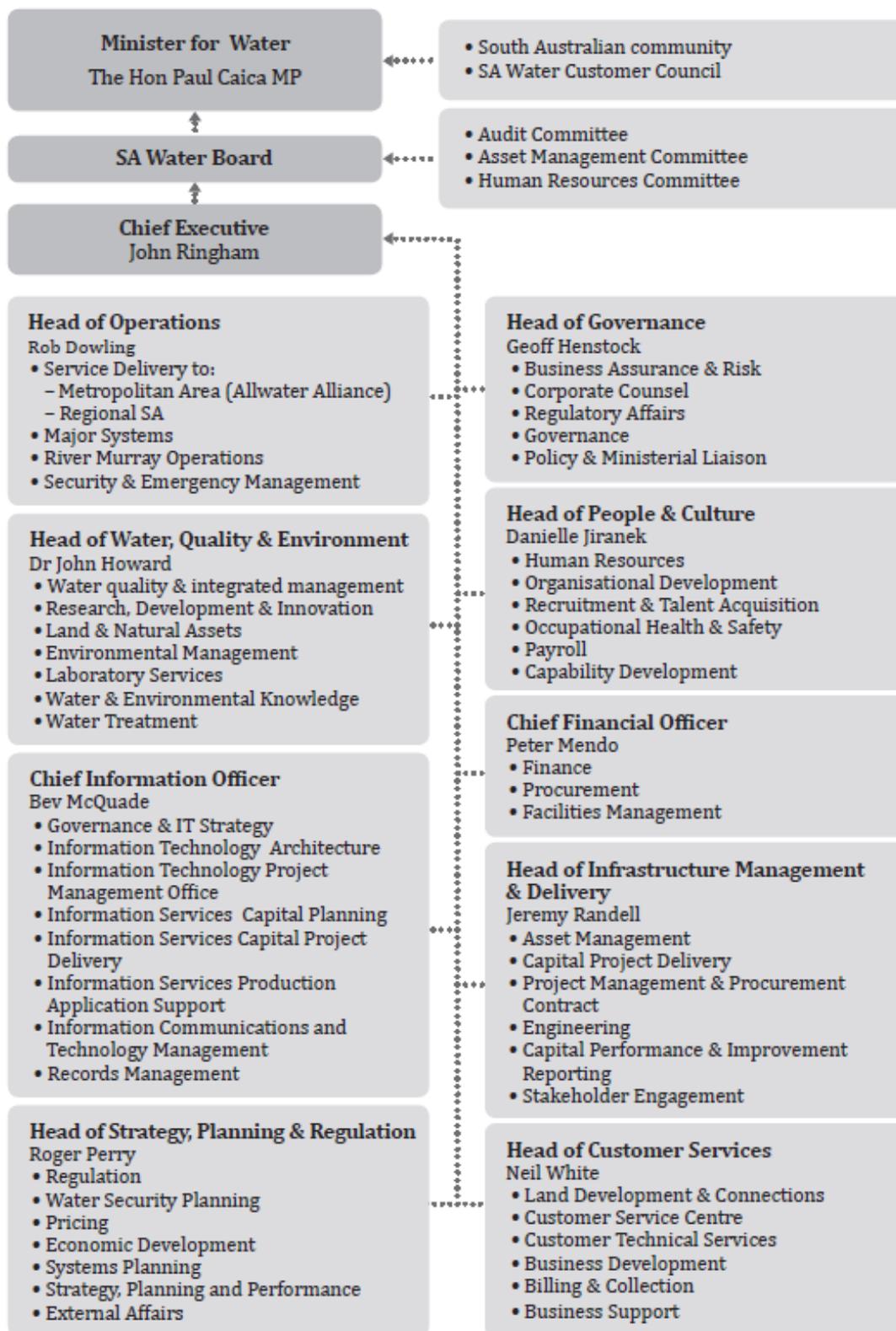


Figure 9: SA Water Organisational Chart (June 2012)

## 2.5.2 Infrastructure Management and Delivery (IMD)

The IMD Group's purpose is to manage infrastructure assets prudently, deliver the capital program efficiently and safely; and proactively engage stakeholders to achieve those outcomes.

This Group is comprised of integrated business units that collectively:

- Ensure that the planning for SA Water's assets to deliver the required level of service by optimising risk, performance and lifecycle costs are understood and carried out across the business;
- Provide engineering and technical support to the Corporation and project management services for the delivery of the capital works program;
- Proactively engage stakeholders to support risk based asset management and the effective delivery of the capital program.

The Head of IMD is a member of the SMT and reports to the Chief Executive and the IMD organisational chart is illustrated below:

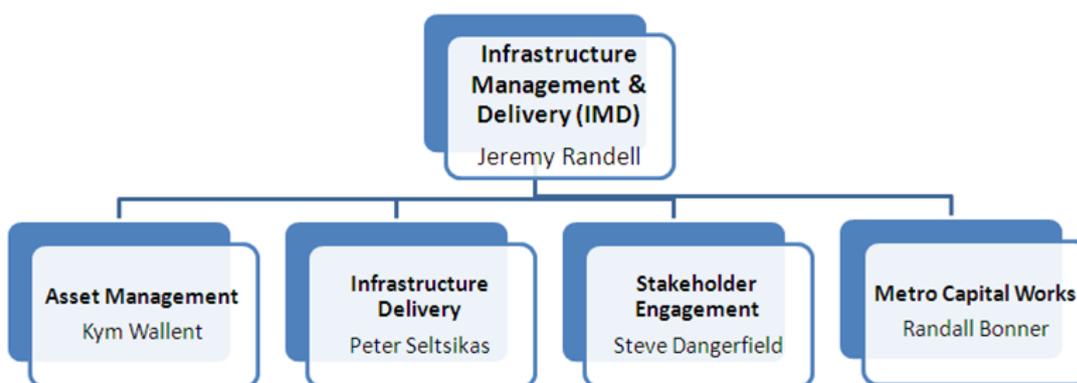


Figure 10: IMD High Level Organisational Chart (June 2012)

## 2.5.3 Internal Stakeholders

The majority of asset management activity is delivered by two major SA Water groups: Infrastructure Management & Delivery (IMD) and Operations. The decision making process is a result of collaboration between the two groups.

IMD has overall responsibility for asset strategies and planning through AMU and project delivery through the Infrastructure Delivery and Metro Capital Works business units. AMU is also the 'Sponsor' for all capital projects to maintain the appropriate balance between project delivery and long term business requirements.

The Operations Group ensure assets are operated and maintained efficiently to the standards set by IMD. The group is also responsible for delivery of specified minor capital works.

## 2.6 Partnering Arrangements

SA Water has established two key contractual arrangements for delivery of many of its services in the Adelaide metropolitan area.

### **2.6.1 Operating & Maintenance (O&M) Alliance Contract**

Allwater, a joint venture of Suez Environment, Transfield Services and Degremont, is SA Water's Alliance partner responsible for the delivery of drinking water, recycled water and the removal and treatment of wastewater from residential and commercial properties across the Adelaide metropolitan area. It operates:

- 6 Water Treatment Plants located at Barossa, Little Para, Anstey Hill, Hope Valley, Happy Valley, and Myponga providing services to an estimated population of approximately one million.
- 6 Wastewater treatment plants located at Bolivar (2), Christies Beach, Glenelg, Aldinga and Myponga providing services to an estimated population of approximately one million.
- Metropolitan water and wastewater networks – (approx. 9,020km water mains and 460,000 water connections; approx. 7,252Km wastewater mains and 438,000 wastewater connections).

The O&M Alliance contract has a nominal term of 10 years which may be extended. Although responsible for delivering only minor capital works, the O&M Alliance will provide input to most metropolitan capital projects, irrespective of who delivers them.

### **2.6.2 Project Management and Procurement (PMP) Contract**

Kellogg Brown and Root (KBR) has been contracted to deliver project management and procurement (PMP) services for the delivery of the majority of SA Water Adelaide metropolitan capital works program. KBR has been operating in Australia for more than 50 years, providing expertise to both government and private sector clients in a range of industries.

The arrangement is a relationship-based services contract which utilises joint management teams. SA Water is responsible for essential system knowledge, skills and data, and project sponsorship. KBR provides the necessary project planning, project management, procurement and construction management to delivery projects effectively and efficiently.

## **2.7 External Stakeholders**

### **2.7.1 Overview**

SA Water recognises the need to engage and communicate with external stakeholders in an open, meaningful, accurate and timely way. Stakeholders are individuals or groups who either have, or perceive themselves as having, an interest or stake in a specific project or decision, or can affect or be affected by a decision or activity. In general, stakeholders include customers, regulators, suppliers, communities, government agencies and employees.

The South Australian community is a legitimate stakeholder in SA Water projects and members of the community are informed about projects that may impact on them or their environment and are given opportunity to influence project decisions, where appropriate.

## 2.7.2 External Stakeholders

A list of the typical external stakeholders is shown below:

- **Community**
  - Residents, Landholders and the broader community
  
- **Stakeholder/Interest Groups**
  - Local Industry
  - Land Developers
  - Environmental Groups
  - Heritage Groups (both European and Aboriginal)
  - Sporting associations
  - Residents Associations
  
- **Government**
  - Minister for Water
  - Councils
  - Local Members
  - Relevant Government Agencies (e.g. EPA, DEWNR, DPTI, Health, etc.)
  - Emergency services
  
- **Utilities**
  - ETSA, Telstra, etc
  
- **Media**
  - Newspapers
  - Local radio

In addition, SA Water has relationships with a number of government agencies, working most closely with the following:

- Department of the Premier and Cabinet
- Department of Treasury and Finance
- Department for Water
- Department of Environment and Natural Resources (DEWNR)
- Department of Health
- Environment Protection Authority (EPA)
- Safework SA

- **Level of Stakeholder Engagement**

SA Water's stakeholder strategies are based around the International Association of Public Participation's (IAP2) Spectrum, which is designed to assist with the selection of the level of participation that defines the stakeholder's role in any engagement program. The Spectrum shows that differing level of participation are legitimate depending on the goals, time frames, resources and levels of concern in the project decisions to be made.



<b>INFORM</b>	<b>CONSULT</b>	<b>INVOLVE</b>	<b>COLLABORATE</b>	<b>EMPOWER</b>
To provide balanced and objective information to assist understanding of the problems, alternatives, opportunities and/or solutions.	To obtain feedback on analysis, alternatives and/or decisions.	Keep informed, listen to and acknowledge concerns and provide feedback on how input influenced the decision.	Work directly with throughout the process to ensure that concerns and aspirations are consistently understood and considered.	Work with to ensure that concerns and aspirations are directly reflected in the alternatives developed and provide feedback on how input influenced the decision.
Examples:	Examples:	Examples:	Examples:	Examples:
<ul style="list-style-type: none"> <li>• Fact sheets</li> <li>• Web Sites</li> <li>• Open houses</li> <li>• Media</li> </ul>	<ul style="list-style-type: none"> <li>• Agency briefings</li> <li>• Focus groups</li> <li>• Surveys</li> <li>• Public meetings</li> </ul>	<ul style="list-style-type: none"> <li>• Workshops</li> <li>• Reference Groups</li> </ul>	<ul style="list-style-type: none"> <li>• Consensus building</li> <li>• Working groups</li> </ul>	<ul style="list-style-type: none"> <li>• Ballots</li> <li>• Delegated Decisions</li> <li>• Agency approvals</li> <li>• Cabinet</li> <li>• PWC</li> </ul>

Figure 11: Stakeholder Engagement Process

### 3 Asset Management System Architecture

- SA Water Asset Management System (AMS) comprises a policy and strategic direction, specific asset management plans, decision making mechanisms, asset information, risk and review activities and roles and responsibilities. It is fully integrated with SA Water Corporate Business and Strategic plans. The Asset Management System’s architecture illustrates how all components fit together.

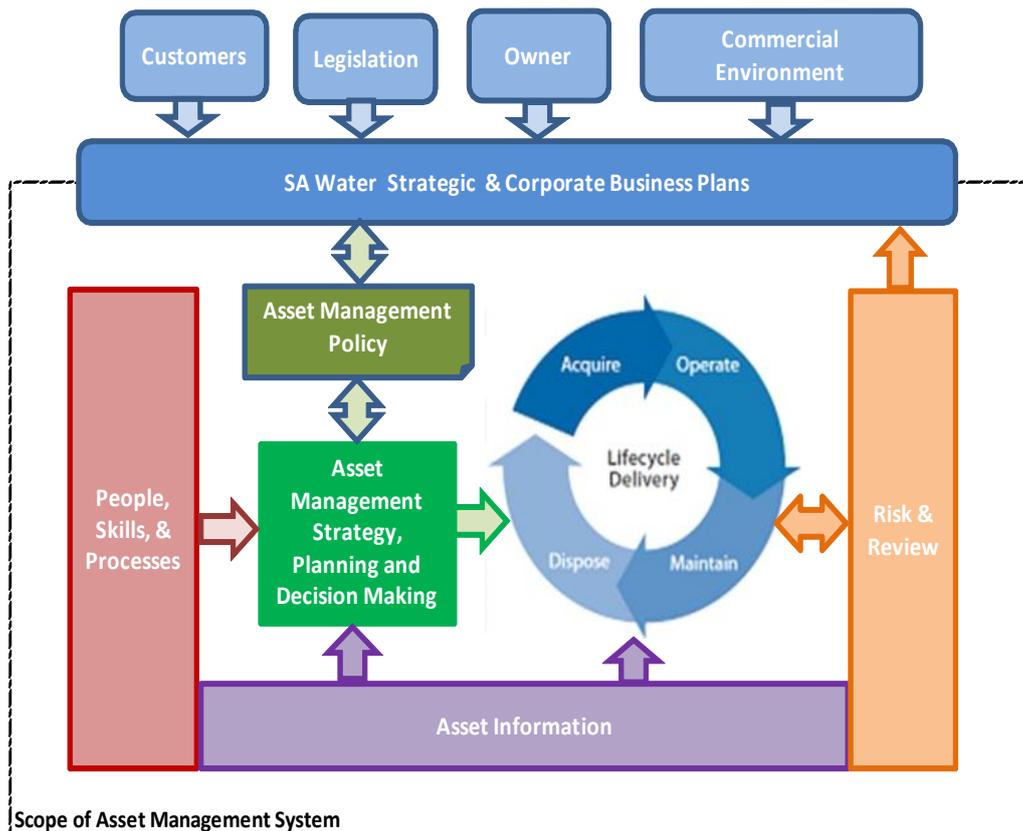


Figure 12: Asset Management System (AMS) Architecture

The **Asset Management System (AMS)** currently used by SA Water’s Asset Management Unit (AMU) in managing SA Water’s assets can be represented by Figure 12 above.

The system’s architecture is designed to describe the overall scope of Asset Management and the high-level component activities that are included. Each component has an important contribution to the delivery of integrated Asset Management and meeting the Corporation’s goals.

The **Asset Management Policy** is the high level driver behind all asset management activities.

