Strategic Asset Management Plan

Published: September 2024

Sydney WATER

Acknowledgement of Country

Sydney Water acknowledges the Traditional Custodians of the lands and waters in Sydney, the Illawarra and the Blue Mountains – the places where we work, live and learn: the Dharawal, Gundungurra, Darkinjung and Dharug nations. Their lore, traditions and customs nurtured and continue to nurture the waters, saltwater and sweetwater, within Sydney Water's operating area, creating wellbeing for all. We pay our respect to Elders, past and present, and acknowledge their continuing connection to land, water and community and the importance of their waterway management, shared through storytelling over the millennia.

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Introduction

1. Introduction

The purpose of the Strategic Asset Management Plan (SAMP) is to clarify intentions, priorities, and practices to be adopted. It takes a long-term view and considers the combination of organisation needs, stakeholder expectations and the realities of existing assets and asset management capabilities.

The development of this SAMP has involved:

- Converting Sydney Water's strategic objectives and stakeholder obligations into Asset Management Objectives (AMOs).
- Outlining the approach for developing management plans.
- Describing the role of the Asset Management System (AMS) in supporting Sydney Water's vision.
- Communicating the concepts of asset and system performance, risk management and planning approaches aligned to risk, cost and performance decision making.

The SAMP is a central document within Sydney Water's document hierarchy as shown in Figure 1.

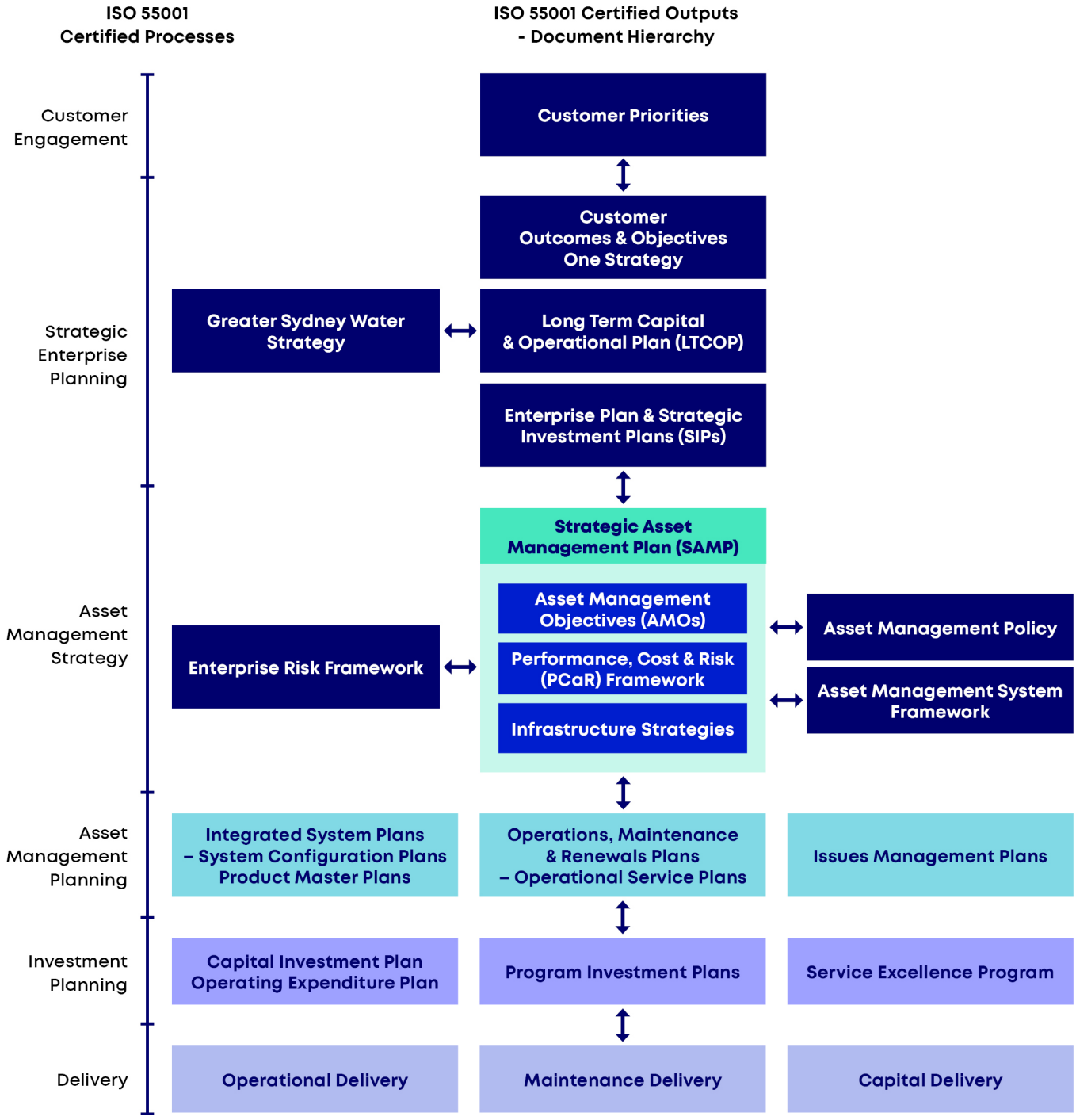


Figure 1: Document Hierarchy

1.1 SAMP overview

Figure 2 provides an overview of the structure of the SAMP with high-level descriptions for each section of the document.

1.2 SAMP Scope

This SAMP applies to Sydney Water's System and Asset Portfolio which provides services including the supply of water, wastewater, stormwater and recycled water to 5.3 million customers. This includes water supply to 2,105,719 properties and wastewater removal from 2,055,860 properties[1].

The scope of the SAMP includes two components:

- Asset Portfolio: All of Sydney Water's infrastructure assets are covered by this document, including water, wastewater, stormwater, and recycled water assets. Property and digital assets will be incorporated in the future. Refer to Table 6.
- Asset Management System (AMS): The scope of the AMS itself is described in Section 5.2 - Asset Management System Scope.

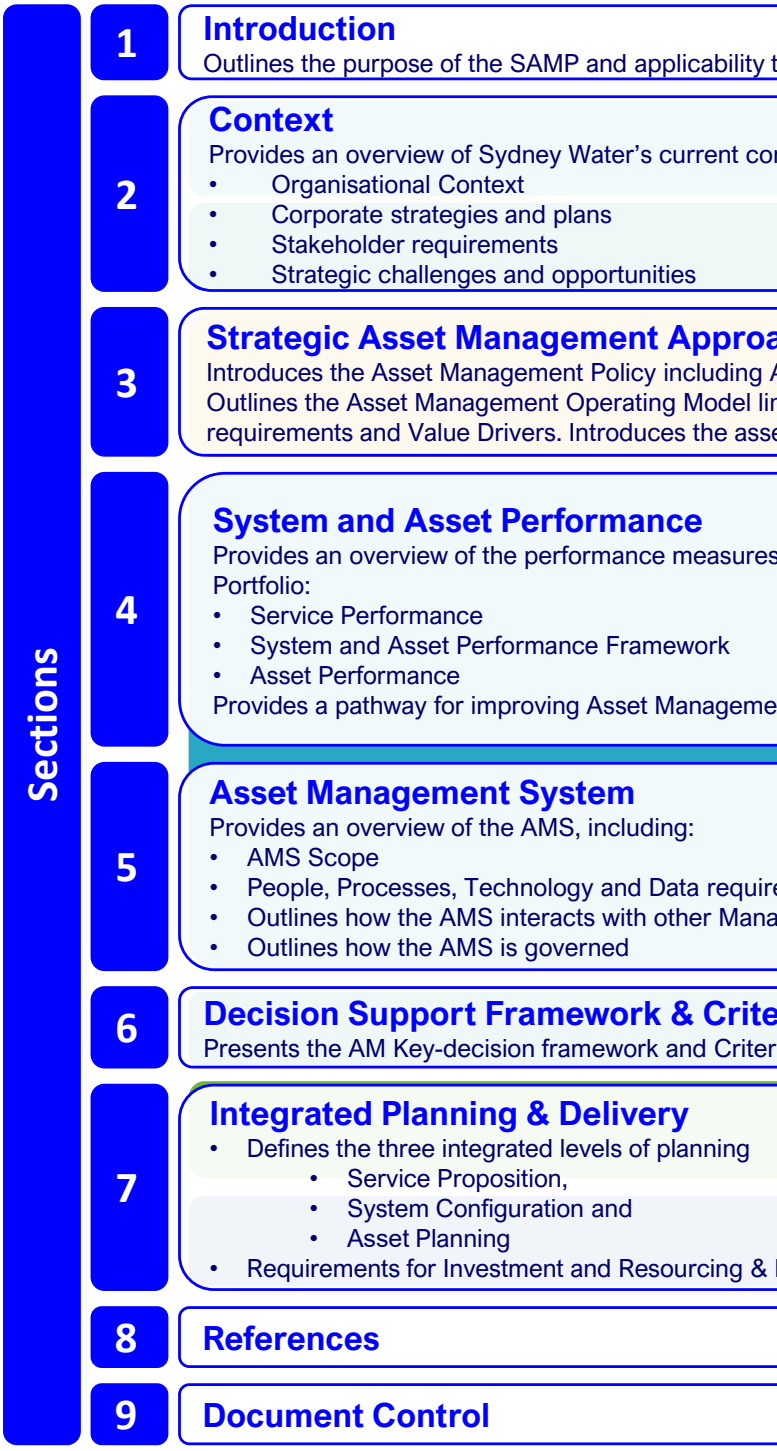
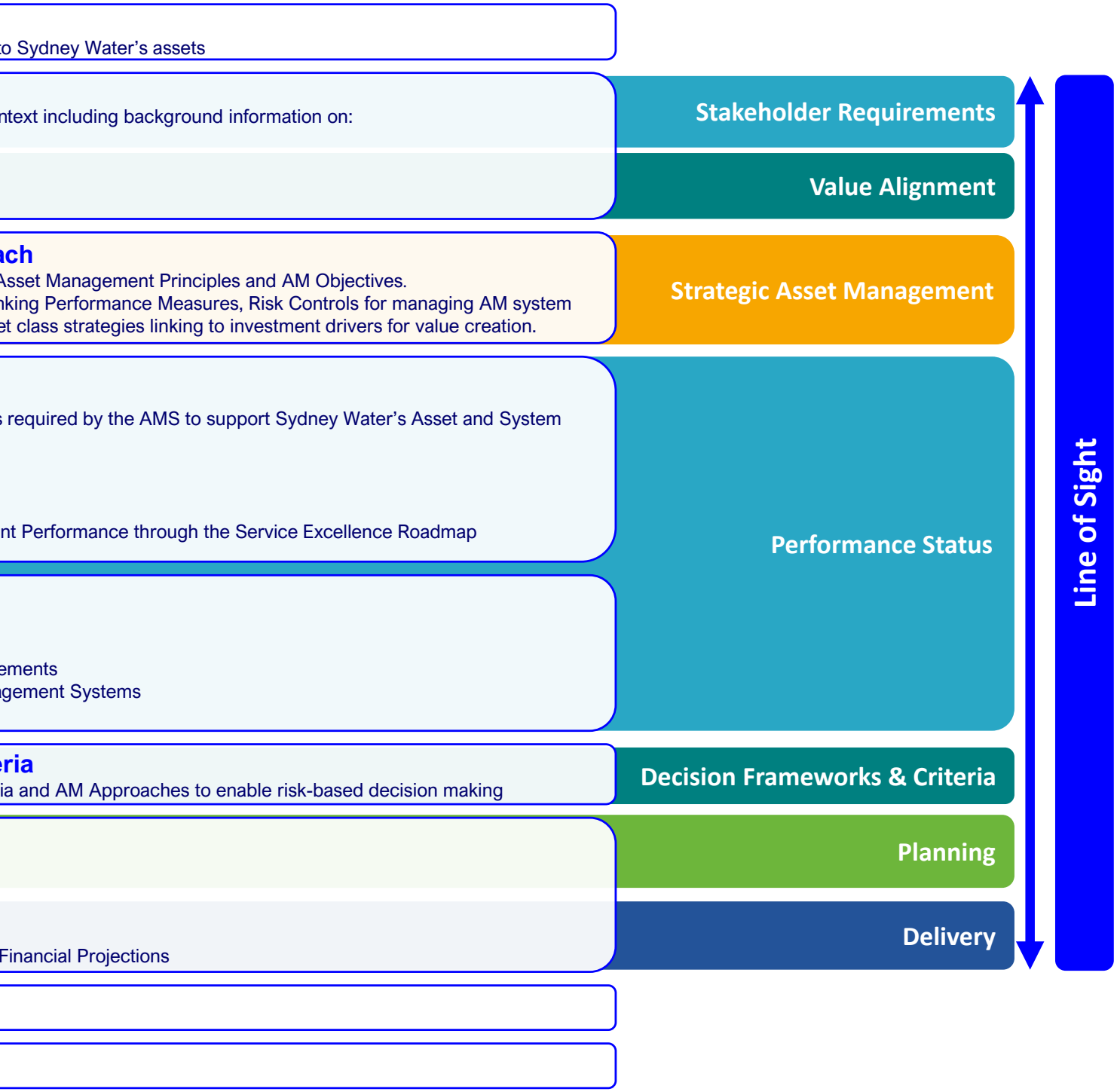


Figure 2: SAMP Overview

1 Sydney Water Annual Report 2021-22 p17


to Sydney Water's assets
ntext including background information on:
Stakeholder Requirements
Value Alignment
ach
Asset Management Principles and AM Objectives.
nking Performance Measures, Risk Controls for managing AM system
et class strategies linking to investment drivers for value creation.
Strategic Asset Management
s required by the AMS to support Sydney Water's Asset and System
nt Performance through the Service Excellence Roadmap
Performance Status
ements
gement Systems
eria
ia and AM Approaches to enable risk-based decision making
Decision Frameworks & Criteria
Planning
Delivery
Financial Projections
Line of Sight

Sydney Water's infrastructure assets are part of its physical service delivery system (Figure 3), which can be segregated into three core business areas:

1. **Water delivery system –** management of water treatment and transfer network including treatment plants, trunk pipelines, pump stations and storage reservoirs for the maintaining supply to reticulated customers.
2. **Reticulation network and customer management –** management of the distribution of water through the reticulation network from the bulk system to the customers, and removal of sewage from the customers to the bulk sewage system, and the interfaces with the customer both physical and virtual.
3. **Sewage transfer system –** management of the transfer, treatment for reuse and disposal of sewage and the by-products of the process, including major gravity trunk network, pumped transfer systems, treatment plants and disposal of solids and liquids.

Sydney Water's infrastructure assets are situated within its area of operations as shown below. Its operating area covers Sydney, Illawarra, and the Blue Mountains as illustrated in Figure 4.