**Asset Management Strategy, Planning and Decision Making** contains the core Asset Management activities required to develop, implement, deliver and improve asset management within SA Water in accordance with Corporation’s strategic objectives.

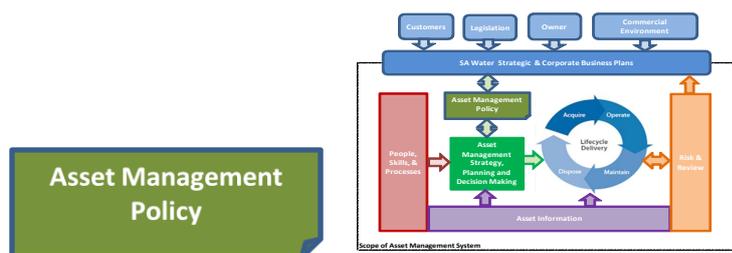
**Lifecycle Delivery** consists of the four main delivery activities associated with asset life from creation, operation and maintenance through disposal.

**Risk & Review** includes specific risk assessment and risk management techniques and ongoing review of performance to ensure sustainable asset management.

**Asset Information** is the collection and combination of information and data about SA Water physical assets used to inform other asset management activities and support decision making.

**People, Skills and Processes** are fundamental enablers of asset management activities.

## 3.1 Asset Management Policy



- The Asset Management Policy translates the corporate strategic objectives into top level asset management strategies which in turn align the planning and decision making to the corporate objectives.

The **Corporate Asset Management Policy** is the high level, Board-approved statement that defines SA Water’s overall approach to asset management which is then translated into action via the other elements of the asset management system.

The Asset Management Policy embedded below was revised and approved by the Board in June 2012.



Item43SAWAssetMa  
nagementPolicyFinalas

### 3.1.1 Purpose

The purpose as stated in the policy is: “This policy establishes the way SA Water’s assets will be managed through asset stewardship that will ensure delivery of water and wastewater services in an efficient, responsive and accountable way.”

The various asset management functions required to deliver efficient and effective asset management are resourced and aligned to the corporate strategies to deliver a common and consistent objective.

### 3.1.2 Asset Management Policy Principles

The Asset Management Policy is based on principles that reflect SA Water’s Vision, Strategic Purpose and Strategic Plan as follows:

- Safety of staff, contractors and the public is the priority.
- Performance of the assets to meet quality and service outcomes to ensure that customer and community service commitments are met.
- Decision making follows defined processes that include:
  - Adopting a lifecycle and sustainable triple bottom line approach
  - Optimising the owner’s returns
  - Demonstrating prudence and efficiency within the economic regulatory environment.
- Asset related risks are managed effectively including those associated with climate variability.

- A program for monitoring the condition of all assets is implemented to ensure informed decision-making on asset maintenance and replacement.
- Asset planning and management occur in a collaborative environment, supporting our people to develop knowledge and experience to provide strong asset stewardship.
- All activity on SA Water’s assets meets statutory and regulatory requirements.
- Continuous improvement of asset management systems.

### 3.1.3 Policy Performance Indicators

Asset Management Policy drives the Asset Management strategy, planning and decision making activities. These activities are performed following the principles stated in the Asset Management Policy with the aim to meet the policy performance indicators below:

- High level of compliance with approved customer service standards
- Compliance with water licence and allocation provisions
- Required returns to owner delivered
- High level of support from the economic regulator (Essential Services Commission of South Australia) in relation to SA Water’s regulatory business proposals
- Long term system capacity plans are regularly updated
- Asset reliability and failure rates are optimised
- Capital projects are delivered on time and on budget
- Treated wastewater is being recycled

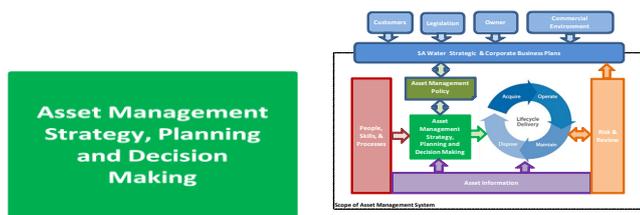
### 3.1.4 Responsibilities

The policy also assigns responsibilities for key groups and positions including:

Role	Responsibility
Chief Executive	Ensure that the various functions required to deliver efficient and effective asset management are resourced and aligned to deliver a common and consistent objective.
Senior Management Team	Ensure that: <ul style="list-style-type: none"> <li>• The Asset Management Policy is applied within their areas of responsibility.</li> <li>• The responsibilities for asset management functions and processes across the various business Groups are clearly defined and understood.</li> </ul>
Manager Asset Management	Ensure that the planning for SA Water’s assets to deliver the required level of service by optimising risk, performance and lifecycle costs are understood and carried out across the business.
Line Managers	Support asset management planning as appropriate and ensure that the Asset Management Policy and Plans are applied within their areas of responsibility.
Asset Management Committee	Monitor and evaluate asset management activities within SA Water, as described in the Asset Management Committee Charter.

Table 4: Asset Management Policy Responsibilities

## 3.2 Asset Management Strategy, Planning & Decision Making



### 3.2.1 Asset Management Strategy

- SA Water has a top level Asset Management Strategy that ensures that the overall asset management activity is fit for purpose in meeting the Asset Management Policy and organisational strategic plan.

The SA Water Asset Management Strategy provides a comprehensive approach to the management of infrastructure assets. The key elements of the strategy are as outlined below:

- Co-ordinate all asset management activity through the Asset Management Unit (AMU) that is part of the Infrastructure Management and Delivery (IMD) Group.
- A comprehensive AMS that covers all technical aspects of asset management planning consistent with the principles of the Asset Management Policy and ensures integration of asset management activity into all other corporate business planning processes.
- Robust management models, plans and programs for all classes of assets to ensure a consistent approach applies to all SA Water infrastructure.
- Clear asset programs that enable SA Water to meet its external obligations consistent with approved customer service standards, legal regulations and good industry practice (also known as meeting Strategic Intent)
- Asset management plans are produced for all facilities (e.g. treatment plants) and pipe networks.
- Information rich asset management decision-making that:
  - Embeds the principle of life-cycle cost efficiency
  - Is fully integrated with SA Water's corporate approach to risk management.
- A project delivery model that is based on a strong partnership between project sponsors and project managers.
- Continuous improvement of:
  - Quality of asset management data and information
  - Asset management processes
  - Asset management technical models
  - Risk & Relationship management

The detail around implementing the strategy is the subject matter of many sections of this HLAMS document.

### 3.2.2 Asset Management Planning

- Asset planning sets out how physical infrastructure assets will be managed, over a specific period of time, to achieve asset management objectives.
- Asset management planning activity generally covers a 25-year horizon with a higher degree of detail and certainty in the early years.
- Asset Programs and Asset Management Plans are the outcome of asset planning activity that is applied directly to the asset base and is aligned with the Asset Management Policy.
- Asset programs are asset plans developed to manage specific themes or asset classes. They ensure clear risk based strategies are in place for each program and they detail forward capital investment requirements.
- Asset Management Plans (AMPs) bring together the relevant information from the Asset Programs and present a view of a particular facility or network in terms of the service that it delivers currently and into the future.
- A key impact on asset planning is population growth which can lead to increased demand for the product or service being produced. The organisation feed demand projections into its long-term planning.
- The Capital Plan is developed using both a bottom up and top down approach.

This part covers all planning activity that is needed to ensure the infrastructure assets meet asset management objectives as defined in the Asset Management policy and SA Water's Strategic Plan.

The assets have operating lives, referred to as the asset life cycle, which extend from creation (acquire), through operations and maintenance to disposal. Asset management planning activity is applied to the asset life cycle in order to produce cost efficient asset performance that in turn ensures delivery of the required customer service outcomes.

Asset Programs and Asset Management Plans are the outputs of asset planning activity that is applied directly to the asset base and is aligned with the Asset Management Policy. A matrix approach has been adopted to manage both the consistency across the common asset types and then, as they are combined, to deliver a particular service from a facility or network.

Asset planning includes:

- Analysis of condition and performance of existing assets
- Analysis of the external operating environment including impact of growth in demand for services
- Utilising appropriate decision-making tools and models to ensure life-cycle costs are assessed and risks are managed effectively.
- Presenting the outputs of the planning work in a clear framework of asset programs, asset management plans, a draft capital works plan and clear project briefs (usual CAPEX) for delivery by others.

The asset management planning section of this document focuses on the key outputs of asset programs and asset management plans. A subsequent section focuses specifically on asset management decision-making (which actually precedes production of asset programs and plans).

### 3.2.2.1 Asset Programs

An **Asset Program** is a summary document that covers a specific theme or asset class. It sets out clear objectives; describes the methodology applied in analysing the issues at hand, summarises current performance and/or status and presents the planned activity for the future which could be a list of capital projects, an enhanced maintenance program or an improved inspection regime.

Asset programs have one of four high level origins (high level categories):

- Meeting External Obligations (also known as Strategic Intent)
- Management of Existing Assets (also known as Asset Renewal)
- Demand Growth (also known as Growth)
- Corporate Support (mainly IS investment)

Overall some sixty asset programs have been developed (refer Part E Appendices for full list). The programs can be grouped into asset strategies which are positioned hierarchically between the high level categories and the asset programs, as per Figure 13 below.

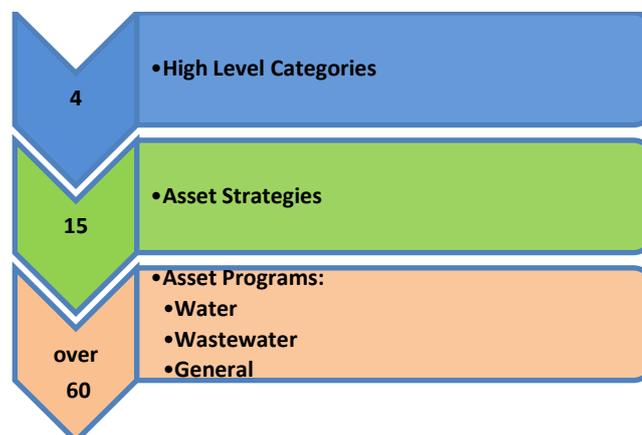


Figure 13: Asset Programs Hierarchy

Furthermore, asset programs are associated with SA Water's 2 key product lines – water and wastewater and a general category - 'General' asset classes (e.g. Security). In terms of dollar, 'General' accounts for about 10% of the spending with the balance being split fairly evenly between 'Water' and 'Wastewater'.

A single Asset Program may contain Water, Wastewater and 'General' classified expenditure (e.g. Capability Management) or just a single category (e.g. Water Networks – Reticulation Mains Renewal will be water only).

The data for all the projects emanating from these Asset Programs is stored in a database that enables extraction by category or combination of categories as required.

Further details of the hierarchy are presented in the table below:

High level category	Asset Strategy	Asset Programs
External Obligations (Also referred to in some documents as 'Strategic Intent')	Water Resource Sustainability	<p>There are over 60 Asset Programs under various Asset Strategies and the respective High level Categories.</p>  <p>Asset Programs.pdf</p>
	Service Reliability Management	
	Water Quality Management	
	Environmental Compliance	
	Safety	
	Customer Service	
Asset Renewal	Pipe Networks	
	Mechanical & Electrical Equipment	
	Structures	
	Other Assets	
Growth	Network Extensions	
	Network Growth	
	Treatment Plant Growth	
Corporate	Information Technology (IT)	
	Major & Minor Plant	

Table 5: High Level Asset Strategies

The embedded document gives further details into each of the categories:



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A summary document exists for each Asset Program that details the assets being covered, the strategy for managing that particular asset, the current state of that group of assets, a proposed replacement plan with the associated capital expenditure.

Three examples of Asset Programs are embedded in the document:

- Adelaide Coastal Water Management (Strategic Intent)
- Water Network Management (Asset Renewal)
- Treatment Plants Growth (Growth)



CX0001\_APS\_Adelai CX0039\_APS\_Water CX0012\_APS\_Growth  
de\_Coastal\_Water\_M \_Networks\_Major\_Pi h\_Treatment\_Plants.

Asset Programs can include one or many capital projects depending of the particular program. The Asset Program summaries identify the expenditure for each project in the program.

For larger individual capital projects (estimated cost >\$11M), an additional justification document is written (*refer example below*). All projects are delivered to a prescribe methodology called Corporate Project Management Methodology.



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Beach WWTP Upgrad

### 3.2.2.2 Asset Management Plans

An **Asset Management Plan (AMP)** is a document that covers a specific facility or pipe network, presents any formal levels of service, summarises current condition and performance, shows the impact of external drivers and presents forward plans including capital works, major maintenance and inspection programs.

Asset Management Plans are prepared for individual treatment plants, large dams and major pipelines and collectively across water and wastewater networks. They can be categorised into water and wastewater.

There are currently 56 AMP's written to cover the facilities and networks as shown in the table below:

Product	AMU department	Asset	Documents
<b>Water</b>	Headworks & Major Pipelines (7)	Large Dams	1 document covering all Large Dams
		Major Pipelines	6 documents one for each Pipeline
	Water Networks	Water Networks	1 document covering all water networks
	Water Treatment Plants (22)	Water Treatment Plants	11 documents comprising a WTP overview document, 9 individual plant documents and one document covering 10 country treatment plants
		Iron Removal Plants	11 documents one for each treatment plant
<b>Wastewater</b>	Wastewater Networks	Wastewater Networks	1 document covering all wastewater networks
	Wastewater Treatment Plants	Wastewater Treatment Plant	26 documents including an overview document

Table 6: Asset Management Plans (as at August 2012)

The embedded document below provides the full list and title of the AMP documents including the index number.



AMP Listing Aug  
2012.pdf

### 3.2.2.3 Link between Asset Programs and Asset Management Plans

There is a very strong relationship between **Asset Programs** and **Asset Management Plans**. Collectively they form a matrix that ensures coverage from two aspects:

- The need to show that there is a comprehensive consistent approach to managing major issues, major asset classes and growth across the whole of SA Water (Asset Program view)
- The need to show that there is in place a clear asset management plan for any treatment plant, major pipeline, large dam, water and wastewater network that will deliver the required level of service

Each Asset Management Plan brings together the relevant information from the Asset Programs in a facility or networks view. A summary of the current AMP's and their relationship to the Asset Programs is shown in the figure below.