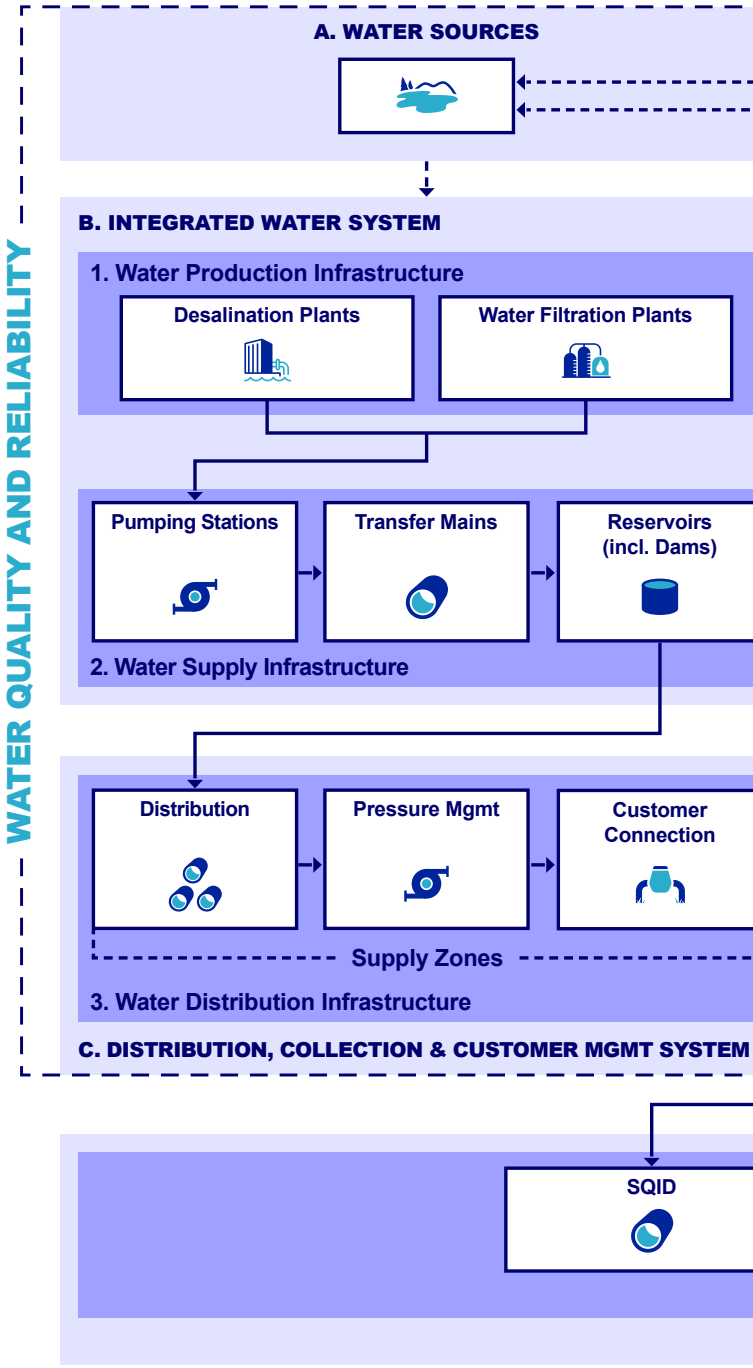


Figure 3: Sydney Water's physical service delivery system

2 Commonly defined as sub 300mm pipes

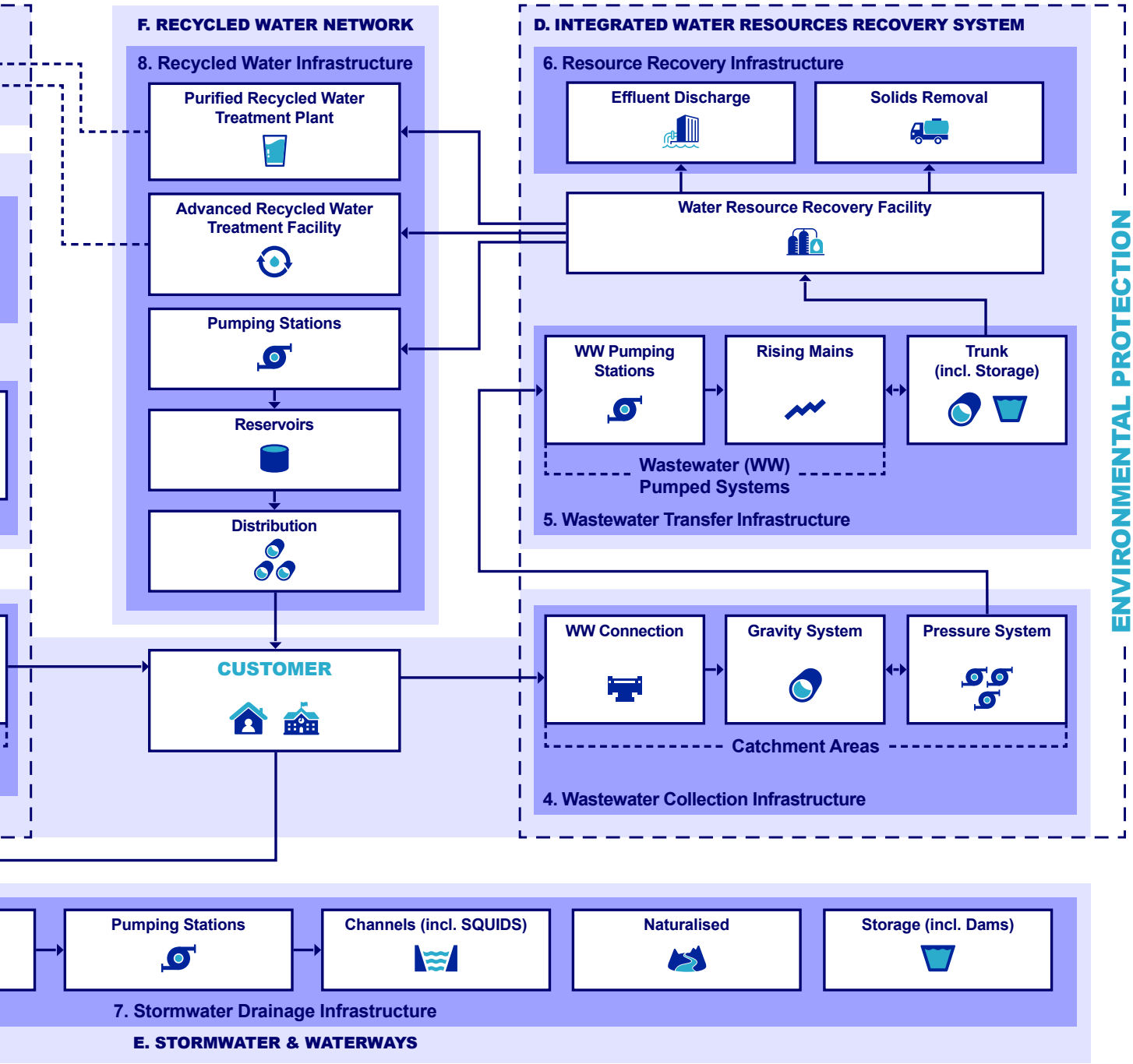
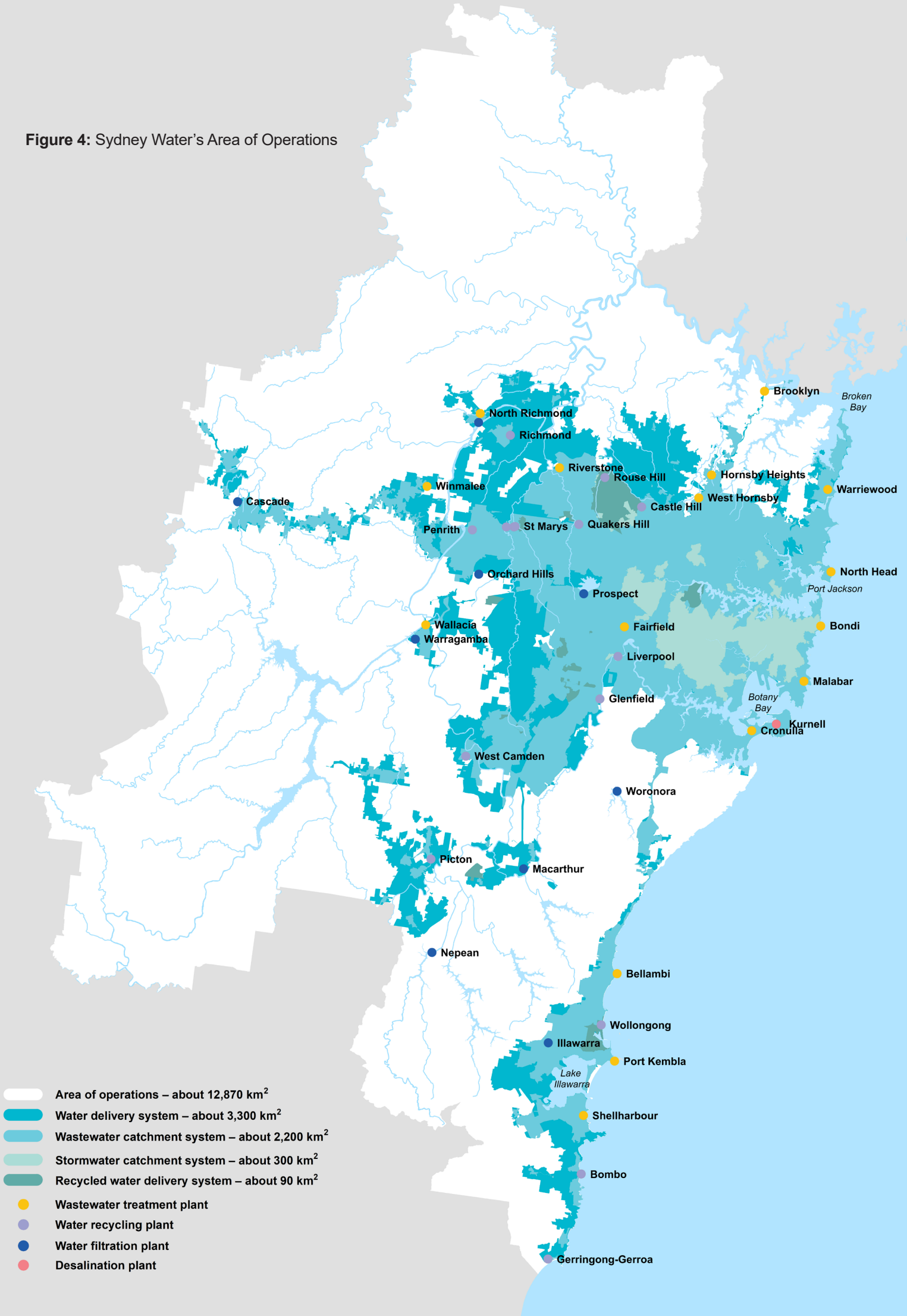

F. RECYCLED WATER NETWORK
8. Recycled Water Infrastructure
Purified Recycled Water Treatment Plant
Advanced Recycled Water Treatment Facility
Pumping Stations
Reservoirs
Distribution
CUSTOMER
D. INTEGRATED WATER RESOURCES RECOVERY SYSTEM
6. Resource Recovery Infrastructure
Effluent Discharge
Solids Removal
Water Resource Recovery Facility
WW Pumping Stations
Rising Mains
Trunk (incl. Storage)
Wastewater (WW) Pumped Systems
5. Wastewater Transfer Infrastructure
WW Connection
Gravity System
Pressure System
Catchment Areas
4. Wastewater Collection Infrastructure
ENVIRONMENTAL PROTECTION
Pumping Stations
Channels (incl. SQUIDS)
Naturalised
Storage (incl. Dams)
7. Stormwater Drainage Infrastructure
E. STORMWATER & WATERWAYS

Figure 4: Sydney Water's Area of Operations



02

Context

2. Context

2.1 Organisational Context

Sydney Water is a New South Wales (NSW) Government owned statutory corporation that provides essential water, wastewater, recycled water, and stormwater services to over five million customers across Sydney, the Illawarra, and the Blue Mountains. Sydney Water's assets reflect the development and growth of Sydney itself, as stakeholder requirements continuously evolves. At the core of Sydney Water is the vision to create a better life for Greater Sydney with world-class water services.

Sydney is primarily supplied by of one of the world's largest per-capita water supplies, Warragamba Dam, which was constructed in the 1960s to address the growth requirements of the city. WaterNSW (formerly The Sydney Catchment Authority) was established in 1999 to manage Sydney's dams and catchment areas. WaterNSW sells raw water to Sydney Water for treatment and delivery to customers across Sydney, the Blue Mountains, and the Illawarra.

In accordance with the Sydney Water Act 1994, expectations for downward pressure on prices maintains Sydney Water's focus on efficiency improvement. The first private water licence was issued in 2009 following the introduction of the *Water Industry Competition Act 2006.*

With climate change impacting rainfall patterns and quality of the raw water for treatment, Sydney Water is focussing on improving the climate independence of its water supplies in order to increase the resilience of the system, as directed by the Greater Sydney Water Strategy. To achieve this, dam supply is being augmented with a range of initiatives including desalination, wastewater recycling and sophisticated water efficiency measures.

In addition to resilient water supply, the Greater Sydney Water Strategy (Greater Sydney Water Strategy | Water (nsw.gov.au)) sets out a range of objectives including enhancing the city's waterways and liveability and delivering a carbon neutral water system.

Sydney Water is proud to deliver essential services to the community and is committed to continually improving performance through understanding and responding to customer expectations and meeting the challenges of a growing population, climate change and competition.

2.2 Corporate Strategies and Plans

Sydney Water's Strategy provides a high-level overview of what Sydney Water aims to achieve by 2030. As displayed in Figure 5, at the heart of Sydney Water's corporate strategy is the vision of creating a better life with world-class water services. Supporting this vision are five key strategic outcomes:

1. Customer Experience
2. Water Quality and Reliability
3. Environmental Protection
4. Accountable, agile, innovative culture
5. Successful and sustainable business

The first three strategic outcomes outline what Sydney Water aims to achieve in developing a customer focused water, wastewater, recycled water and stormwater business. The remaining two outcomes are organisational enablers that support our three customer outcomes, outlining 'how' to enable our business to deliver our customer outcomes.

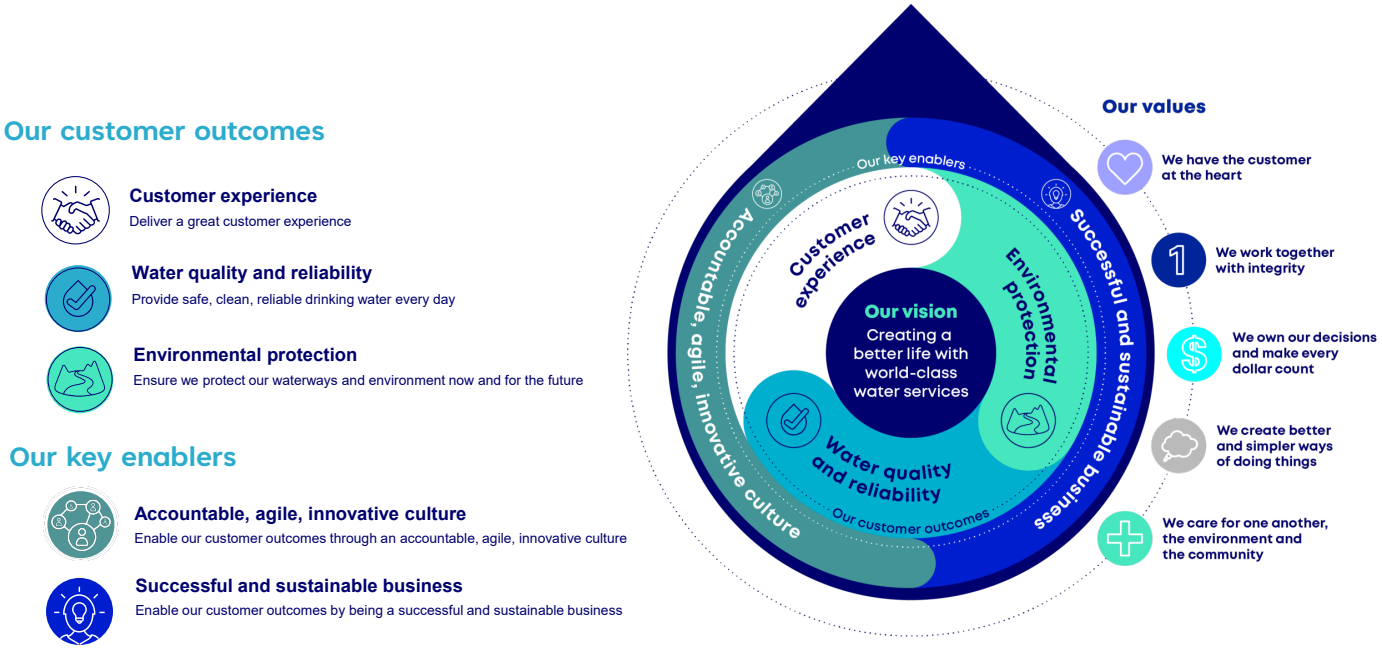


Figure 5: Sydney Water's Corporate Strategic Outcomes

2.3 Stakeholder Requirements

As a regulated monopoly, Sydney Water's service scope is defined by the requirements of several key stakeholder groups (note: where the term 'stakeholder' is used it refers to this collective group unless otherwise stated):

- Federal and State Government
- Regulators
- The wider community
- Residential customers
- Commercial customers
- Developer customers

Sydney Water's role is to develop, manage and operate the service delivery systems in a way that meets both our regulatory requirements and the needs of our customers, while considering the broader agendas of the community and government (Figure 6).