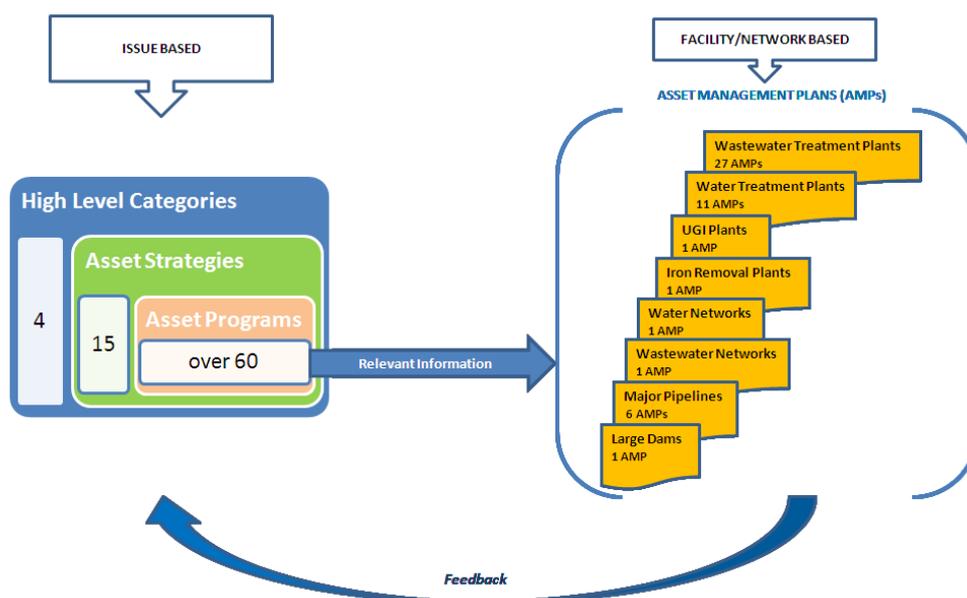


Figure 14: Link Asset Programs & AMPs

### 3.2.2.4 Planning for Growth in Demand

A key component of asset planning activity is determining when existing pipe networks and treatment plants need to be upgraded due to growth in demand (on the basis of continuing to provide agreed levels of service).

The analysis required is in two parts:

- Demand Planning using tools to assess the likely rate of growth in demand
- Capacity Planning using tools to assess the capability of existing infrastructure to cater for predicted growth scenario.

#### 3.2.2.4.1 Demand Planning

Demand planning activity is based around assessing the rate of population growth which could lead to increased demand for the product or service being produced and how this demand translates into the required outputs that the organisation's assets will need to deliver.

These are based on:

- Assumptions of key growth drivers, using the best available information
- Most recent available data
- Range of feasible future behaviours
- Factors affecting current and historic demand

When making demand projections, both annual and peak period demands are considered. The annual demand reflects the overall impact on a resource and future capacity requirements. Peak period projections are used to ensure that infrastructure has sufficient capacity to cope with extremes (e.g. from a water supply perspective, the high demand for potable water can occur in hot weather; and from a sewer perspective, increased flows during wet weather). Peak periods are a particularly an issue for network/reticulation systems (peak periods can refer to the peak instantaneous demand in a day, a peak day in a year, or, when considering balancing storage requirements, the peak week or month in a year).

Consideration of annual demands is used for:

- Designing head works to ensure capacity can be adjusted for future requirements without interrupting the service
- Securing appropriate water allocation licences for overall water security
- Calculating operational costs.

Consideration of peak period demands is particularly important for:

- Ensuring network/reticulation system capacity and the ability to meet future requirements
- Operational efficiency of a system – i.e. recognising where capacity is required for a short period of its overall life.

With respect to drinking water, demand forecasts take into account:

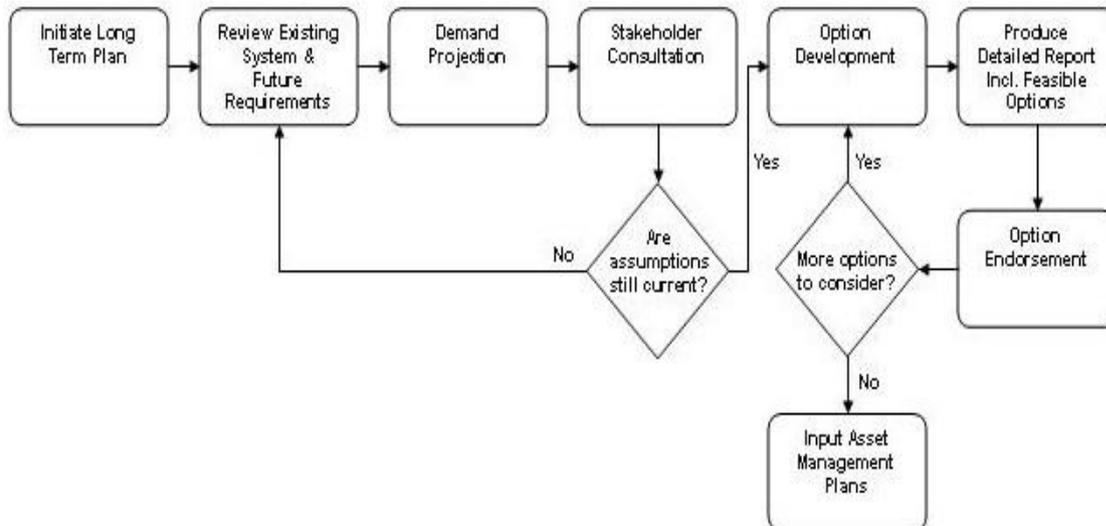
- Actual water demand
- Comparison with historical data
- Population forecasts
- Consultation with Stakeholders as required (community, local government, developers, state government agencies, local members of parliament, regional development authorities; and natural resources management boards, etc.)

#### **3.2.2.4.2 Capacity Planning**

To meet forecast demand in a timely and sustainable way, the organisation must assess the capability of its infrastructure under current and predictive demand. The analysis uses analytical pipework tools and treatment plant investigations to determine bottlenecks and create long term capacity plan.

There is a level of uncertainty the longer the forecast period is and this uncertainty is reflected in the resulting Asset Management Plans. The asset planning also needs to consider the capacity and capability of the assets to deliver the forecast demand and how this may limit SA Water's ability to service an increased demand for a product or service.

Capacity plans (also known as Long Term Plans -LTPs) are linked to SA Water's Strategic, Business and Asset Management Planning processes. The figure below illustrates the methodology followed in preparation of such plans.



**Figure 15: LTPs Process Map**

All assumptions within SA Water's Long Term Plans are reviewed annually. Where assumptions are out of date a new Long Term Plan may be developed.

### 3.2.2.5 Long Term Asset Plans

Asset management planning activity is focused on one, three to five and 25-year horizons and includes forward plans of required capital investment.

Asset Programs identify a capital spending path for the next 25 years. For the key asset renewal category, the first three to five year spending profile (influenced by length of designated regulatory cycle) is dominated by the results of applying the detailed asset management assessment and decision making described in this document.

The five to 25 year profile has less certainty around the particular asset being replaced and is more focussed on the level of spending required to make approved levels of service sustainable. A simple example of this would be that if there are 100 water pumps installed over the last fifty years and they each have a fifty year estimated useful life, then it follows that 2 pumps per year could need to be replaced. Precisely which two pumps in which year are not predicted initially.

Preparing **long term asset plans** which forecast replacement expenditure with a reasonable degree of accuracy requires a clear quantification of the assets (number, replacement cost, and age), reasoned prediction of asset life and application of an analysis tool that allows calculation of costs for various scenarios.

SA Water uses a cost predictive model called “Nessie” to give a view of optimised maintenance and renewal costs over a given study period. It can also be used to identify potential gaps and the impacts of various expenditure scenarios, as exemplified in the *Figure 16* below.

In summary, Nessie takes the replacement value of existing assets and using the construction dates and assumed asset life, predicts future replacement / rehabilitation costs. The modelling output is compared with current replacement expenditure and the model is re-run with adjusted asset lives (or failure distribution) until the predicted expenditure matches current expenditure. The model output is used to populate the 6 - 25year portion of the capital via “unallocated” renewal projects.

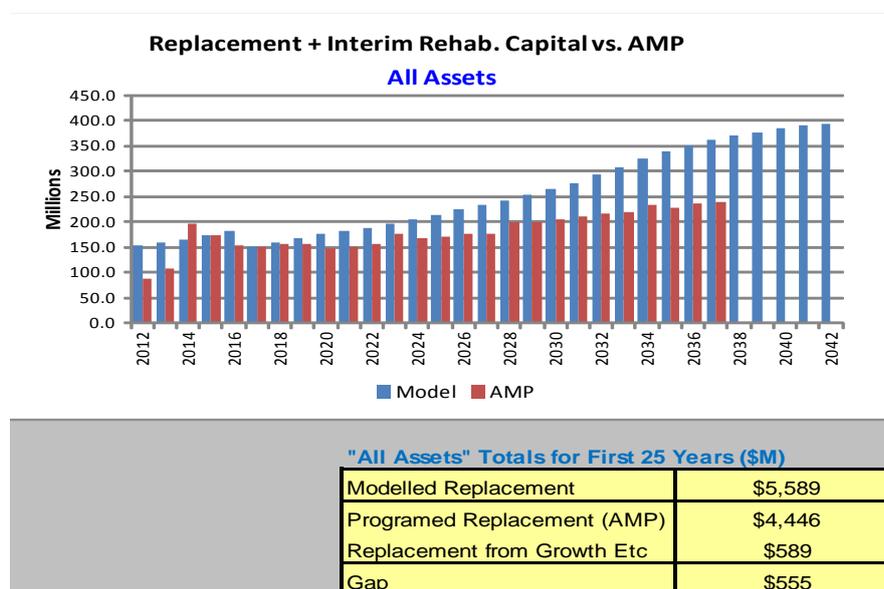


Figure 16: Nessie Model Example

The above diagram shows the end result. The model is predicting realistic output for the current planning period (first 5yrs) and correlates well with the capital plan. The model would be used to increase the capital plan expenditure for the “outer” years.

### 3.2.2.6 Capital Investment Program

Capital investment is undertaken considering asset degradation and trading off capital costs, maintenance costs, risks and their probabilities in order to optimise whole of life value. Capital investment is one of the outcomes of asset management decision making.

Proposed capital programs and projects are embedded in the key output documents prepared by AMU

- Asset Programs
- Asset Management Plans

It is a fundamental corporate requirement that the organisation can show its total capital works plan in a consolidated way. The capital projects outputs embedded in AMU planning documents are extracted and consolidated to form a draft capital works plan. The consolidation framework used is shown in Figure 17. It is a reflection of the Asset Program Framework. This enables the plan to be presented in outcome terms, since each Asset Program has specific business objectives. The completed draft capital plan describes what capital investment the corporation should make (over a planning period up to 25 years) in order to manage its risk/cost/custom service profile effectively.

Finalisation of an approved capital plan is a two step process:

1. As above to produce a draft plan
2. Test the draft against the ability to fund. Regardless of the granularity of the modelling and analysis undertaken to make Asset Management decisions and produce a draft capital plan, there will often be a capital availability challenge for the Corporation.

The transformation from draft plan to approval capital plan requires using a second, top down, process – capital prioritisation.

The capital prioritisation stage is to review the relative priorities under the Asset Program strategies and then under the High Level Categories and finally across the whole portfolio making sure it meets the organisations financial constraints. The top down perspective considers corporate constraints and imperatives and prioritises, if necessary, the results from the bottom up approach to meet the wider corporate requirements.

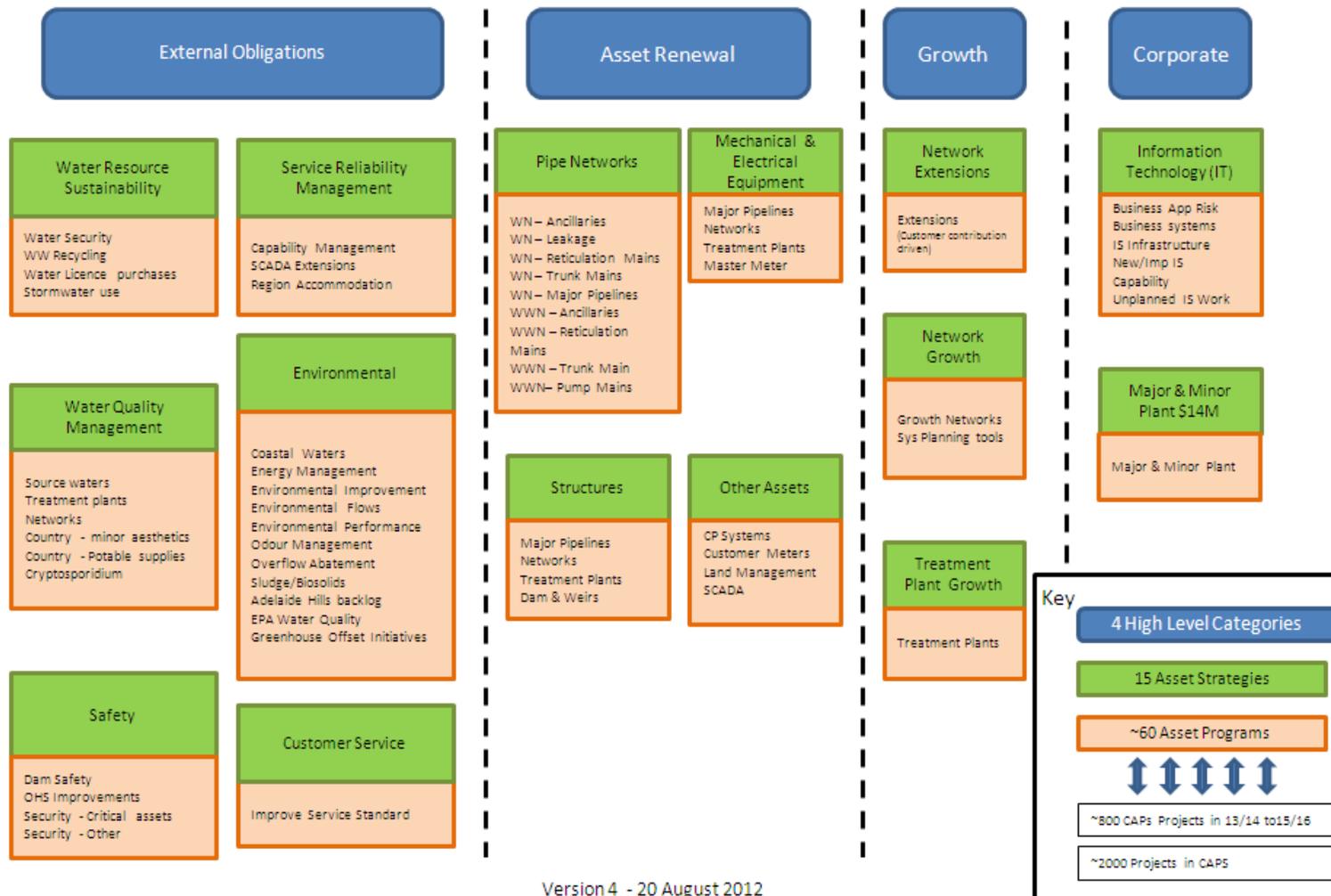
Depending on the scope and scale of capital program, the capital prioritisation follows one or a combination of the following approaches:

- Judgement-based prioritisation, using project justification or approval
- Risk ranking, with a range of variants that include current asset risk (i.e. total asset risk if project does not proceed); risk mitigated by the project.
- Ranking based on benefit-cost ratio including risk represented in \$.
- Prioritisation based on ranking against strategic objectives / value and risk.
- Program reduction based on minimising performance impact

The capital prioritisation process includes an extensive process of analysis of data, risk assessment and consultation, aiming at:

- Ensuring that the highest priority projects and programs are funded first
- Ensuring that the capital program can be developed and delivered within allocated capital funds and resources
- Maintaining required service standards
- Allowing for population growth and uncertainty in growth demand

The capital program structure is shown in the figure below. It is aligned with the asset programs hierarchy (Table 5 *High Level Asset Strategies*):



Version 4 - 20 August 2012

Figure 17: Capital Program

High Level AMS Aug 2012

### 3.2.3 Asset Management Decision Making

- Asset management decisions are made with the aim of optimising whole life value given any underlying constraints, statutory legislation or regulatory obligations.
- A variety of decision making models are used to suit the specific circumstances
- Reliability Centred Maintenance, Condition & Performance Assessments and Criticality models are some that are used to differentiate in the treatment of the assets and obtain the best use of available resources.

Asset Management Decision Making occurs at all different stages of the asset lifecycle and is made with the aim to optimise whole life value given any underlying constraints, statutory legislation or regulatory obligations. Asset Management Decision Making is undertaken in accordance with the top level strategy and is a key part of the asset planning activity.

Behind every Asset Program, Asset Management Plan, Capital Work Plan and Project Brief there are asset management decisions. The overall process is that in relation to any asset or set of assets, the operating environment is assessed in accordance with some sort of methodology, decisions are made and the results are set down in a program, plan or project brief.

The objective of asset management decisions should always support the corporate asset management policy. That is, decisions should support the model that assets need to provide agreed level of service across specified life at minimum life-cycle cost while ensuring effective management of risks.

#### 3.2.3.1 Asset Management Decision-Making Models

The type of methodology or decision making models applied depends on the key drivers of the issue at hand:

- If it is an external obligation that needs to be met (e.g. OH&S, dam safety, etc.) the asset management decision is simply to translate the required corporate commitment into real projects, maintenance plans or inspection programs that can be specified for a real asset base.
- If it is growth driven, the asset management decision is to ensure model results from forecast and capacity planning are tested, and proposed projects are estimated adequately and the planned timeframe is defensible.
- If condition/performance of existing assets is the driver, the asset management decision will result from having applied robust asset management models.
- Capital investment decisions take into consideration whole of life costs and levels of risk to varying degrees of sophistication depending on the project; for instance multi-criteria analysis is used on large complex projects and NPV calculations for smaller projects.

The types of Asset Management decision-making models used vary for different classes of assets and some are described in more detail in the rest of this section.

- Maintenance Strategy
- Condition/Performance Assessment
- Asset Criticality
- Pipe Network Renewal models
- Dam Safety Management

All models and strategies have to be supported by good asset information. Refer to Section 3.5 Asset Information for an overview of information systems used throughout the assets' life-cycle.

### 3.2.3.2 Maintenance Strategy

As an important component of life-cycle asset management decision making, SA Water has in place a risk based maintenance strategy that recognises the different needs of different asset classes, eg long life passive assets will require less day to day maintenance than Mechanical & Electrical assets.

A maintenance recording or classification framework is part of an effective maintenance strategy. SA Water classifies maintenance as follows:

#### **Preventive Maintenance**

Preventive Maintenance is maintenance which is carried out on an item which has not failed. It includes maintenance which is carried out at predetermined intervals (weekly, monthly) or according to prescribed criteria (hours run) or where an item is not working to its normal operating capability (but has not broken down).

There are two categories of Preventive Maintenance;

- **Scheduled Preventive**  
Inspection, maintenance or condition monitoring carried out at predetermined intervals (weekly, monthly etc) or according to prescribed criteria (i.e. operating hours).
- **Follow-up Preventive**  
Maintenance carried out where a piece of equipment is not working to its normal operating capacity (but has not broken down) and requires maintenance (i.e. condition based maintenance). This includes work identified during Scheduled Preventive maintenance.

#### **Breakdown Maintenance**

Maintenance carried out after an item has failed. There are two categories of breakdown maintenance;

- **Reactive Breakdown**  
Reactive (previously known as emergency) breakdown maintenance is maintenance performed on an item to restore it to its normal operating state after a failure has occurred which must be carried out *immediately (usually <12hrs)*.
- **Planned Breakdown**  
Planned breakdown maintenance is maintenance performed on an item to restore it to its normal operating state after a failure has occurred which can be scheduled for a later time (>12hrs).

Mechanical & Electrical assets are the key assets that require active ongoing optimised maintenance plans and SA Water uses Reliability Centered Maintenance (**RCM**) for these assets incorporating Failure Mode and Effects Analysis (FMEA), to ensure that maintenance tasks and intervals are more appropriate, risk based and consistent across similar assets.

The RCM method requires the consideration of 7 questions:-

1. What are the functions of the asset and its required performance standards in its operating context?
2. In what ways does it (or could it) fail to fulfil its functions?
3. What causes (or might cause) each functional failure?
4. What happens when a failure occurs?
5. In what way does the failure matter?
6. What can be done to predict or prevent each failure?
7. What should be done if a suitable proactive task cannot be found?

Working through this series of questions for complex/active assets is an involved and time consuming process and so, although the approach is applied consistently, it is applied to different degrees depending on the asset and its criticality. For example, Major Dams are the focus of an intensive safety management system that monitors the "health" of each structure and regularly assesses each dam against ANCOLD guidelines. Likewise complex assets such as pumping stations comprising "active" assets such as pumps, motors, electrical and control systems have received rigorous application of the reliability centred maintenance analysis tool to determine the most appropriate maintenance strategy for each asset.

Availability Workbench (AWB) is the software package employed by the organisation to optimize the reliability and maintenance strategies. This optimisation and review process, along with historical data and field experience, results in well defined maintenance strategies for various asset components. All maintenance plans are loaded into an Asset/Works Management System, Maximo 7, for execution, review, analysis and planning purposes. All work activity events and the associated expenditure are captured within Maximo 7.

Since 2008, the RCM model has been adopted as a basis for maintenance plans for the following asset classes:

- Water Pump Stations
- Wastewater Pump Stations
- Water Production Bores
- Water Dosing Stations
- Iron Removal Plants

The RCM process is currently being extended to cover:

- Wastewater Treatment Plants
- Water Treatment Plants
- Control Installations (PRV, HOCV, HOSV, etc)

### **3.2.3.3 Condition/Performance Assessment**

Condition and performance assessments provide the following benefits in optimising asset management whole of life costs:

- Validate asset performance against design criteria
- Identify business risk exposure
- Input to optimised future maintenance, planning, design and investment.
- Early warning of potential problems
- Improved understanding of how particular assets perform in specific environments (age, condition)
- Determination of replace v rehabilitate v maintain
- Evidence of 'prudence and efficiency' to the regulator for justifying capital expenditure

High Level AMS Aug 2012

There are three approaches to condition and performance assessment:

- Reactive
  - Upon failure of an asset undertake inspections and assessment to determine future preventative actions for the failed asset and similar assets in service.
- Proactive/Planned
  - Asset inspection programmed as part of preventative maintenance schedules for Mechanical and Electrical Assets.
  - Desktop prioritisation of sewer mains for CCTV based on performance history, age, material.
- Opportunistic/Ad-hoc
  - Capital project or operational event that leads to a critical asset being isolated or exposed in a planned manner. Opportunity to inspect not otherwise readily available.

The various approaches are used dependent upon the risk of failure that the asset presents to the business (refer figures below)

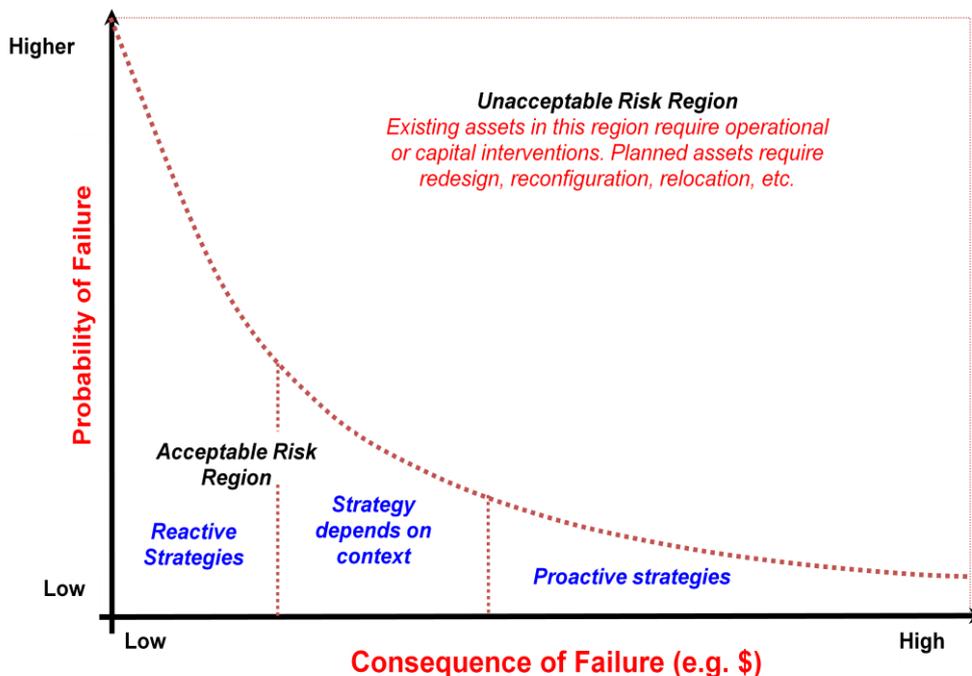


Figure 18: Condition Assessment Management Strategies

Under the RCM method, inspection has the aim of determining if an asset has failed, or its risk of failure. SA Water has a variety of asset condition assessment techniques depending on the asset involved.

Some of these techniques require technical skills, for example:-

- Large Pumps - regular efficiency testing to assess the need for refurbishment / overhaul
- Large Pumps - Vibration analysis of bearings
- Infrared imaging of switchboards
- Concrete Structures - carbonation testing, coring
- Pressure vessel corrosion assessments
- Dams in accordance with ANCOLD Guidelines
- Sewer mains - CCTV inspection program
- Sewer Vents - Visual Inspection and Boroscope
- Water Meters – Infield Compliance Testing
- Water Mains – leak detection, acoustic methods, CCTV

Other assessment techniques are aimed at identifying if a problem might exist to then flag assets for more rigorous inspection by a technical expert. These techniques are generally based on subjective visual assessment with a graded 1 (excellent) to 5 (very poor) condition scale and an opinion on performance. These inspections can be efficiently undertaken by field operators as part of their preventive maintenance tasks at a facility. Assets rated 4/5, or with poor performance, are then targeted for further investigation.

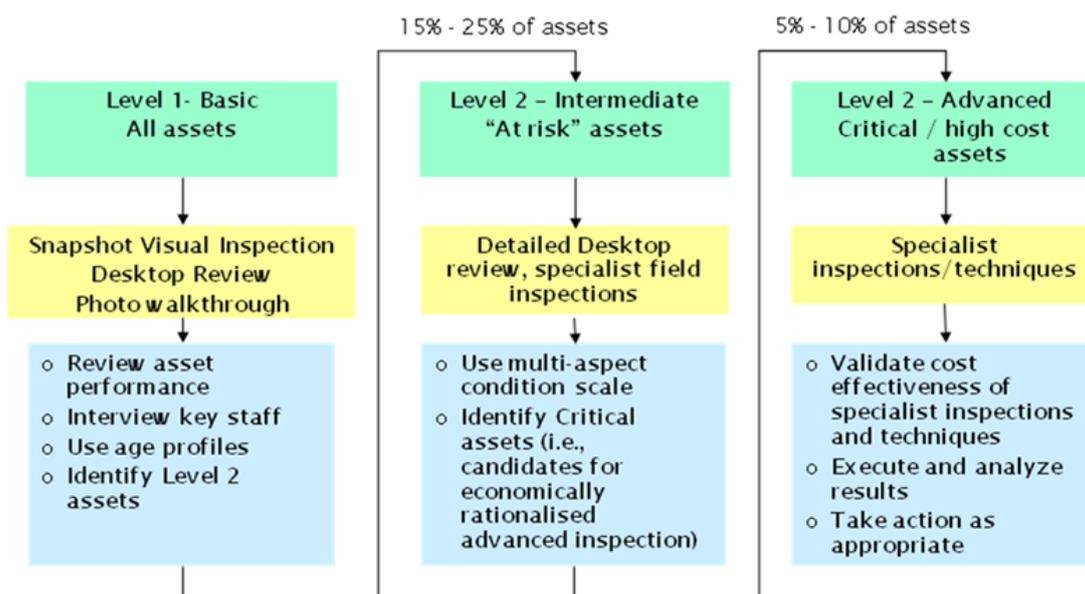


Figure 19: Staged Approach to Condition Assessment

The embedded document below provides more details around both condition and performance inspections.



AMC Presentation  
Cond Perf Ass 27081

### 3.2.3.4 Asset Criticality

All organisations operate under constraints that limit the availability of funds and labour. As part of operating in this environment it is important to identify which assets are more critical than others to differentiate and prioritise the activities and ensure that the risks are managed at an acceptable level. Critical assets are generally defined as those assets where consequence of a particular failure would be unacceptable and then one or more of the following actions are taken compared to a non-critical asset:

- Increased maintenance
- Performance monitoring
- Condition assessments
- Refurbishment
- Renewal

The choice of action will depend on the optimal lifecycle cost and the ability of the action to reduce the likelihood of that particular failure and/or help predict when that failure will occur with greater certainty.

SA Water has the following critical assets and manages them differently from the rest of the assets as described in the following table.

Asset	Asset specific actions
Large Dams	Large Dams are managed in accordance with ANCOLD guidelines including quantitative risk assessment. 6 out of 17 major dams have received safety upgrades (essentially increasing their flood capacity, structural strength, resistance to development of leaks and earthquakes) and the dam structures are continuously monitored for integrity.
Pipelines	The major pipelines are key water supply sources and extended outage due to asset failure is a risk that is managed through Asset Management Plans for each pipeline and the application of RCM to the major pumping stations associated with each pipeline. (The maintenance plans are incorporated into the asset management plans.)
Major water mains	Large diameter water mains characteristically have a low failure rate compared with reticulation water mains but the consequence of failure can be significant with high repair costs both for the asset and other infrastructure and private property. All water network mains over 375mm in diameter are therefore evaluated for the risk of failure against specific criteria that account for financial, social and environmental costs for that specific main
Trunk Sewer mains	Large or trunk reinforced concrete sewer mains (i.e. over 300mm diameter) are at risk from corrosion from sewer gases and therefore have a structured programme of CCTV inspections to identify sewers in need of renewal before a collapse occurs.
Large Water Treatment plants	The major Metropolitan water and wastewater treatment plants have RCM based maintenance plans – these plans were developed by United Water under the Adelaide Water Contract. Now that responsibility for the asset management of these assets has returned to SA Water, the maintenance strategies for these facilities are being reviewed.
Large Wastewater Treatment plants	

Asset	Asset specific actions
Large Water Pumping stations	Large water pumping stations (not already associated with a major pipeline) have maintenance management plans developed from RCM.
Water tanks	Water tanks are an example of a passive asset where the decay mechanism is generally slow, but can potentially go unnoticed until rehabilitation is very costly. Most of SA Water's tanks are constructed from reinforced concrete. The critical factor in the longevity of these tanks is ensuring that the steel reinforcement is prevented from corroding. Monitoring the progress of carbonation (where the pH of the cement matrix reduces with the ingress of atmospheric CO <sub>2</sub> ) and then applying and maintaining carbonation barriers when the steel is at risk of corrosion.