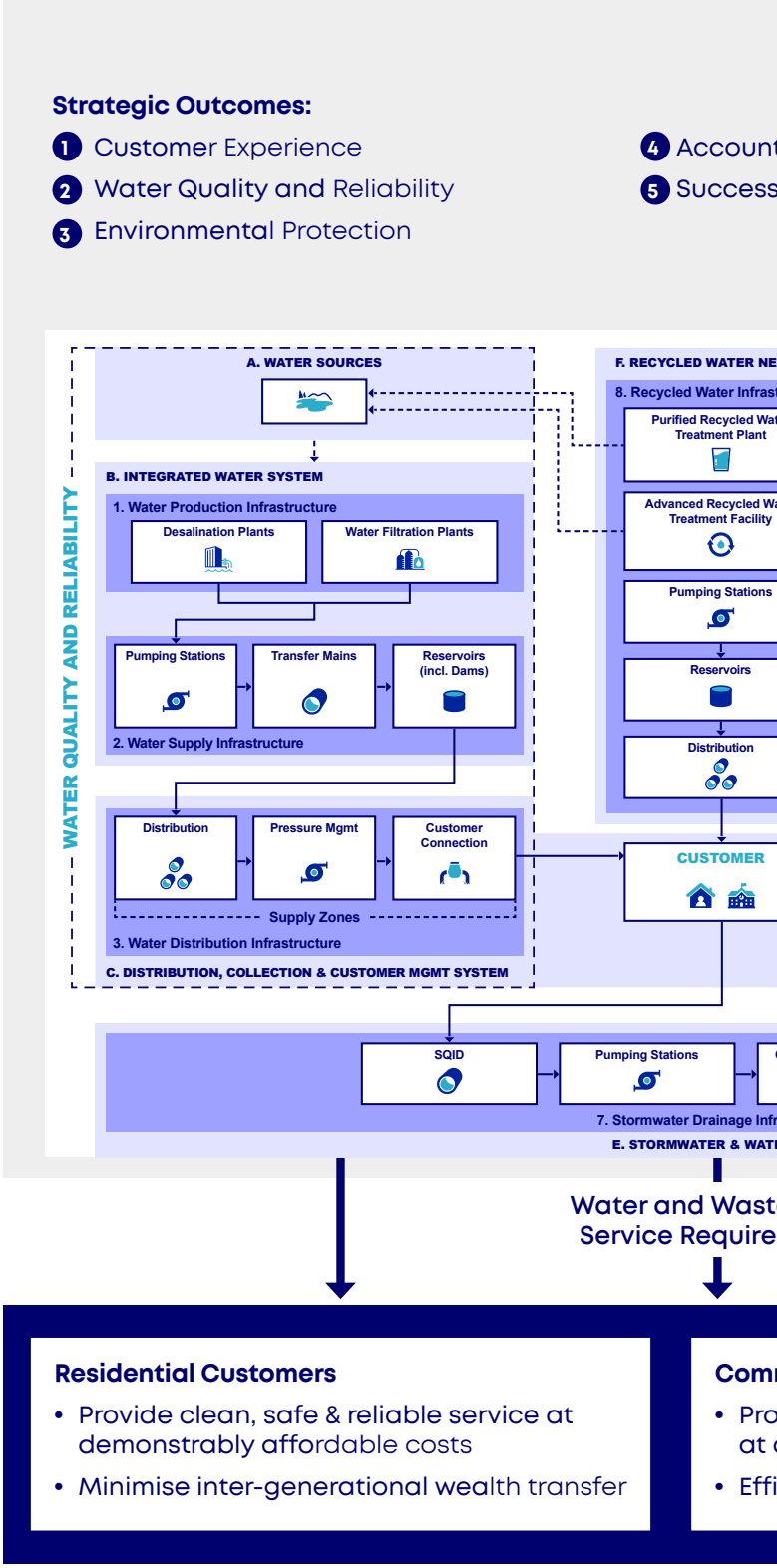
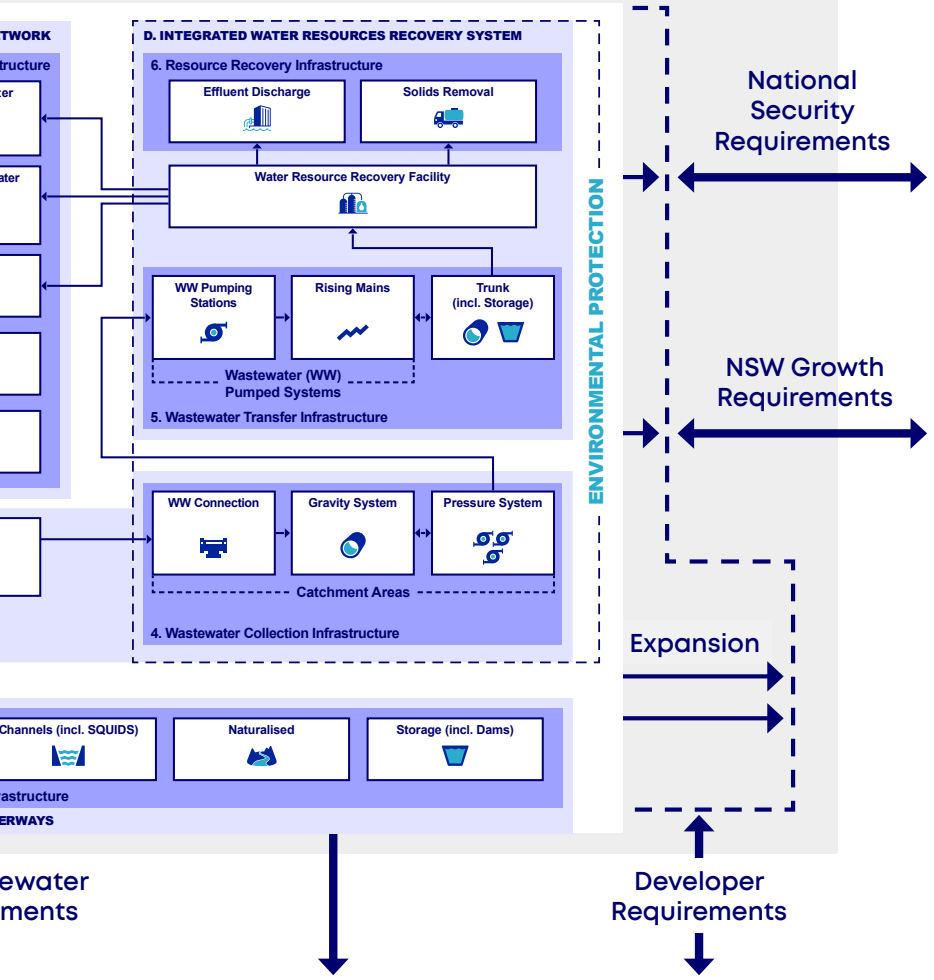


Figure 6: Example of the interaction between Sydney Water's Co

table, agile, innovative culture

sful and sustainable business



National Security Requirements

NSW Growth Requirements

Expansion

ewater
ments

Developer Requirements

Key Stakeholders

Federal & State Government

Alignment with the broader Federal and State objectives, including:

- Compliance with the SOCI Act 2018
- Meet climate change targets
- Service a growing economy
- Develop resilient water systems
- Develop green and liveable cities
- Protect the health of waterways and landscapes
- Provide water management and services that meet community needs

Regulators

Compliance with the requirements set by regulatory bodies, including:

- IPART operating license
- Australian Drinking Water Guidelines
- Environmental Protection Licenses

Community Requirements

mercial Customers

ovide clean, safe & reliable service
demonstrably affordable costs
cient trade waste processes

Developers

- Timing certainty
- Process efficiency

Value Makers

Community

rporate Strategy, stakeholder requirements and physical service delivery system Interact

2.3.1 Customers

Sydney Water has direct responsibility for developing strategies, and delivering the service requirements of its customers both now and in the forward planning window, in a way which minimises inter-generational wealth transfer:

- Commercial customers:
  - Provide clean, safe and reliable services at demonstrably affordable costs.
  - Provide efficient trade waste services.
  - Provide efficient customer service and support.
- Residential customers:
  - Provide clean, safe and reliable customer outcomes at demonstrably affordable costs.
  - Provide efficient customer service and support.
- Developer customers:
  - Providing timing certainty on the delivery of growth infrastructure.
  - Driving process efficiency in the service interactions with developers.

2.3.2 Community and Government Stakeholders, including Regulators

In servicing Community and Government stakeholders, Sydney Water's role is to:

- Work with the Community stakeholders to determine Sydney Water's ongoing role in meeting current and emerging community needs.
- Deliver solutions that meet Government and Regulator stakeholder requirements cost-effectively, including:

Federal Government: has objectives pertinent to Sydney Water operations, including:

- Security: Compliance with the Security of Critical Infrastructure (SOCI) Act 2018.
- Climate: Supporting the achievement of Australia's goals to reduce the impact of activities on the global climate.
- Social and economic: Supporting the development of Australia's society and economy.

State Government:

- Policy: State economic and environmental objectives by providing clean, safe, reliable water management and services that address:
  - The community's water and wastewater system resilience requirements,
  - The development of green and liveable cities,
  - The protection and improvement in the health of waterways and landscapes,

    And other State Government objectives in line with the NSW's Government's Statement of Expectations for Sydney Water.
- Regulatory: Operating requirements set by the Sydney Water Act 1994, other Acts and associated regulatory bodies including:
  - The Independent Pricing and Regulatory Tribunal (IPART) – Operating Licence.
  - The Environment Protection Agency (EPA) – Environmental Protection Licence(s).
  - New South Wales Health (NSW Health) – Australian Drinking Water Guidelines.