Table 7: Critical Assets Specific Actions

### 3.2.3.5 Water Network Renewal Model

There are two primary drivers for identifying water mains for renewal.

- Managing, effectively “avoidable maintenance” costs such as repairing bursts and leaks, flushing/rodding mains, responding to complaints etc. Where the avoidable maintenance costs are around 8% (or greater) of the estimated replacement cost, the project would be a good financial proposition.
- Maintaining an acceptable level of service. (I.e. Number of interruptions, poor pressure, poor water quality.)

In a large number of cases, the need to restore a reasonable service standard will trigger renewal before the number of failures makes replacement justifiable solely on an economic basis.

The method of calculating a ranking score for water main replacements has two main elements. An economic component determined by the ratio of the cost of repairing bursts and the cost of replacement, and a service standard component which is calculated as the number of customer interruption hours avoided per \$1000 spent in replacing the pipe. The ranking is used to determine which pipes should be replaced each year within the Capital Works Plan allocation for “rehabilitate mains”.

The NESSIE and CSIRO models provide complementary tools for determining the general envelope of the annual expenditure for this category:

#### **NESSIE Model:**

Water main renewals are estimated by applying a normal distribution about the assumed mean life for each water main (material) type. The lives assumed are comparable to those used for determining depreciation

#### **Pipeline Asset Risk Management System (PARMS):**

The CSIRO has performed statistical analysis of the failure records for water mains in both the Adelaide and Country water networks and has been able to develop a model that predicts the future failure performance versus age for pipes with similar characteristics. These are:-

- Diameter
- Material Type
- Soil Type
- Traffic Loading
- Static Pressure (Metro only)

The failure curves determined for each of the above combinations have been used to model the number of failures in each of the networks for various expenditure programs. This software is in the process of being updated for application at a National level.

The identification and prioritisation of individual water main renewal projects are based on actual failures and service standard performance.

### **3.2.3.6 Wastewater Networks Renewal Model**

There are three main decision-making models for the wastewater networks:

- **Proactive Gravity WW Main CCTV Inspection Program:**  
Gravity Trunk Mains (>300mm diameter) do not have performance signs of deterioration and are not suitable candidates for level 1 inspections. Due to the unacceptable results of sudden trunk main collapse, SA Water has a proactive inspection program for 'critical' mains based on diameter, year laid and pipe construction material. All mains are inspected using CCTV and assigned a condition assessment rating. All results are then added to the Sewer Prioritisation Model for determination if relay or reline is recommended.
- **Reactive CCTV inspection :**  
Gravity reticulation mains are too numerous to justify a proactive inspection for all mains. Chokes and overflows give early warning signs of poor performance and poor condition. From determination of the cause of a choke/overflow, if condition is considered to be of concern, CCTV inspection is undertaken and a condition assessment rating is assigned with the results are added to the Sewer Prioritisation Model.
- **Sewer Prioritisation Model:**  
Wastewater gravity mains listed for relining or replacement is the result of prioritisation from the Sewer Prioritisation Model. Mains with a CCTV inspection rated to Australian Standards are added and prioritised by standard criteria to determine the highest priority mains each year as suitable candidates for lining or relaying. Emergency failures can bypass this process.

### **3.2.3.7 Dam Safety Management**

Dams are critical assets. Their primary purpose is to store and release water in a safe manner while remaining serviceable under all conditions which can range from normal to extreme (rare floods, earthquakes and rapid drawdown). A number of SA Water's dams are sited upstream of developed populated areas and their failure is therefore a significant risk to life and the South Australian economy.

Australian National Committee on Large Dams (ANCOLD) Guidelines indicates what levels of dam safety are required at each dam. In the absence of Dam Safety Legislation in South Australia, SA Water is committed to meeting the ANCOLD or other international dam safety guidelines where appropriate. This should ensure that the dams remain serviceable under all conditions.

The principle components of SA Water's dam safety management are the surveillance, operations and maintenance programs. They are designed to identify any issues at an early stage so decisions can be taken to take action to prevent any situation becoming worse and possibly leading to dam failure.

SA Water's approach to maintenance on its large dams is based on the philosophy of preventative maintenance. All components of the dam should be maintained in a condition that ensures it and the dam as a whole can be operated safely and for the purpose intended. This will ensure that exposure to risk due to failure to supply or failure of the structure is limited. The surveillance programs identify condition based maintenance requirements.

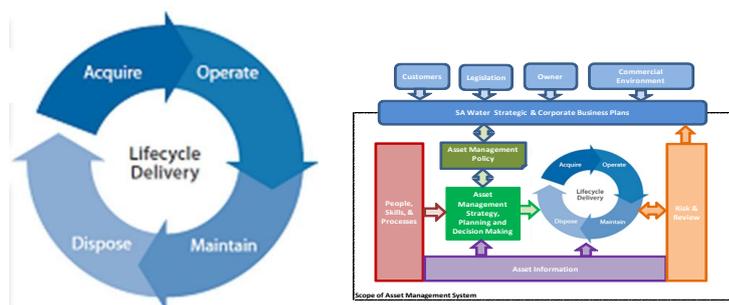
A quantitative risk based approach is used to identify dam safety upgrade work. The ANCOLD Guidelines provide the quantitative risk assessment methodology. A portfolio risk assessment across all the dams' priorities the dam safety upgrade work first addressing high life safety risk and then economic risk.

### **3.2.4 Asset Disposal**

The condition and age of the water and wastewater network, mechanical and electrical equipment, the concrete structures at a number of metropolitan wastewater treatment plants and the key components of the Supervisory Control and Data Acquisition (SCADA) system are critical to the efficient operation of the asset base and were given particular planning attention recently.

The risk-based decision-making approach to asset disposal is based on the assessment of the condition and performance of the installed infrastructure, predictive modelling, experience and expert opinion.

### 3.3 Asset Lifecycle Delivery



- SA Water has specific procedures and processes in place for each of the lifecycle activities (acquire, operate, maintain and dispose) to ensure optimal outcomes are achieved.
- *Acquire* stage is covered by a corporate project management methodology
- Capital planning is undertaken considering asset degradation and trading off capital costs, maintenance costs, risks and their probabilities in order to optimise a capital investment decision, both in terms of timing and in terms of the choice of asset.
- Prioritisation occurs at the different stages and levels, ultimately determining an overall capital plan from the ground up.
- *Operation* of assets is undertaken by Operations in accordance with standards set by IMD.
- *Maintenance* is determined based on cost effectiveness & criticality and delivered by Operations
- *Disposal* where possible is carried out in conjunction with acquisition to minimise costs.

One of the important components of SA Water’s AMS architecture is asset lifecycle delivery, which ensures that the organisation’s assets do deliver customer services of the required standard, in an ongoing and reliable manner.

It is in the Asset Management Lifecycle Delivery activity that the majority of expenditure is incurred. There are significant opportunities to identify efficiencies through the adoption of good practice Asset Management in these Lifecycle Delivery Activities, as well as significant risks of increasing costs and risks if these delivery activities are not well managed.

The Lifecycle Delivery activities are not considered in isolation. A lifecycle approach to Lifecycle Delivery activities is adopted to ensure the maintenance phase of the lifecycle is represented at the acquisition phase of the asset lifecycle to ensure maintainability issues are considered at the design stage. The disposal phase is also considered at the acquisition phase of the lifecycle as there may be opportunities to influence the disposal costs through changes in the design or materials used.

#### 3.3.1 Asset Acquisition

SA Water has a capital investment program that supports achieving the strategic plan objectives. The plan will be delivered via one or a combination of delivery strategies. The key strategies employed by IMD are:

- Building new assets either on “green field sites” or add-ons to existing facilities
- Replacement of existing assets at the end of their service or economic life
- Refurbishment of existing assets to extend their service life

SA Water employs a project management methodology that ensures consistency of approach and that what is required gets delivered. It is in line with good industry practice and is applied to all capital works.



Figure 20: CPMM Process

All projects include optioneering to find the best solution to address the project objectives and provide optimal life cycle cost. The “do-nothing” option is always assessed.

For large capital projects, **Multi Criteria Analysis (MCA)** is used and a wide range of different options considered. In this context the MCA process uses a triple-bottom line approach which considers the impacts of a project from environment, social and economic perspectives. Also prior to full financial approval (FFA) operating expenditure, including energy costs, are estimated across 25 years using SA Water’s standard financial analysis **Net Present Value (NPV)** calculation tools. For smaller expenditure capital projects Net Present Value (NPV) calculations factor in future operating and maintenance.

### 3.3.2 Asset Operations

Delivery of day-to-day operations and maintenance of assets is the responsibility of SA Water Operations group. This is performed in accordance with the following elements:

- Detailed Asset Management Plans developed by Asset Management, which set the agreed standards and requirements for maintenance and inspection;
- Capital program developed and managed by IMD.

The operating and maintenance activities seek to maintain current level of service and achieve target outcomes for customers while minimising the total costs and while satisfying SA Water, environmental and social expectations.

Asset operators are an important contributor to achieving an organisation’s objectives and service delivery requirements. AMU provides guidelines about how to operate the assets within the appropriate design, maintenance and operational parameters. This includes the development of a strategy and plan which would outline the organisation’s approach to ensuring that the assets meet their functional requirements, are operated to deliver the required service level, meet all statutory and technical requirements for health, safety, security and reliability and achieve and sustain defined levels of physical, functional and financial performance.

**Operations plans** – documents that define how the facility / system / network should be operated to deliver its intended service requirement – are developed by Operations. These plans, however, are important to asset planning because they (may) contain contingency plans to be activated in the event of an emergency or major failure. The recognition of the risk and the approach to managing an

emergency are inputs to the asset planning process. Similarly, the maintenance strategies developed as part of the asset planning process are inputs to the operations plans.

**Operations Issues Register** – as mentioned previously the interactions between Operations and AMU is key to successful asset management and to facilitate this, an operational issues register is used. New issues are raised by completing a standard document and submitting it by email. The issue is then entered on the issues register and allocated to the appropriate person in AMU. The aim is to 'deal with' the issue within four weeks. The current status of the issues register is a standing agenda item at the AMU Leadership Team meeting. The embedded document below is a sample of the report that is tabled at that meeting.



OIR Summary for  
AMLT Meeting.pdf

### 3.3.3 Maintenance Delivery

Maintenance is conducted in accordance with the plans loaded into an Asset/Works Management System, Maximo 7, for execution, review, analysis and planning purposes. All events and expenditure are captured within Maximo 7.

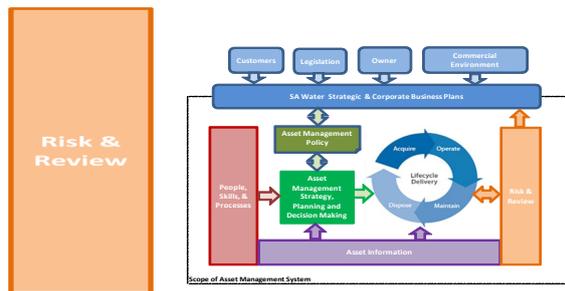
Regional maintenance works is primarily carried out by SA Water operational depots and trade workshops, with some parts are outsourced to contractors. Metro maintenance work is undertaken under a major contract through the alliance contract with Allwater.

The overall objective of maintenance is to ensure that the assets remain safe and operational to meet their service duty and performance requirements.

### 3.3.4 Asset Disposal

The relative cost of disposal is increasing due to more stringent legislative and regulatory requirement in this area. Where practicable, disposal of an old asset occurs as part of the construction of a new or upgraded asset.

## 3.4 Risk & Review



### 3.4.1 Risks Management for Assets

- Risk management relating to assets is conducted in line with the corporate risk management methodology
- Risk assessments are conducted at various stages of the asset's lifecycle to assist in decision making.
- A number of asset specific risk matrices (Heatmaps) are used in addition to the corporate one to ensure maximum effectiveness
- About 20 key practice documents, based on the top risks managed by AMU, have been written to provide the next level of detail to that provided in this 'High Level AMS' document

The corporate risk methodology described in Part B Corporate Perspective provides the high level approach to the way risk management is conducted for SA Water's assets. One of the key objectives under the Asset Management Policy is to manage the assets at an acceptable level of risk, and to be able to do so requires that risk identification and control occurs in nearly all facets of asset management decision-making. Some examples of these include:

- As the basis for assessing which activities are given the priority between asset classes
- As part of the consideration of the various options at the project optioneering stage
- As a means to prioritise assets for replacement inside a particular asset class
- As input to comparisons between options for a particular asset e.g. maintain, repair or replace
- As the basis for RCM strategy (built into the model)
- As a means of determining which assets are more critical than others

#### 3.4.1.1 Risk Matrices for Assets

Various risk matrices (Heatmaps) are used depending on the requirements of each asset management activity. For instance, where there is a need to perform comparisons across asset classes and/or provide information across the wider organisation, then the corporate heatmap would be used. Alternatively where the activity is very restricted, for instance determining which water network reticulation mains are renewed first given fixed sum money, then there may be considerable deviation from the corporate heatmap to ensure the effectiveness of the outcome and integrity and consistency of approach over time with that particular asset class.

The following table shows the asset management specific matrices currently in use in AMU.

Activity/ Facility	Purpose	Impact Categories
Capital Prioritisation 2012	Producing a prioritised list that satisfies the business imperatives out of the technically based capital plan	Levels of service Environmental Finance OH&S
Large Dams	Evaluate the risk for each dam to determine the timing of the spending from 3 months to 25 years and in accordance with ANCOLD guidelines	Finance OH&S Environmental Performance (supply disruption) Reputation Safety
Pipelines & Water Network Major Mains (i.e. over 375mm)	To determine which mains should be repaired/replaced and in what timeframe	Repair costs Environmental Impact (Leak size & duration) Loss of service Public image Injury or fatality Water loss Financial loss Public inconvenience Fines and penalties
Water Networks	Prioritisation of networks pipes for replacement	Economic Supply Interruption
WWTP	Formulate a management model based on risk scores	Financial Safety Environmental Water Quality Political (Reputation) Performance indicators Customer service (Interruptions)
WWTP's	Environmental Impacts review that identifies the significant risks (scores >30) at a particular WWTP	Risk index for ~70 site specific activities [Risk Index = (Frequency of Aspect + Likelihood) x (Severity + Sensitivity)]
Overflow Abatement for Sewer mains	Prioritise sewer mains for consideration for overflow prevention.	Combination risk assessment and asset performance

Table 8: Risk Matrices (AMU)

### 3.4.2 Review Asset Management Processes

- SA Water regularly reviews its asset management practices and implements improvements
- SA Water is made aware of best practice through research and information sharing with national and international water agencies
- SA Water has an AMS improvement process incorporated with the periodic updates of the key AMS documents

One of the principles stated in the Asset management Policy is that there will be continuous improvement of the asset management system. This is achieved by conducting ad hoc and periodic reviews that compare current SA Water practices to national and international best practice and then determining whether or not to make the change taking into consideration the benefits, the effort required, and the priority relative to other activities being undertaken.