2.4 High Level Strategic Challenges

Sydney Water is faced with three key strategic challenges:

1. Understanding the long-term stakeholder and operating environment requirements by engaging:
   - Customers and the Government – to understand evolving community requirements, and develop the most effective solutions to deliver on the requirements.
   - Regulators – to understand the regulatory environment over time to support the delivery of the required solutions.
2. Designing the long-term system configuration required to meet evolving community needs, as driven by external factors including:
   - Federal and State resilience requirements – there currently exists major single points of failure, such as the Prospect supply system, which exposes a security risk at a Federal Government level (SOCI Act 2018).
   - Climate change and tightening environmental requirements – extreme weather (i.e., droughts and flooding) is pushing Sydney Water to adopt more climate independent supply and sewage management, and methods of improving system connectivity to ensure water supply security.
   - Advancements in water cycle management approaches and technologies that allow for improved long run service delivery outcomes. E.g., Modern sewage treatment technologies that reduce the risk and cost of the sewage transfer system and creates a climate independent water supply option.
   - Changing customer demographics and expectations – Addressing the evolving customer service expectations in the face of population growth and changes in urban form.
3. Determining the optimal operational management practices to maintain efficient service delivery on ageing infrastructure, whilst supporting efficient transition to the long-term system configuration.

2.5 The Asset Management Planning Approach

The asset management planning approach focuses on the following three key aspects to respond to the high-level strategic challenges discussed in Section 2.4:

1. Maintaining alignment between asset management approaches and:
   - Evolving stakeholder requirements (see Section 2.3).
   - Long-term system configuration plans (e.g., the way in which a rising main is managed will differ depending on plans to decommission or to expand).
2. Supporting the creation and integration of new assets:
   - Provide input into the capital delivery process to ensure the assets to be created are operable and maintainable.
   - Develop asset management plans to ensure smooth integration of new assets into existing service delivery systems.
3. Supporting the implementation of asset management approaches and driving continuous improvement:
   - Ensure the asset management plans are implemented in a way that delivers service outcomes aligned with stakeholder requirements.
   - Develop performance monitoring systems to drive continuous improvement in asset management approaches.

This approach aligns with three integrated levels of planning required to support efficient service delivery (further explained in Section 7).

2.6 Asset Management Strategic Challenges and Opportunities

The high-level strategic challenges outlined in Section 2.5 translates into the following challenges and opportunities for Asset Management.

2.6.1 Water Delivery, Sewage Transfer, and Stormwater Systems

Asset Management determines the optimal management approach for transitioning to the future integrated water cycle management system configuration and maintaining service on the existing water, sewage, recycle water and stormwater assets in a manner that supports a cost-effective transition to the new configuration.

There are two key areas of focus for Asset Management:

1. Supporting the design of a cost effective, operable integrated water, sewage, recycle water and stormwater system that is able to deliver on the future combined requirements of resilience, environmental and community outcomes as set out by the stakeholders and regulators.
    - Driving an understanding of the alternative approaches to integrate the systems to achieve the optimum solution for delivering integrated water cycle management, particularly managing the trade-off between the cost of source, treatment and transport – e.g., balancing the role of the potable network, recycled water and stormwater management to achieve the urban liveability and waterways health objectives reliably and efficiently.
    - Ensuring that the operating implications/ costs of the new infrastructure are clearly incorporated in the development of the new configuration.
    - Developing consistent and effective asset management and maintenance approaches to support efficient transition to operation of the new configuration.
2. Operating the existing infrastructure in a way that maintains efficient service delivery in the short and medium term while supporting the transition to the new configuration.
    - Developing improved asset management approaches to address the complexities of maintaining service on aging infrastructure.
    - Developing a transition management approach to maintain service on assets that will become redundant in the future configuration at low long-term capital cost.

2.6.2 Pipe Network

The main challenge facing the pipe network is to maintain services with an increasingly aging infrastructure. Unlike the bulk system where there is likely to be significant change in the asset configuration as Sydney Water moves to integrated water cycle management, the configuration of the reticulation networks is unlikely to change significantly in the foreseeable future. As a result, Sydney Water needs to develop a long-term approach to maintaining service on aging reticulation network.

In the 20th century, the reticulation networks were operated on a ‘run-to fail, then replace’ management approach. This primarily responsive approach was applied across the reticulation network. As the majority of the infrastructure was relatively new with low failure rates, this approach was effective because the cost of collecting and assessing network condition and performance data far exceeded the value of the data.

In the last 25 years, the proportion of network entering high performance risk has doubled from 25% to 50% (Figure 7), resulting in a steady increase in failure rates (performance risk) in the geographies where aging network is prevalent. This increased performance risk necessitates a change in the approach to maintaining service levels cost effectively across the service area.

3 Reticulation pipes are those that are < 300 mm
4 Over 70% of network was installed between 1950 and 2000 with an expected life of 70 – 90 years
5 Over 50 years old

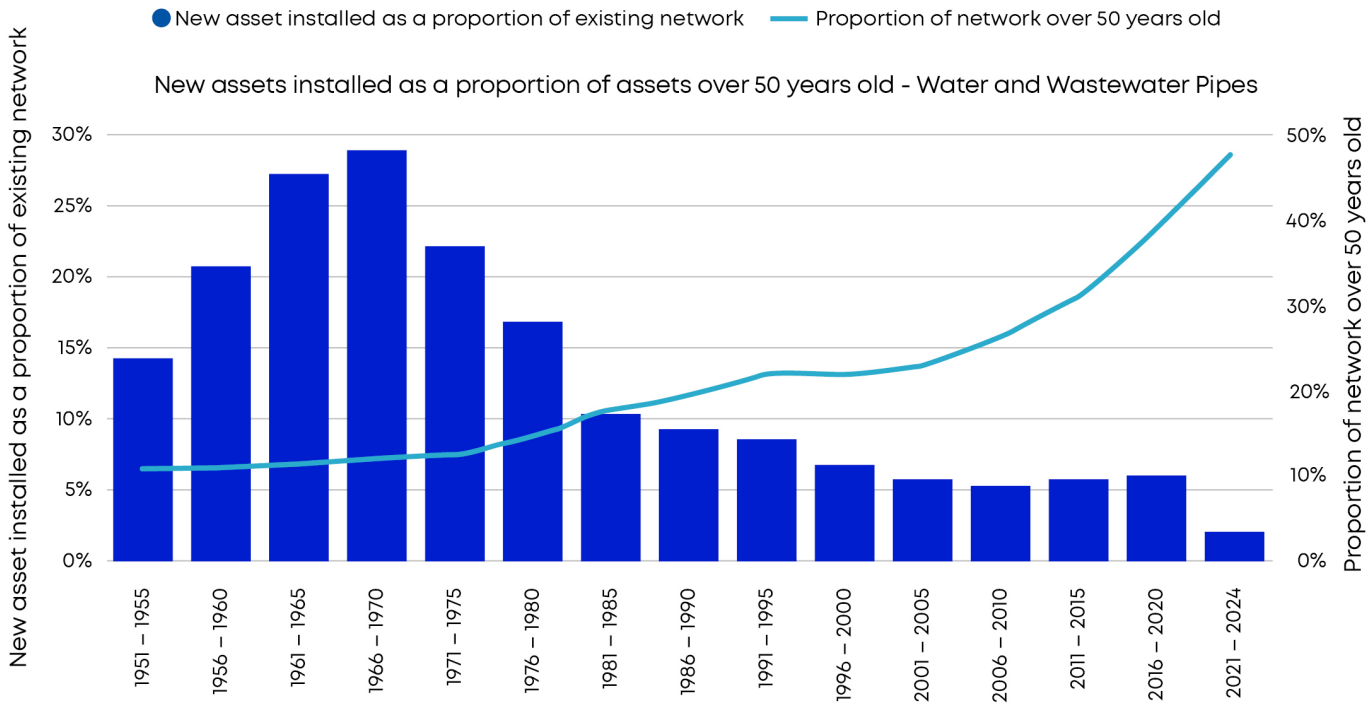


Figure 7: Water & wastewater network exmple[6]: Profile of the reticulation network showing the proportion of new network and network over 50 years old.

To maintain service on ageing pipe network infrastructure, there are two key areas of focus for Asset Management:

1. Improving performance certainty across the network by:
   - Using historical asset performance data to triage the network into high, medium and low performance risk areas.
   - Assessing the potential of emerging information capture technologies to provide cost effective fault monitoring of high-performance risk areas and deploying where appropriate.
2. Developing improved fault management approaches to cost effectively maintain service levels:
   - Working with operators to reduce the number of faults induced by operational practices (e.g., valve operation, pressure management).
   - Leveraging asset performance monitoring data to improve early identification and rectification of faults before they become disruptive, in order to minimise customer disruption and non-revenue water[7] (NRW).
   - Developing renewals decision support frameworks to focus asset renewal on addressing known condition issues.

6 Over 70% of network was installed between 1950 and 2000 with an expected life of 70 – 90 years
7 Non-revenue water (NRW) refers to the water lost during the distribution to customers due to faults in the system (e.g., leaky pipes)

03

Strategic Asset Management Approach

3. Strategic Asset Management Approach

The strategic asset management approach outlined in this SAMP is consistent with Sydney Water's organisational strategy and the Asset Management Policy. The SAMP will guide decision-makers in selecting the optimal approach to address asset management strategic challenges and opportunities.

3.1 Asset Management Policy

The Asset Management Policy outlines Sydney Water's Asset Management Principles, Asset Management Objectives (AMOs) and Measures. These are governing artefacts which reinforce the importance of good asset management practices to achieve Sydney Water's strategic blueprints.

3.1.1 Asset Management Principles

The Asset Management Principles aim to establish accountability and an effective internal control structure for the Asset Management System. The eleven Asset Management Principles have been mapped to the Key Result Areas (KRAs) in Table 1 to demonstrate how the principles can be achieved through focusing on KRAs.

Table 1: Asset Management Objective Mapping

		KRA 1	KRA 2	KRA 3	KRA 4	KRA 5	KRA 6
Asset Management Principles		**Customer & Stakeholder Engagement**	**Zero Harm**	**Regulatory Compliance & Sustainable Operations**	**Cost, Risk & Performance Optimisation**	**Optimal Lifecycle Cost**	**Risk, Controls & Process Excellence**
01	Ensure safe, reliable, and sustainable services for the benefit of current and future generations through both asset and non-asset solutions.	✓	✓			✓	
02	Consult with relevant internal and external stakeholders in deciding the level of service that drive customer and stakeholder satisfaction and willingness to pay.	✓					
03	Manage assets for lowest lifecycle cost to achieve desired level of service and acceptable risk.		✓		✓		
04	Comply with legislation, regulations, licences, policies and Sydney Water's management systems.			✓			✓
05	Ensure clear roles and accountability for staff to manage our assets and services.						✓
06	Build and maintain the capabilities necessary to execute the accountabilities effectively and efficiently.			✓			✓
07	Manage information to enable asset management activities and decision making.	✓	✓	✓	✓	✓	✓
08	Seek to continually improve by monitoring performance and benchmarking.		✓		✓		✓
09	Meet internal strategies, management systems, policies, and supporting direction setting documentation relating to Sydney Water efficient services.			✓	✓	✓	✓
10	Develop and implement innovation where it enhances our services and outcomes.		✓	✓			✓
11	Ensure our systems, are resilient to continue services to our customers while our operating environment varies, which includes climate change.	✓	✓	✓	✓	✓	✓

3.1.2 Asset Management Objectives

Sydney Water's Asset Management Objectives are derived from Sydney Water's Vision, Strategic Outcomes and Key Result Areas as illustrated in Figure 8. This SAMP further describes how these AMOs are monitored against Service Performance KPIs and Investment Outcomes in Sections 4.3.1 and 7.4.1 respectively.

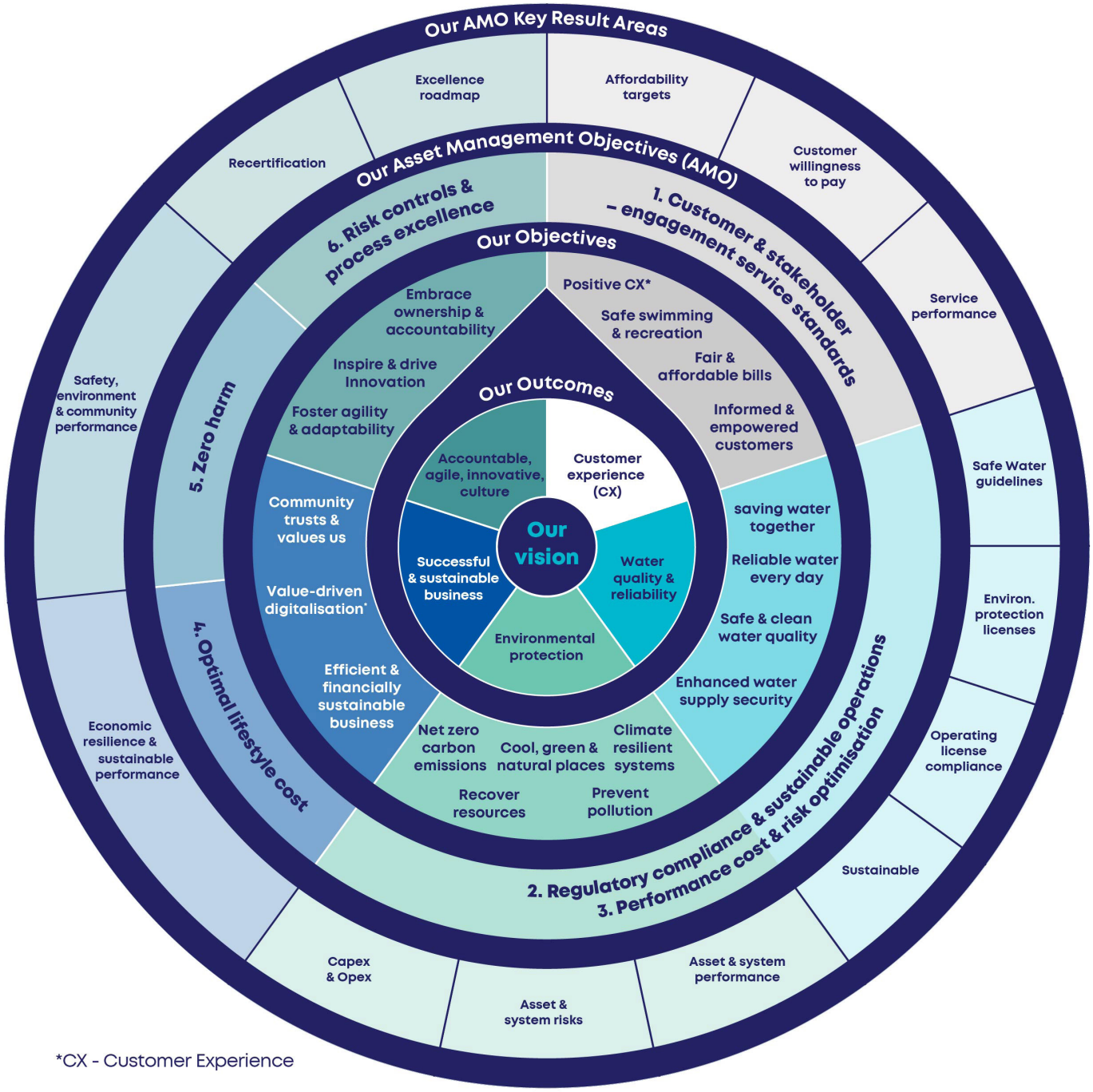


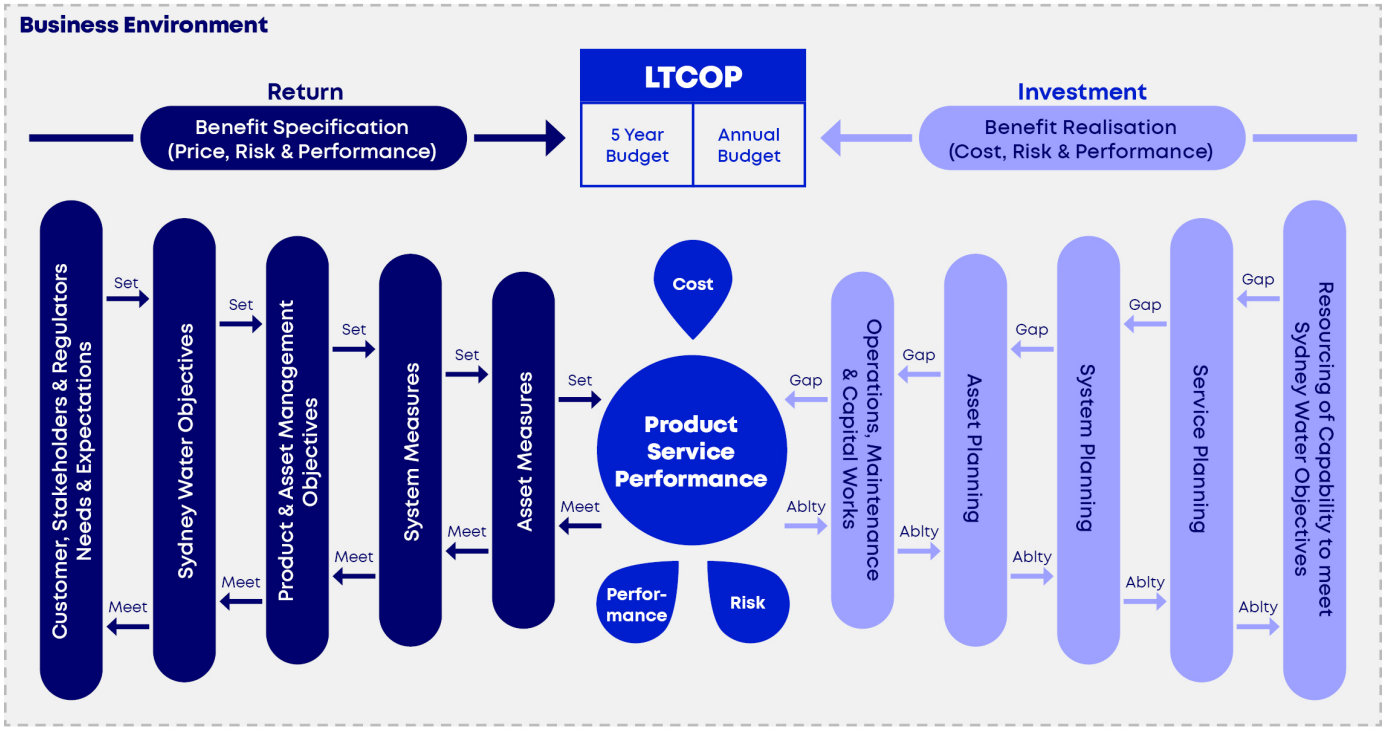
Figure 8: Asset Management Objectives (AMO) and Measures

The six Asset Management Objectives are:

1. **Customer and Stakeholder Engagement – Service Standards:** We will engage with customers and stakeholders to set service standards and manage our assets to ensure customer satisfaction.
2. **Regulatory Compliance and Sustainable Operations:** We will comply with relevant regulatory requirements or obligations and operate in a sustainable manner.
3. **Cost, risk, and Performance Optimisation:** We will optimise programs of investment to balance performance, cost and risk for customer outcomes.
4. **Optimal Lifecycle Cost:** We will manage our assets to ensure that capital and operating decisions optimise lifecycle costs.
5. **Zero Harm:** We manage our assets so that there is zero harm.
6. **Risks, Controls and Process Excellence:** We will understand the risks and opportunities at the strategic, technical, and operational levels by achieving Asset Management process excellence.

3.2 Asset Management Operating Model

Sydney Water's Asset Management Strategy considers asset 'Performance, Risk and Value (Cost)' measures as illustrated in the Asset Management Operating Model (Figure 9). Understanding the Performance, Risk and Value (Cost) associated with managing Sydney Water's assets enables decision-makers to make optimal decisions as described in more detail in Section 6. This Asset Management Strategy ensures that the Asset Management Objectives are achieved through excellent Product and Service Performance with support from an Asset Management System aligned with ISO 55001:2014 which specifies the requirements for an Asset Management System within the context of the organisation as outlined in 5.



Legend Ablty - Capability | LTCOP - Long Term Capital and Operating Plan

Figure 9: Asset Management Operating Model

3.2.1 Performance Measures

Performance Measures or Key Performance Indicators (KPIs), shown on the left-hand side pillar in Figure 9, stem from the following:

- Customer, stakeholder, and regulator needs and expectations.
- Sydney Water objectives.
- Asset Management Objectives.

These KPIs are evaluated using actual service performance information working as feedback loop to the organisation to assess overall business performance.

Section 4 further describes the monitoring of Service Performance KPIs using Table 6 as an example which details performance targets linked to AMOs and Key Result Areas.

3.2.2 Asset Management System requirements in terms of resourcing and capability

The right-hand side of Figure 9 outlines that performance is directly impacted by the appropriate level of resourcing and system capability.