There is currently no ISO standard for Asset Management Systems to use as a single source of best practice, although one is currently being produced. So SA Water uses a number of different reference documents on asset management systems and practices to keep them advised of good industry practice. See embedded document below for more information.



External Frame of  
reference .pdf

In addition to this, SA Water is an active participant of Water Services Agency of Australia (WSAA) that facilitates the sharing of information and promotion of best practice asset management.

Reviews are conducted in a number of different ways and at different levels in both in ad hoc opportunistic timeframes as well as periodic reviews. For example:

- WSAA Asset Management Improvement Project – 4 yearly cycle
- AMS review – in conjunction with the annual update of this document
- WSAA R&D Asset Management – R&D programs for asset management for which SA Water helps sets the priority
- As and when new information becomes available from whatever source

#### 3.4.2.1 WSAA Improvement Project

SA Water participates in benchmarking as part of the WSAA Asset Management Improvement Project which provides ratings for all asset management functions and processes. This enables relative strengths and weaknesses of the various processes to be compared both internally within SA Water and externally with approximately 40 other national and international water agencies. The benchmarking project occurs every four years, i.e. 2004, 2008 and the 2012 project is currently in train.

#### 3.4.2.2 AMS Review Process (Improvement Plan)

A process is in place that identifies, prioritises and plans AMS improvements as part of the periodic updates of this and the associated key practice documents. The last cycle was a major update of all documents and the details for the various stages of the process have been included in italics below to aid comprehension.

- During the write up of current practices documents improvement opportunities are identified - *In April 2012 following the rewrite of the high level AMS and 20 key practice documents, fifty opportunities were identified and prioritised*
- The list of improvement opportunities are consolidated and incorporated with other available information, e.g. recent consultants reports
- Each opportunity is prioritised as one of four categories i.e. Very High, High, Medium and Low. *There were 6 Very High Priority and 18 High Priority actions in the latest plan*
- An improvement plan is drawn up for the next planning period with responsibility assigned at one level below the Manager Asset Management. *The last planning period went from May to September 2012*
- For 'Very High' and 'High' priority actions the Responsible Manager provides milestones one to two months apart
- Achievement of the milestones are tracked monthly through to the completion of the improvement action
- Every 2 months a full update of progress is recorded i.e. including the Med and low priority actions
- At the end of the planning period the appropriate documents are updated and the cycle begins again

This process itself is reviewed at the end of each cycle to determine what can be improved to make it more effective.

### **3.4.2.3 WSAA Research & Development Activities**

SA Water is actively involved and obtains significant benefit from research & development activities for water industry asset that is conducted by WSAA. The output from these projects generally document Australian water industry practices as well as best results thus providing the ability to compare SA Water's current practices and the ability to determine whether or not there is benefit in making changes.

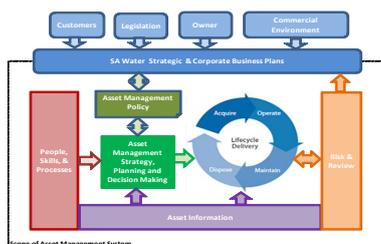
The embedded document below is a presentation given to the Asset Management Committee in August 2012 on the involvement and benefits of working with WSAA on developing and implementing best water practices and provides examples of the type of projects that are conducted and the outputs.



10 - WSAA R and D Program and Collabor

### 3.5 Asset Information

Asset Information



- Asset hierarchies are used to group assets together to enable effective and different considerations to be taken into account at the appropriate hierarchy.
- There are nine major classes of assets: water pipe networks, water treatment plants, water pump stations, large dams, water storage tanks, bores & wells, wastewater pipe networks, wastewater treatment plants, wastewater pump stations and these are considered as a group of assets and individually as appropriate.
- Data is captured in various applications and made available in a form to support the decision making.

Effective asset planning and operational activities rely on asset data, information and asset knowledge as key enablers. The can be viewed as the following:

- **Data** – Numbers, words, symbols, pictures, etc. without context or meaning, i.e. data in a raw format.
- **Information** – A collection of data expressed with a supporting context.
- **Knowledge** – A combination of experience, values, information in context, and insight that form a basis for decision making.

Competent management of assets such as facilities, equipment and network infrastructure to ensure ongoing, cost-effective delivery of services to customers is complex. A critical aspect of this is having ready access to accurate, comprehensive information about the assets and their performance

This information includes asset identification, geographic location and connectivity, design specifications, performance data, condition assessment observations, preventive maintenance data and asset lifecycle costs. It represents the collective knowledge used to manage our assets as well as to produce and deliver products and services to SA Water customers.

In order to make and justify effective decisions, it is very important to acquire and manage relevant asset information at all stages of the asset lifecycle (refer figure below).

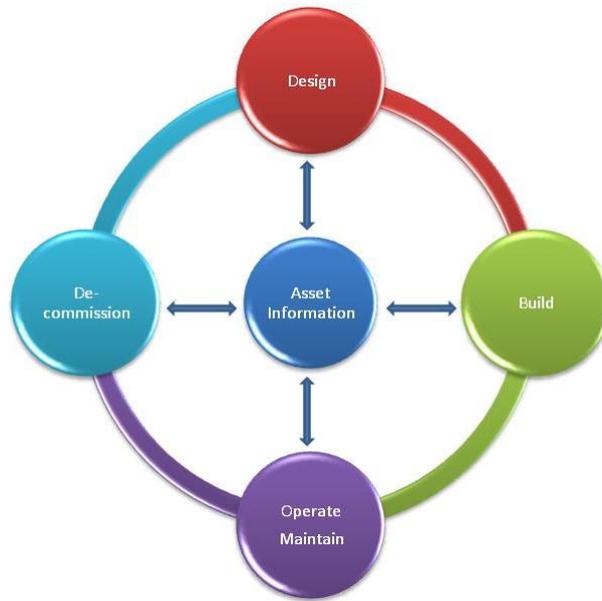


Figure 21: Asset Information Lifecycle

A key objective for asset management is to establish and maintain an asset information management framework that effectively supports the data requirements and business outcomes of asset management planning functions and initiatives including asset programs, asset management plans, preventive maintenance plans, condition assessment and performance monitoring programs and capital works plans.

### 3.5.1 Categorisation of Assets (Asset Hierarchy)

Asset hierarchies are a method for allocating assets to a set of logical groupings and sub-groupings. Asset hierarchies allow for aggregated or detailed analysis of asset performance at various levels, from the product level down to the individual equipment item level.

The figure below illustrates the structure of SA Water’s asset hierarchy, starting with the product, the asset group and at the lowest level the asset.

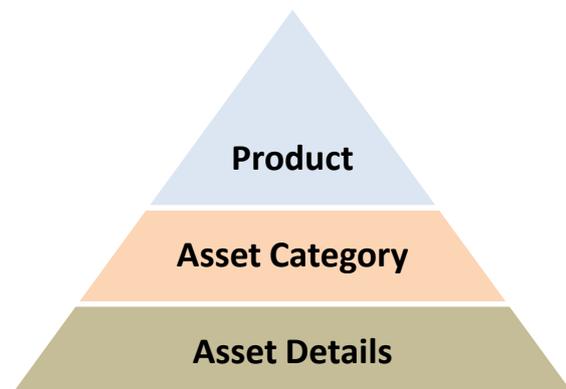


Figure 22: Generic Asset Hierarchy

The following table shows the main categories of asset hierarchy.

Product/Service	Water	Wastewater	Recycled Water
<b>Asset Category</b>	Pipe Networks (including connections), Water Pump Stations, Water Tanks, Water Treatment Plants, Large Dams, Bores & Wells, Water Dosing Stations	Pipe Networks (including connections), Wastewater Treatment Plants, Waste Water Pumping Stations,	Recycled Water Treatment Plants, Recycled Water Distribution Mains, Recycled Water Pumping Stations
<b>Example of Assets within a category</b>	Water Pipes of different material Flocculation Tank Individual pumps within a pumping station Chlorine Analyser Telemetry System Buildings	Sewer Pipes of different material	Purple PE Water pipes.

Table 9: Asset Categories

### 3.5.2 Assets Description – General descriptions of the assets categories are given in the following table:

<b>Asset Category</b>
<p><b>Water Pipe Networks</b> Water networks includes: Water mains including major pipelines and major mains (dia =&gt; 375mm), reticulation mains (dia &lt;375mm), fire services, valves, metered service connections, chair supports and thrust blocks.</p>
<p><b>Water Treatment Plants</b> Water Treatment Plants (WTPs) are the key infrastructures that convert raw catchment/source water into clean drinking water that is distributed to customers. Technologies applied include reverse osmosis, membrane filtration and conventional flocculation/sedimentation/filtration processes</p>
<p><b>Water Pump Stations</b> Pumping stations includes all pumping stations which are used for the transfer of water in bulk or distribution systems. Pumping stations range widely in capacity but are all comprised of major asset components including: pumps, motors, switchboards, control systems, pipeworks, and buildings.</p>
<p><b>Large Dams</b> Large Dams are the major structures that impound water, resulting in the formation of reservoirs. Types: earth embankment, rockfill and concrete embankment, concrete gravity and concrete arch dam walls. Dams have spillway, outlet facilities and associated pipework. Off-stream dams have intake facilities (weirs, aqueducts, tunnels).</p>
<p><b>Water Storage Tanks</b> Water storage tanks include all structures located throughout the water delivery networks used for storing water for flow balancing purposes. Tanks can be surface mounted, in-ground or elevated and construction materials are various including concrete (majority, &gt;80%), steel, fibre glass and plastics (for linings).</p>

Asset Category
Tank appurtenances include access ladders/stairs, pipework, isolating and control valves, chambers, energy dissipaters, monitoring equipment and power supplies.
<p><b>Bores and Wells</b></p> <p>Bores and wells are used for the collection of groundwater for supply into distribution systems or transfer into bulk systems.</p> <p>Comprised of major asset components including: bore or well, pumps, motors, switchboards, control systems, pipework, and buildings.</p>
<p><b>Wastewater Networks</b></p> <p>Wastewater pipe networks includes:</p> <ul style="list-style-type: none"> <li>• Gravity trunk mains, gravity reticulation mains and pumping mains</li> <li>• Customer connections</li> <li>• Appurtenances including access chambers, fan stations, vents</li> </ul>
<p><b>Wastewater Treatment Plant</b></p> <p>Waste Water Treatment Plants (WWTPs) are designed to remove contaminants from wastewater and include physical, chemical and biological processes. The objective is to produce a high quality effluent and stable sludge suitable for discharge to the environment or recycling without causing unacceptable by-products during the process (e.g. odour, noise)</p>
<p><b>Wastewater Pump Stations</b></p> <p>Wastewater pumping stations are used for the transfer of wastewater in wastewater systems.</p> <p>Comprised of major asset components including: pumps, motors, switchboards, control systems, pipework, sumps and buildings</p>

Table 10: SA Water Infrastructure Assets

### 3.5.3 Asset Information Framework

The framework needed to ensure provision of quality asset information has to include:

#### 3.5.3.1 Asset Data and Knowledge

Includes relevant asset data and information of appropriate quality to support asset management decision-making processes. Data includes:

- Asset specification details
- Asset life information
- Asset lifecycle costs
- Asset performance data (e.g. bursts leaks, chokes, M&E failures etc.)
- Asset maintenance activities
- Asset condition assessment observations

This data should be clearly understood and managed in a manner that optimises its effectiveness in decision-making and business processes.

### 3.5.3.2 Asset Information Standards

Used to define the asset data and information, its format, the source and frequency of provision. This includes clearly defined asset structures (asset hierarchies), asset identification methodology, asset naming conventions and failure codes which are required in order to correctly reference and link asset information.

- **Asset Hierarchy Standard – TS149**

This document describes the technical standard for asset information to be provided to SA Water in relation to new assets created as part of a capital project. The document describes the required information, the structure of the information and the format the information shall be supplied in.

- **Asset Information Standard**

This document provides a common and uniform definition of the major assets owned and/or managed by SA Water, and to define the structure of data recorded for these assets, including the asset hierarchy structure and the attributes recorded for each major asset class. This document also defines the components and sub-components of each major asset class, along with any attributes of the components.

- **Asset Cost Model**

An asset cost model has also been developed which defines what costs are included in the life cycle costs of an asset. As part of the Maximo 7 project, this costing model was implemented which enables costs (labour, materials, chemicals, energy) to be captured against an asset. This capability is being used to provide asset management with information that complements existing analysis and reporting initiatives. The costs collected as described by the model are used to manage asset, delivery and resource financial performance.

- **Asset Valuation Methodology**

An asset valuation methodology has also been developed which utilises the structure and content of asset information from a number of corporate asset information systems to calculate valuations for corporate pipe & non-pipe assets. SA Water infrastructure valuations are managed in the Corporate Fixed Asset Register (FAR).

The Automated Valuation System (AVS) refreshes the pipe data in the FAR every year with new values calculated using pipe unit rate information sourced from external consultants and the pipe data held in the corporate GIS. The AVS application also provides the input data for the long term replacement modelling application for the pipe assets.

Other asset types, such as treatment plants, pumping stations, major dams etc. are revalued from first principles on a rolling 5 year plan (values are indexed for the intervening years). Each of these revaluations includes reconciliation with the Maximo 7 asset register. SA Water has initiated a project to more closely integrate the FAR and Maximo 7 asset registers. This project is planned to take 3 years with the ultimate aim of being able to refresh the FAR directly from Maximo in a similar way to the approach for pipes using the AVS.

- **As-Constructed Drawings -TS95**

This document describes the format, content and requirements related to the submission of “as-constructed” drawings to SA Water

Asset information standards provide a consistent structure and vocabulary upon which to engage stakeholders, conduct analysis and to support asset management decision making.

### **3.5.3.3 Asset Information Systems**

Used to automate asset management activities and provide consistent decision support analysis. These systems acquire, maintain, analyse and create asset information through various automated processes.

The key asset information systems within SA Water are:

- Corporate Geographic Information System (GIS)
- Maximo
- Fixed Asset Register (FAR)
- Customer Services Information System (CSIS)

The Corporation has three main asset registers for infrastructure assets. Two are used for operational, planning and strategic purposes; they are the geographic information system (GIS) and Maximo<sup>7</sup>. The third is used for financial asset valuation purposes and is the corporate Fixed Assets Register (FAR).