Section 5 of this document further describes these resourcing requirements in more detail, outlining the broader Asset Management System and the forty Asset Management Controls that are in place. As discussed in Section 5, these controls manage the risk of deviating from the Asset Management System expectations outlined in this document.

Section 7 of this document provides more detail on the three integrated levels of planning to support efficient service delivery.

3.2.3 Cost (Value) Drivers

The top section of Figure 9 shows how both the short-term and long-term cost projections are considered in future investments for Sydney Water's asset portfolio. This is achieved through review of the annual budget, five-year investment plan, and the Long-Term Capital and Operational Plan (LTCOP). Sections 6.3 and 7 of this document provides more detail on how costs are considered in asset management related decisions.

3.3 Infrastructure Strategies

Sydney Water's infrastructure strategies provide direction to enable decision-making at the appropriate level of risk, cost to customers, and a pathway to close the gap between current and expected performance. It also bridges the Sydney Water objectives with the tactical and operational management plans including systems, renewals, maintenance, investment, works and delivery plans. Table 2 summarises the content of the infrastructure strategies aligned to NSW treasury guidelines.

Table 2: Infrastructure Strategy Content

1	**Purpose** The Infrastructure Strategy helps SW to demonstrate the relationship between the performance of physical asset portfolio and the service delivery aligned to GSWS and Customer Outcomes. It also enables SW to determine whether the proposed services and resultant physical asset requirements are sustainable within realistically anticipated funding levels aligned to IPART pricing principles. The Infrastructure Strategy sets the direction to SW service and asset value chain to manage assets to best support service delivery with the current Budget allocation.
2	**Asset summary** A visual to illustrate the linkage between asset quantities and the services, i.e. which assets or asset groups support each of the dependent services.
3	**Level of service** Describe the services that SW deliver and show how these support results achieved for the community, through answering the key questions about service delivery: What services, when, where, to whom and to what level?
4	**Growth profile and projections** Aligns the existing infrastructure with growth servicing objectives.
5	**Performance, Cost and Risk (PCaR) Approach** Summarise the performance requirements for SW service and asset value chain based on PCaR metrics by answering: How will SW know how well our asset portfolio is supporting service delivery to the required level (what measures will SW use)?
6	**Consequence of Failure (CoF)** Outlines the assessment of the consequence of failure of an asset determines the impact that the failure of that asset will have on different levels of service.
7	**Health and performance** Describe how well SW's existing physical assets support each service (or service group) and identify 'gaps' between performance of the existing assets/portfolio and that required to support service delivery needs. This 'gap analysis' enables SW to develop an asset portfolio that will best support service delivery needs in the short and long term.
8	**Key issues and risks** Describe the service risk through asset risk, by outlining key issues, causes, likelihood and consequence aligned to enterprise risk framework.
9	**Performance, Cost and Risk Assessment** Evaluate SW's asset portfolio by looking at specific characteristics (performance, health, probability of failure, consequence of failure, capacity, capability, etc) of the asset – service relationship. In this process, each characteristics represents a "gate" through which assets must pass to get to an action. Where an asset fails to satisfy the requirements of a particular gate, intervention (corrective action) must be considered, and a solution proposed.
10	**Business units responsibilities** This should inform service and asset value chain about short term and long term actions and ongoing responsibilities at high level to ensure continuous physical asset support to services, and efficient use of financial and other resources available to SW. It identifies assets that are, or will, no longer be needed to support service, assets that need to be procured to ensure required service support, and required level of maintenance for remaining assets. In short, it is a brief summary of capital investment, disposal, and maintenance needs, which will then be developed in the corresponding plans by the planners, engineers, etc.
11	**Forecasted investment profile** Alignment to capital and operational investment plans with strategic actions.
12	**Information and digital requirements** Alignment to information and digital requirements with strategic actions.

04

System and Asset Performance

4. System and Asset Performance

Up to date information on the current performance of existing assets and systems is key to understanding how Sydney Water's asset base needs to be managed to support the delivery of the Asset Management Objectives. Driving continuous improvement to deliver better outcomes for customers, the community and the environment is a top priority for Sydney Water. Development of performance monitoring systems to track key performance indicators will enable the development and implementation of targeted improvement programs.

4.1 System and Asset Performance

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4.2 System, Infrastructure and Asset

Sydney Water's Asset and System Portfolio hierarchy is classified into 'System, Infrastructure and Asset' categories as shown hierarchically in Figure 10. Asset management approaches for water and wastewater assets are described in terms of a tiered hierarchy that is based on a logical decomposition of the assets. The hierarchical approach establishes specific cost, risk and performance requirements at each level which are directly used as the foundation for asset capital, maintenance, and operating plans. Each category is outlined in Table 3.

4.2.1 System and Asset Scope

The Table 4 outlines the major asset classes, quantities and assessment approach used to monitor and align asset management activities to either maintain, renew or enhance the infrastructure to ensure services Sydney Waters customers value are sustained.

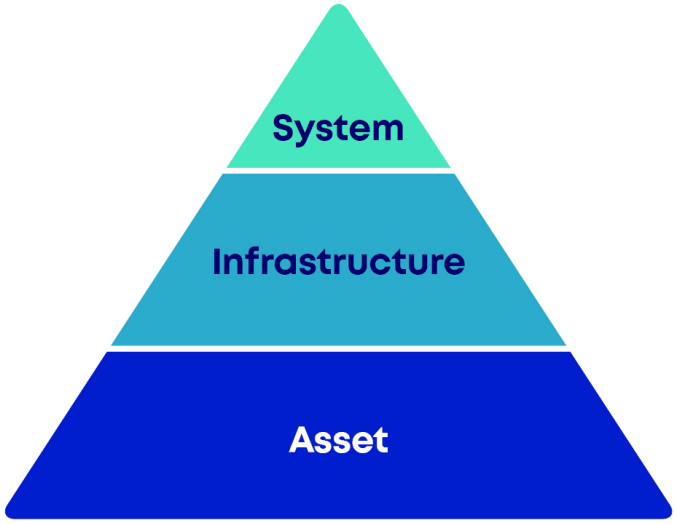


Figure 10: System, Infrastructure and Asset Hierarchy

Table 3: System, Infrastructure and Asset Definitions

	Description	Performance Management Objectives	Inputs
System	A water or wastewater geographical based area used to provide service outcomes.	Translates stakeholder and regulatory requirements to specific goals and performance specifications within the performance, cost and risk framework for each system.	Relevant acts, codes and licences.
Infrastructure	Facilities such as pump stations, treatment plants, reservoirs or infrastructure used to transport flow.	Cascades the system goals and specifications into the service and asset management value chain elements within each infrastructure category.	Relevant acts, codes, licences and customer contracts.
Asset	Individual components within the infrastructure for the purpose of operational and maintenance management.	Specific performance requirements for each element of each infrastructure asset.	Licences

Table 4: Asset Scope (figures from the 2024 State of the Assets Report)

Asset Class per Service	Quantity	Assessment approach
Water		
Water Filtration Plants	9 (5 SWC /4 Built Own Operate (BOO)) + 1 Raw water chlorination Plant (Major Hazard Facility)	A combination of deterioration modelling, bottom-up assessment, asset performance data and risk assessments used to generate spend and forecast longer term trends
Water Pumping Stations	153	A combination of condition assessment, asset performance monitoring and risk-based decision making.
Water Mains	22,912 km	A combination of condition assessment, asset performance monitoring, net present value analysis and risk-based decision making.
Reservoirs – Drinking water	252	A combination of condition assessment, asset performance monitoring and risk-based decision making.
Water Meters (Customer)	1,632,781	Reactive replacement on failure and proactive replacement on age and synergy with proposed smart metering strategy.
Wastewater		
Gravity Sewer Mains	26,873 km	Deterioration modelling to understand required rate of rehabilitation, risk-based approach to targeting interventions – unit rate analysis to forecast costs.
Sewage Pumping Stations	698	A combination of deterioration modelling, bottom-up assessment, asset performance data and risk assessments used to generate spend and forecast longer term trends.
Pressure Sewer Mains	778 km	Bottom-up assessment based on individual performance, material analysis.
Water Resource Recovery Facilities	30	A combination of deterioration modelling, bottom-up assessment, asset performance data and risk assessments used to generate spend and forecast longer term trends.
Odour Control Units	191	
Chemical Dosing Unit	66	
Recycled Water		
Recycled Water Mains	822 km	A combination of deterioration modelling, bottom-up assessment, asset performance data, net present value analysis and risk assessments used to generate spend and forecast longer term trends.
Meters	41,257	
Recycled Water Pumping Stations	12	
Reservoirs – Recycled water	9 units	
Storm Water		
Channels/Pipelines	457 km	Bottom-up assessment based on individual asset performance data, surveys and risk assessments.
Pump Stations	3	
Storages	22	
Stormwater Quality Improvement Devices	81	
Monitoring and Control Assets		
Monitoring And Control Assets	3,217 RTU, 770 PLC, 2649 gauges, 19,470 IoT devices	Reactive replacement on failure and proactive replacement on age and risk.

Build, Own and Operated (BOO) Plants

The assets that are build, own and operated (BOO) by external service providers are critical to Sydney Water's service outcomes. It is therefore vital that the any activities which may influence Asset Management outcomes at BOO Plants are monitored and optimised through the Asset Management Controls identified in this SAMP. This would maintain consistency with good asset management practices adopted by Sydney Water which would provide the confidence for a seamless transition in the event of changes in operational and maintenance responsibilities moving forward. Currently, Sydney Water has four water filtration plants that are build, own and operated by external service providers.

4.2.2 Significant Infrastructure

Significant Infrastructure is a classification of asset, defined by an extreme unmitigated consequence based on the Corporate Risk Matrix or contributes to a large single failure point (SFP) in the system. An example of an infrastructure asset that is an SFP is a water resource recovery facility. Upon failure, there would be a significant impact on customer serviceability, the environment and community.

There are 122 significant infrastructure assets identified across all drinking water and wastewater asset classes. These were evaluated into three categories:

- The 5 Resilience Principles (as defined in the Resilience Policy)
- Risk of Failure (as defined by the Corporate Risk Matrix)
- Current Asset Health

Identification of significant infrastructure and current health rating allows for optimisation of asset management activities to prioritise these assets and mitigate extreme consequences of failure.

4.3 Service and Asset Performance

This SAMP ensures adequate service and asset performance outcomes to support customer demand by providing a guide to:

- Identifying and understanding the factors influencing service performance.
- Taking a data-driven approach to assess the state of current assets and systems performance.
- Assessing the impact of current programs to address performance gaps and determine if further action is required.