- **Corporate Geographic Information System (GIS)**

SA Water’s GIS serves as a spatial information repository for use in asset management, operations and customer enquiries. In particular, it stores location and descriptive information about corporate linear network assets including water, wastewater and recycled water mains.

The corporate GIS provides SA water with a framework for understanding & visualising information from a variety of sources

Point (e.g. Pumping Stations, Treatment Plants, and Valves), Line (e.g. pipe segments) and polygons (e.g. administrative boundaries, infrastructure zones, drainage areas) features are used to represent and model corporate infrastructure assets.

Other key datasets include:

- Geographic location of breakdown events on pipe networks.
- Water main shutoff blocks
- Linkage of properties served to pipe assets

All assets are uniquely identified within the system and in the case of non-pipe assets, the Maximo location identifier is used as a primary key to link with further detailed information that resides in the corporate Maximo system.

Information within the GIS is used to support a range of asset decision making processes.

The GIS and related infrastructure supports a number of core applications, upstream and downstream applications including:

- AquaMAP, based on the ESRI eView product; and
- MaximoMAP, the GIS component of Maximo.

As such, GIS information is available to all SA Water and Alliance personnel. Limited access to the spatial information stored within the GIS is also available to external organisations such as surveyors, consulting engineers and plumbers.

The GIS is updated through three main streams. These are the as-constructed drawings provided by the development industry (for new land divisions), gazettal sketches from mains extensions, and as-constructed drawings from SA Water capital projects.

All “as-constructed” drawings are required to be produced using the drawing number(s) provided by SA Water and all drawings are submitted using the electronic drawing template provided by SA Water.

At completion of the project, the signed original hard copies of the ‘AS Constructed’ drawings ONLY along with an electronic copy (in .dwg format) of ALL revisions (i.e. For Comment, For Tender, For Constructed, As Constructed) to date of each drawing are provided to the Engineering Support Manager.

Once the Drawings have been processed and load into SA Water’s plan index system (Dataviewer) the hard copy is the provided to State Records where it is held for perpetuity.

A copy of the Project Brief clearly defining the Scope of works is provided with the drawings to enable the full set of drawings to be audited for completeness against all engineering disciplines.

Prior to sign off on the Project Operational Handover Checklist (Form CPMM302) by the Engineering Support Manager, all ‘As Constructed’ drawings are checked for compliance to this standard (TS-95).

- **Maximo**

Maximo is SA Water’s Asset and Work Management System and it is used to manage the maintenance and operation of SA Water’s network assets, and is the data store for non-pipe assets (pipe assets and minor fittings are stored in the GIS).

Maximo provides the information needed to:

- Generate long and short-term asset plans,
- Plan and schedule preventive, reactive and condition-based maintenance,
- Optimise resource utilisation,
- Measure key customer and operational charter performance indicators.

Maximo is integrated with other systems to meet the corporation’s requirement for information relating to:

- The network assets;
- The condition of those assets;
- The services those assets deliver;
- How much it costs to run the assets;
- What events occur on the assets;
- The response made to events, and ;
- The customer impact of events

Maximo 7 has recently (July 2011) been rolled out to regional operations and the new metropolitan alliance contractor (Allwater). As part of this rollout, Asset Management has designed and implemented new asset hierarchies and failure codes to be used within the Maximo system. These hierarchies are more comprehensive and provide improved flexibility and granularity for asset information analysis.

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- **Fixed Asset Register (FAR)**

The SA Water Fixed Asset Register performs the valuation and depreciation calculations for all assets except major plant, minor plant and the following major infrastructure asset groups:

- Major Dams
- Waste Water Treatment Plants
- Water Treatment Plants

These asset groups are managed in complex spreadsheets and represented by a single entry in the Fixed Asset Register.

- **Customer Services Information System (CSIS)**

SA Water's Customer Service Information System (CSIS) manages the billing for water and wastewater products and services. In addition, CSIS supports the following core business function:

- Customers and Property Maintenance – for maintaining and enquiring on all customer and property information,
- Meters – for the creation and maintenance of meter reading schedules, the collection and verification of meter readings, and the management of meter maintenance,
- Customer Applications – for processing new water and sewer applications, building plan approvals, and concessions for eligible pensioners,
- Billing – for automatic invoicing of customers based on pre-determined schedules and rates,
- Receipting – for the acceptance and reconciliation of payments by mail, over the counter or electronically,
- Recovery – for monitoring the status of accounts receivable and the collection of overdue debts,
- Financial Controls – for the transfer of information between the billing system and the General Ledger,
- Conveyancing and Adjustments – for the processing of applications received related to property settlements and the handling of adjustments to bills or payments,
- Pending Work Queue (PWQ) – to allow business related functions to be performed across a variety of sections in SA Water.
- Audit Controls and Reports – to meet audit requirements

### ***3.5.3.4 Asset Information Strategies***

These strategies define the activities that will need to be undertaken to ensure that its asset information meets current and future needs. Key areas of focus include:

- **Asset Data Quality**

Asset Data quality relates to a number of key parameters including:

- Accuracy
- Clarity
- Completeness
- Consistency
- Correctness
- Integrity
- Uniqueness

A GIS Data Quality strategy has been produced and improvement initiatives have been activated and delivered. A similar approach is being developed for asset data quality in

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Maximo. A range of data exception reporting is being developed to identify data anomalies in the system. Data errors will be resolved as appropriate. These activities will also identify inconsistencies in current business processes which require improvement.

Asset Management are reviewing existing business workflows that involve the handover and capture of asset information in order to improve the timeliness of asset information handover by identifying and removing barriers / delays. Presentations to project management staff are also being conducted to inform them of asset information handover requirements at various project milestones.

- **Asset Data Management & Governance**

In conjunction with SA Water's IS Group, Asset Management is reviewing governance requirements for asset information with a view to:

- Providing one point of accountability
- Reducing asset data duplication
- Increasing confidence in asset data
- Improving timeliness and usability of asset data
- Establishing a vocabulary of asset data to ensure access to the right information
- Defining enterprise-wide values for common reference asset data

- **Core Asset Information Systems**

Refer to section on "Asset Information Systems"

- **Key Functional Requirements from Corporate Asset Information Systems**

Asset Management currently undertake a range of reporting and analysis including:

**Asset Performance Information**

- Detailed analysis of network asset breakdown events (e.g. burst, leak, choke, overflow etc.) is undertaken using data from both Maximo (event details) and the corporate GIS (event location).
- Breakdown event data and preventive maintenance completion details for non-pipe assets are available from within Maximo and are analysed using ad-hoc reporting tools.
- Pump testing is undertaken on a regular basis. The results are currently captured into a stand-alone database. Standard reports are generated which graph and summarise pump performance results. These reports are used to develop strategies for pump remediation or replacement.
- Flow and pressure readings are automatically captured and logged at a number of flow meters installed on the pipe network throughout the state. Asset Management is responsible for the consolidation and loading of this information into the corporate Operational Data Store (ODS). The ODS also provides asset management with consolidated real-time information on the operational performance of major facilities.

**Asset Condition Assessment Information**

A number of stand-alone databases exist which capture asset condition assessment data. This information is used on an ad-hoc basis to support asset planning activities. These databases include:

- Asset Condition Assessment Database (ACAD) - Maintained by United Water for condition assessments of metropolitan non-pipe assets (an update will be received at the completion of the existing contract)

- WPS - Database which stores the results of condition assessments conducted at regional water and wastewater pumping stations.
- Water tank condition assessment database - Developed by external contractor for their use in the capture and reporting of condition assessment data for regional water tanks.
- Infonet - Used by Asset Management to consolidate, review and analyse data provided by external contractors in the CCTV inspections of metropolitan wastewater pipe network. The data includes video footage, photographs, and detailed observations of any defects they encounter along the surveyed pipe.
- DamSmart - Used by Asset Management to capture, monitor, review and analyse asset information for corporate dam holdings.
- Maximo 7 – Recording condition assessment ratings by operational personnel for asset in conjunction with preventative maintenance program.

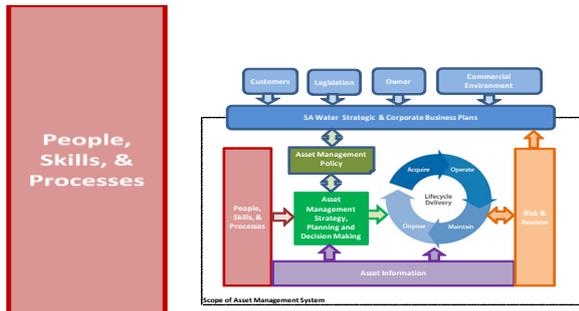
### **KPI Reporting**

Asset Management report on a number of Key Performance Indicators (KPI). They include pipe network performance, the completion rate of preventive maintenance activities, preventive vs. corrective maintenance ratios and the number of properties experiencing 3 or more unplanned water interruptions in a rolling 12 month period. Asset information is sourced from Maximo and the corporate GIS for these calculations.

The long term vision for asset information management is that every asset management decision and "trigger" point will be defined by the asset managers/planners for all asset classes and the asset information needs identified so that a robust and flexible framework is available to deliver the full complement of analysis and reporting requirements. To that end key requirements include:

- Optimisation and consolidation of asset information reporting and analysis environment via a business intelligence framework
- Enhancement and development of asset replacement prioritisation models for a wider range of asset classes.

### 3.6 People Skills & Processes



- AMU is structured around four (4) key functional teams and four (4) major support teams contributing together to successful asset management.
- AMU uses a consistent performance processes to align individuals with the goals of the organisation
- Asset management processes are designed to deliver the desired customer outcome. The processes involve all parts of SA Water to varying degrees and the way these are managed varies to suit the circumstances and to manage the risks effectively.

SA Water’s Organisational Structure & Culture proactively support structures, roles and responsibilities that are both conducive to Asset Management thinking and tailored to specific Asset Management goals. The Competence and Behaviour of individual staff match the demands of their roles.

#### 3.6.1 AMU Structure

The Asset Management Unit (AMU) has been structured to fulfil the following responsibilities:

- To plan for SA Water’s assets to deliver the required level of service by optimising risk, performance and lifecycle costs
- To ensure management of assets is intergrated, understood and carried out across the business

The line managers of various teams within AMU support asset management planning and ensure that the Asset Management Policy is applied within their area of responsibility.

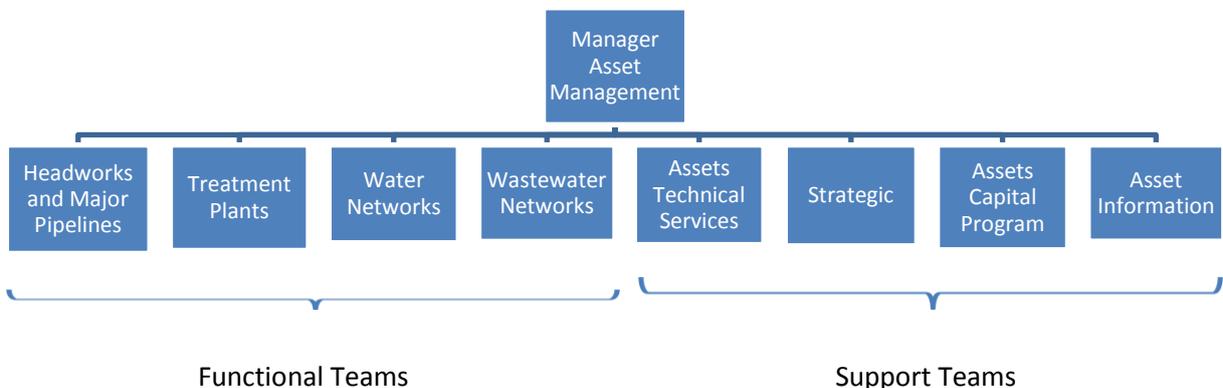


Figure 23: AMU Structure

### 3.6.2 Workforce Management Responsibilities

**Manager Asset Management:** Responsible for ensuring appropriate workforce planning occurs in AMU and that this connects to the wider IMD and SA Water processes, especially succession planning and its relationship with development planning and the performance management process. Also responsible for ensuring appropriate knowledge documentation.

**Team Asset Managers:** Responsible for contributing to AMU workforce and succession planning and ensuring that this links to development planning and the performance management process. Also responsible for identifying required knowledge areas for capturing and contributing to their documentation.

**All teams in AMU:** Responsible for contributing to team workforce and succession planning; ensuring that this links to development planning and the performance management process. Responsible for contributing as necessary to knowledge capturing process.

### 3.6.3 Functional Accountabilities

The diagram below shows the structure of the AMU including the area of activity and responsibility of each team in relation to various asset categories.



Figure 24: AMU Team Responsibilities

### 3.6.4 Skills & Training

SA Water has a Performance Management Framework under which all employees are provided with role clarity (includes job description, competency and behavioural requirements, performance outcomes, sight of role to corporate strategy and plans), regular feedback and development planning, including succession and progression planning. There is a mandated and regular process for individual performance and development review and appraisal.

A corporate human resources management system supports business wide and individual development planning, which includes progressing skills and knowledge attainment in identified and documented gaps between role requirements and individuals current skill levels.

The Corporation currently has and is developing job family profiles and frameworks that support job and career advancement, by being able to easily identify individuals' development needs in order to support their advancement within roles or for career progression.

SA Water also has workforce and succession planning frameworks that support organisational and capability sustainability.

SA Water requires diverse and specialised technical capability to meet business and compliance needs. To this end, SA Water provides access to a wide range of technical education and training to ensure employees have the skills, knowledge and competencies to perform their jobs safely and effectively.

As people management and leadership is a key component of enabling organisational performance this is equally true of asset management. SA Water has a leadership development framework in place that facilitates leadership growth from front-line training through to high potential development programs.

Technical training is structured under the SA Water Technical Training Framework to provide systematic and accredited development as a continuous process. Key business drivers for technical training include:

- To facilitate employee's achieving the competency (skills and knowledge) to perform their jobs safely and effectively.
- Compliance with licence, certification and regulatory requirements as well as OHS, environmental and drinking water quality guidelines.
- Ensuring future business sustainability.
- Continuous improvement incorporating new technologies, systems and practices.

SA Water engages with external Registered Training Organisations and universities to access accreditation and qualifications under the National Training Framework.

### 3.6.5 Asset Management Processes

At the broadest level, SA Water’s approach to asset management is to identify and quantify the relevant inputs or drivers, expose them to a series of asset management processes that transforms them into the desired customer service outputs, and to monitor the performance for feeding back through the management cycle.

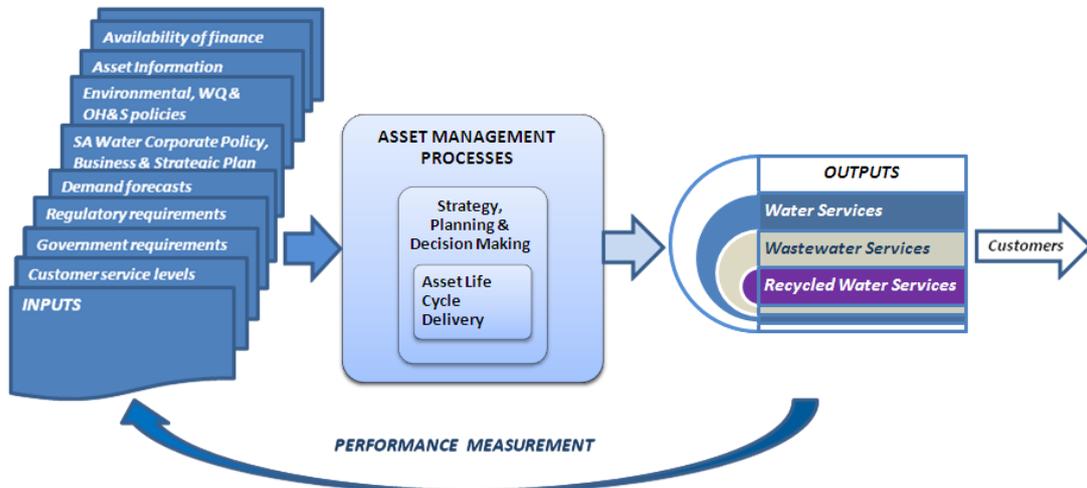


Figure 25: Asset Management Cycle

The figure below provides an indication of the type and number of interactions associated with the asset management function as performed by AMU in conjunction with other parts of the organisation.

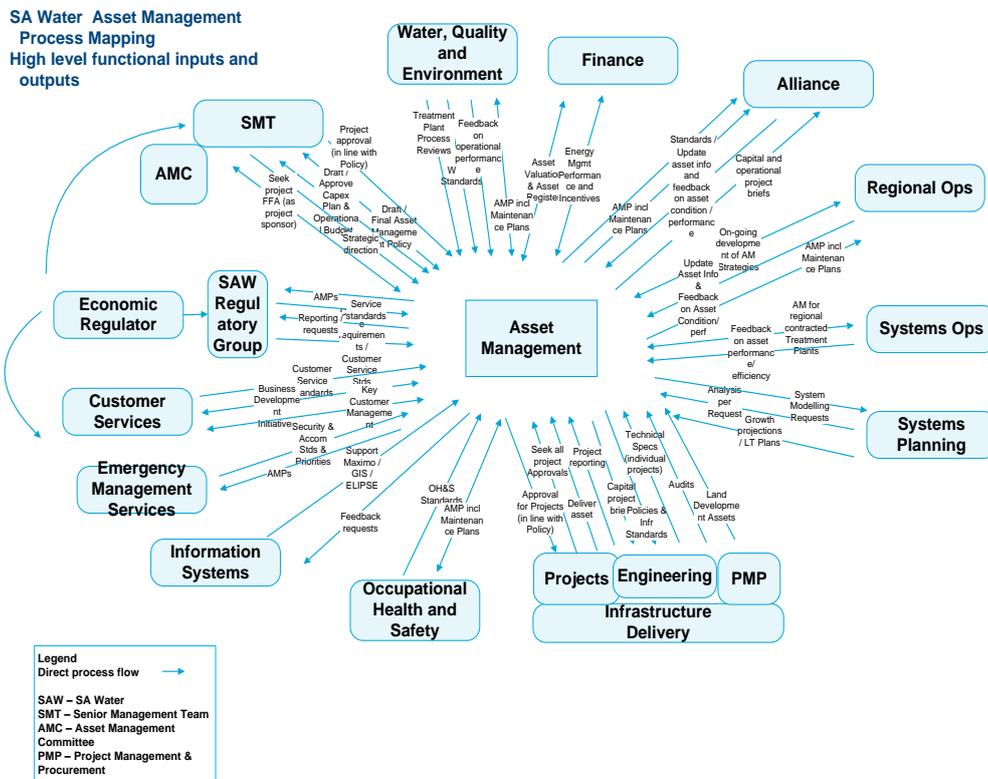


Figure 26: Asset Management Interrelationship Map

The remainder of this section provides examples of some of the key processes and also how they are managed.

### 3.6.5.1 Capital Plan Processes

Clear and effective working relationships between functional areas/departments are critical to the successful delivery of the Capital Plan requiring the coordinated involvement of various teams from within Customer Service, SPAR and AMU.

The activities that have been addressed and where there is now documentation that explains the way things work are:

- Responses to Development Applications – participants in the process include AMU, Long Term Planning and Customer Services
  - The purpose of this work is to ensure that all parties are aware of development applications for Major works and in addition have an opportunity to make comments and recommendations.
  - This has been achieved by the development of a process map, outlining how the process will work, and was supported by a 60 day pilot/trial.



Preliminary advice  
and DA process v0.5.

- Long Term Planning delivery model – participants in the process include AMU and Long Term Planning.
  - The purpose of this work is to ensure that all parties are aware of Long Term Planning projects and that they are managed appropriately.
  - This is achieved by the development of a protocol for LTP and AMU in working together for the delivery of their projects. It specifies roles and responsibilities:



RESPONSIBILITIES  
OF ASSET MANAGEMEN

- Business Development – participants in the process include Business Development (BD) and AMU .
  - The purpose of this work is to ensure that all parties understand the estimating and scoping of business development work
  - Delivery is still in progress but it is envisioned this will be in the format of a checklist to assist BD in scoping opportunities and work
- Augmentation Charges – participants in the process include: Customer Services, Long Term Planning, AMU and Finance.
  - Extensive work has been undertaken in how Augmentation charges will be changed, applied and managed in the future
  - A working group has been established to implement this change and several documents and protocols have been developed. These include: SMT papers outlining the policy changes, review of legislative requirements, process for implementing an augmentation charge, process for ongoing management (from each area involved in the project, Developer Contribution Framework.



### Management of an augmentation charge

- Pre-initiate stage - AMU has been working to improve the understanding across the business for the key tasks and activities that occur in the “Pre-Initiate” stage of a capital project’s lifecycle. This work is currently in progress.

#### 3.6.5.2 Operations Issues Register

Clear communications between AMU and Operations is particularly critical to delivery stage of lifecycle. The Operational Issues Register is a mechanism through which emerging operational issues can be lodged with AMU at any time for assessment and response. The purpose of this document is to gather important operational information regarding our Asset performance. The process is explained in the embedded document below.



~WRO0003.pdf

#### 3.6.5.3 General Stakeholder Interactions

Asset management is broader than the activities performed by these groups and many other effective relationships are required both within and outside SA Water as can be seen in Figure 26 above which illustrates at a high level the interactions required to manage the SA Water assets effectively within the current organisation structure. Proactive management of these interactions is undertaken through regular meeting with the key stakeholders facilitated by AMU in accordance with the schedule in the document embedded below.



Information sharing matrix v0 9.pdf



Information sharing sessions v0.3.pdf

#### 3.6.5.4 Key Practices

Part of documenting SA Water’s asset management system includes the next level of detail below this high level document for the more important practices. There are a number of reasons for documenting these ‘key practices’ including consistency of understanding both internally and externally, consistency of practice and as a means to facilitating improvements.

The way these ‘key practices’ are identified is through a risk assessment that identifies the top ‘raw’ risks (prior to controls being in place) associated with asset management practices. Then a document is written that states how these risks are currently managed. These are the ‘Key Practice’ documents, which are in a standard format containing the following sections:

- Background
- Current practice
- Responsibilities
- Observations
- Potential Improvements

Relevant existing documentation is embedded to clarify the process and to draw together important documents and associate it with the risk it is there to manage.

This is a relatively new process and it has only been piloted with processes led by the Asset Management Business Unit (AMU). The aim is to prove that the approach is effective without complicating it by crossing over into the other management systems already in place; i.e. EMS, WDAQMS & OHSMS.

As part of the periodic review of the AMS, consideration will be given as to the best way to extend this practice, e.g. go deeper covering more AMU managed risks or go wider covering asset management practices led by groups outside of AMU which will inevitably involved interactions with other management systems.

The top AMU led risks are identified in the table below and there are associated key practice documents for each one of these risks that are updated as and when changes occur and in any event reviewed as part of the periodic AMS review.

High Level Risk Category	Risk Theme	Top Risks Managed by AMU
<b>1. Failure of the infrastructure to deliver required Levels of Service (LOS)</b>	1. Delivered Water Quality	1. Inability to meet ADWG potentially causing sickness and injury to third parties - Water Treatment Plants
		2. Inability to meet ADWG potentially causing sickness and injury to third parties - Water Networks
	2. Continuity of water supply	3. The pipe networks do not supply the customer with continuity of water supply
		4. Water source failure (Reservoirs & Bores)
	3. Waste Water Removal & Treatment	5. Blockage or insufficient capacity in WW network resulting in overflows
		6. Odour levels cause complaints & EPA investigations
		7. WW infiltration compromises network and WWTP capacity and recycling objectives
<b>2. Failing to manage OHS&amp;W risks effectively</b>	4. Hazards encountered by AMU employees going to sites	8. Falling from tank roofs
	5. Sudden failure of infrastructure and the resultant impact on third parties outside of the service obligations captured above	9. Dam collapse and the water released causes injury and property damage
		10. High pressure water main burst in commercial area causing damage to property, loss of business etc eg NE Road
		11. Trunk WW Main collapses, manhole collapses, or educt vent failure
<b>3. Failing to develop an effective Capital Plan</b>	6. Development of the Capital Plan	12. Risk based qualitative decisions limit the robustness of the capital plan resulting in incorrect prioritisation and potentially poor choices being made
	7. Capital Rationing	13. Rationing decisions not made via a well-developed corporate capital prioritisation model, which could also detract from the case to a regulator and may lead to poor capital choices being made.
	8. Project Estimation	14. Insufficient funds available when project moves into delivery impacting current budget constraints and/or what approved by Economic Regulator (from corporate risk register review April 2012)

High Level Risk Category	Risk Theme	Top Risks Managed by AMU
<b>4. Failing to optimise whole of life asset costs</b>	9. Maintenance based on asset criticality	15. No clear maintenance strategy linked to criticality of the plant resulting in maintenance effort is not targeted to get the biggest bang for the buck
	10. Availability of asset information particularly relating to cost	16. Where costs are not allocated to the asset at the correct level, then optimising whole of life cost is unachievable. Perpetuates poor quality inputs where information not fed back using the data. Wrong decisions will be made because information is not readily available. Documents can't be found resulting in rework and inefficiency
	11. Asset Valuations	17. FAR, GIS & Maximo are inconsistent resulting in incorrect valuations impacting return on investment (from corporate risk register review April 2012)
<b>5. Failing to have adequate supporting systems in place</b>	12. Consistent Risk Management	18. Severe limitation in the ability to implement the co-ordinated comprehensive risk based approach to asset management dictated by SAW's AM Policy
	13. AMS and an associated improvement plan	19. Inability to prove that asset management is being run effectively in SAW and that there is a rationale for improvement
<b>6. Failing to get the best from our people</b>	14. Lack of clearly defined roles and interactions with key stakeholders	20. Risk of poor outcomes and being viewed as, or actually being, ineffective, because AMU does not have clearly defined and agreed working roles and arrangements (or exchanges) with key stakeholders, thus making it more difficult to develop and maintain good working relationships with those stakeholders.
	15. Lack of Role Clarity and cohesive leadership	21. Activities get missed or worked on twice and a single consistent outcome is unclear Tension and difficulties arise through lack of clarity
	16. Role and Effectiveness of Project Sponsor	22. Risk of poor project outcomes because Project Sponsors do not have clear roles and do not carry out those roles effectively
	17. Risk of Knowledge loss and gaps	23. Lack of business continuity due to knowledge residing in one or two people, little knowledge documentation and lack of succession planning

Table 11: Top AMU Managed Risks

## 4 Asset Management Documentation

- Improvement of AMS documentation has recently been identified as a priority.
- There are a suite of documents that are considered to be key in describing SA Water’s AMS including this document, Asset Management Plans, Asset Programs and Asset Management Key Practices.

### 4.1 Overview

The practice in SA Water has been to focus its limited resource on achieving good outcomes at the expense of high quality documentation. This fact has been recognised and reflected in past WSAA Asset Management Improvement projects, ie 2008 and 2012 (initial findings). Consequently the existing documentation does not always reflect the maturity and sophistication of the existing practices.

It is recognised that there are now compelling reasons to improve this situation; eg the requirement for external parties to easily understand current practices as part of economic regulation, and the forecast increase in staff turnover. Consequently the situation has been addressed in the past few months and that will continue to the point it reaches the desired standard.

### 4.2 Key Documents

The schematic below shows the documents that are currently considered to be key to describing the main components of SA Water’s AMS.

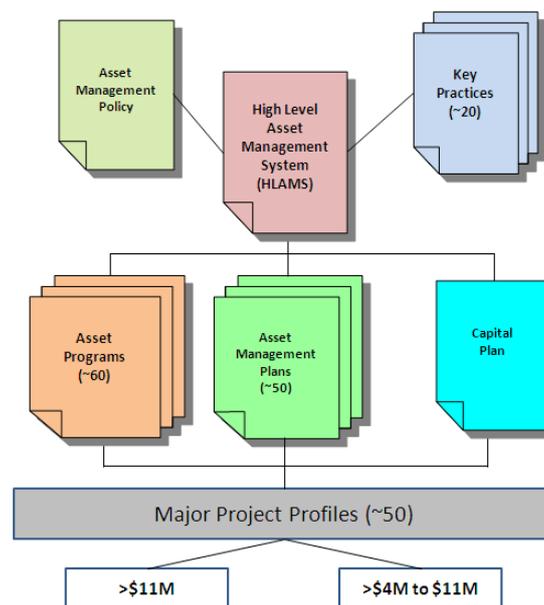


Figure 27: Document relationships

The **High Level AMS** is this document and its purpose is to explain how everything fits together and it covers standards management system content.

The **Asset Management Policy** makes the connection between the corporate strategies and the asset management practices

**Key Practices** provide the next level of detail beneath the High Level AMS for the top risks managed by the Asset Management Business Unit. There are about 20 separate documents.

**Asset Programs** essentially provide an asset class view of the way the assets are managed and contain a 25 year view of the associated forward expenditure. There are about 60 separate documents.

**Asset Management Plans** provide a facility and network view including the associated service level requirements of that particular asset together with the expenditure profile that is the same and different cut of that provided in the Asset Programs

**Capital Plan** is a single document where all the capital expenditure for SA Water is drawn together for the next 25 years.

**Major Project Profiles** are significant and individual projects that are contained in all three documents and that warrant more detail justification and explanation. They are split into two financial categories above >\$11M and between \$4-\$11M. There are about 30 separate documents for the >\$11M project and a single document that contains summaries for about 20 \$4M -\$11M projects for the first regulatory business proposal period.