4.3.1 Service Performance

Service Performance KPIs show the overall ability of the network and treatment plants to process and supply both drinking and wastewater systems to meet the requirements outlined in the operating licence. Monitoring Service Performance KPIs against AMO Key Results Areas ensures Sydney Water is meeting the AMOs outlined in this SAMP.

Table 5 shows an example of how the Service Performance KPIs are being monitored to achieve the AMOs which have an associated target for the Financial Year.

The Service Performance KPIs associated with AMO 1 cater to the needs and expectations of Sydney Water's stakeholders with Key Result Areas focussed on affordability and service outcomes (e.g., percentage of properties affected by poor performance) which influences overall customer satisfaction.

Safety related KPIs associated with AMO 5 emphasise Sydney Water's commitment to upholding safety, environmental and community standards by monitoring the number of High Potential Incidents, Reportable Notifications for EP and Community Complaints.

Service Performance KPIs linked to AMO 2 ensure Sydney Water's compliance with regulatory requirements whilst operating in a sustainable manner to achieve the reliable, resilient and sustainable service outcomes.

Table 5: Service Performance Measures

	Asset Management Objective	Key Result Area	Key Performance Indicator	Yearly Target*
1	We will engage with customers and stakeholders to set service standards and manage our assets to ensure customer satisfaction.	Affordability | Service Performance | Customer Satisfaction	Water Continuity - Properties affected by unplanned interruptions (>5hrs) in a financial year	2% or ≤43,069 properties
			Water Continuity – Repeat Interruptions	99.34 % or ≤16388 properties
			Water Pressure Standard - Properties affected by fewer than 12 pressure failures in a financial year.	99.99% or ≤208 properties
			Properties unaffected by uncontrolled wastewater overflow in a financial year.	99.28% Or ≤14973 properties
			Properties affected by fewer than three uncontrolled wastewater overflows in a financial year.	99.99% or ≤202 properties
			Water Literacy	≥5
			Customer Satisfaction	Top Quartile
			Affordability	0.78%
			Percentage of P6 Breaks/Leaks responded to within 3 Hours	90%
			Percentage of P5 Breaks/Leaks responded to within 6 Hours	90%
			Digital Empowerment	65.3%
			% of bills paid on time within 21 days	65%
5	We manage our assets so that there is zero harm.	Safety | Environment | Community	TRIFR (Combined Employees and Contractor)	≤5
			Pollution and Environmental Harm Incidents	≤ 1053± 1 Std
			Customer Complaints (Resolved – Drinking Water)	< 200/ month
			Customer Complaints – (Resolved - Noise)	≤ 92/year
			Customer Complaints (Resolved - Odour)	≤ 256 /year
			Complaints Handling - % of complaints resolved within the first time	>85%
			Public access and recreation - Number of new sites where recreational access to land and waterways is improved and amenity enhanced	2
			Employee Experience	>75%
			Diversity & Equity Index	>75%

	Asset Management Objective	Key Result Area	Key Performance Indicator	Yearly Target*
2	We will comply with relevant regulatory requirements or obligations and operate in a sustainable manner	Safe Water Supply | Meet Licence Safely | Sustainable Operations	Adherence to Australian Drinking Water Guidelines	100% (All 13 delivery systems)
			Adherence to Australian Guidelines for Water Recycling	All 14 Systems
			Customer Tap Minimum Chlorine Level	≥90% (>0.6 mg/L for chlorinated and >0.2 mg/L for chlorinated systems)
			L1.4 Dry weather overflows from SPS	0
			L1.3 - Dry weather overflows non-compliances (Controlled + Uncontrolled)	≤300
			L7.4 - Sewage Treatment Systems (STS) licences compliant	All 12 systems compliant
			Wet weather overflows meet system limits	100% (All 19 systems compliant)
			Load and concentration Limits	≤14
			Quality of treated wastewater (% of WRRFs where quality complies with annual concentration limits for core pollutants)	88.5%
			Non-compliant bypasses from Treatment Plants	≤15
			Environmental impact index.	100
			Volume of Recycled Water Available	33 GL
			Additional recycled water available for cooling and greening public spaces (GL)	1 GL
			System Leakage.	≤8% (within ELL band)
			Renewable Energy Generation	67,480 MWh
			Natural area and green infrastructure land actively managed	50%
			Growth Servicing - Environment	TBA
			% materials recycled and reused (excluding biosolids)	85%
			Net carbon emissions (t CO2-e Sydney Water's own operations)	334,000

*The targets are aligned to FY25 Strategic Success Measures and refer to the latest information in the Corporate Performance Report.

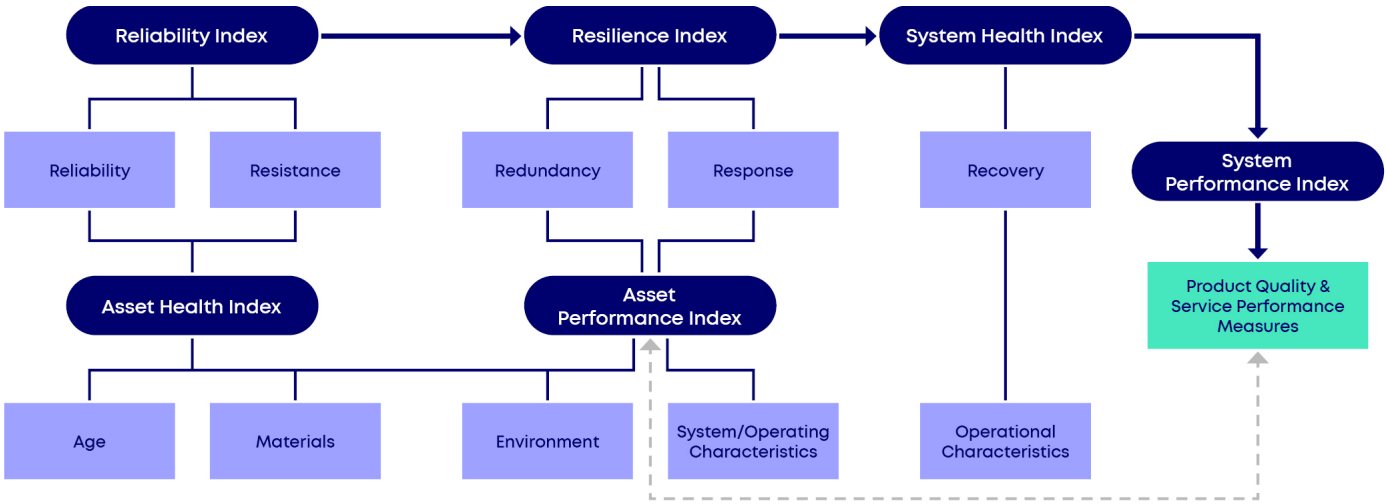
4.3.2 System and Asset Performance

The system and asset performance framework is the overarching view of assets and systems, which assesses the capacity for resilience, based on Sydney Water's resilience policy, to external 'and internal 'shocks' such as the failure of critical assets. This asset and system performance framework considers issues such as asset criticality and redundancies within systems alongside asset and system health when assessing resilience in relation to performance outcomes. The following indicators are being developed and monitored progressively.

- **Asset and System Health indexes** are combined to define the ability of an asset and system to deliver its function under normal and extreme loading conditions, over an extended period. – *Leading Indicator*
- **Asset and System Performance indexes** are combined to measure the asset and system failure events aimed at demonstrating the ability of the asset and system to deliver service to customers. – *Lagging Indicator*
- **Reliability index** is defined as the measure of the likelihood that an asset and system will function when it is required to operate. – Leading Indicator
- **Resilience index** is defined as the ability of assets, networks and systems to anticipate, absorb, adapt to and/ or rapidly recover from a disruptive event. – *Leading Indicator*
- **Service Performance index** is defined as the quality of services delivered to customers against to the expected/ agreed service standards.

AMO 4 and AMO 5 capture indexes outlined in Sydney Water's Asset and System Performance Framework (Figure 11). This framework shows how both Asset and System Performance Indexes, in addition to all the other KPIs linked to AMO 1, 2 and 3, are essential to understanding Sydney Water's Product Quality and Service Performance Measures.

Table 6 shows an example of how the Asset and System Performance KPIs are being monitored to achieve the AMOs which have an associated target for the Financial Year.



Source - In 2017, CH2M published a framework to show the relationship between asset health and resilience by working with several water companies in England and Wales for Ofwat. Framework is slightly adapted to suit Sydney Water operating model.

Figure 11: System and Asset Performance Framework

Table 6: System and Asset Performance Measures

	Asset Management Objective	Key Result Area	Key Performance Indicator	Yearly Target
3	We will optimise programs of investment to balance performance, cost and risk for customer outcomes	Cost | Risk | Performance	Drinking Water Use (Per capita total daily drinking water consumption (LPD) - average weather (total)	183 Ltr/Person/Day
			Available Water Storage (90% to 15% raw water storage in years)	17%
			Climate risk maturity health	Repeatable
			Delivering Infrastructure when it is required (Overall Measure of Delivery (OMD))	>90%
			Operational and Maintenance Acceptance	Yes – 10% (Fully accepted or accepted with minor defects) Partially – 5% (Accepted with Defects) No – 0% (Not accepted)
			Project Development Performance Schedule/Cost (Earned Value)	10% improvement
			Project Delivery Performance Schedule	10% improvement
			Project Delivery Performance Cost	
			PM Effectiveness	>80%
			*CM and MPM Effectiveness	
			Breakdown to Total Ratio Cost	<20%
			Availability – WRRF and WFP	>90%
			Investment Pipeline – Number of Projects	
			Totex funding allocated for high-risk assets	>90%
			MTTR (Mean Time To Repair)	>80%
			Breakdown Response Rate	High Priority >95% Low Priority >85%
			Overdue Maintenance	High Risk assets - 0
			Work Order Delivery	>80% overall >90% for underperforming assets
			Asset Risk Index	1% improvement on baseline
			Asset Performance Index	<Amber zone
			Asset Risk Index	

	Asset Management Objective	Key Result Area	Key Performance Indicator	Yearly Target
4	We will manage our assets to ensure that capital and operating decisions optimise lifecycle costs.	Health | Resilience | Sustainability	Asset Health Index	1% improvement on baseline
			System Resilience Index	1% improvement on baseline
			Asset Sustainability Ratio	>90%
			System Health Index	TBA
			Demonstrating value for money to our customers (ROIC)	≥ 4.9%
			EBITDA	$1,834m
			Proportion of revenue spent on Research & Innovation	>0.17%
			Growth Servicing - Customer	≤ 15%
			Digitalisation Index	38

*The proposed long-term targets for Asset Mgmt. Objectives 3 and 4 are in line with industry best practice. The interim targets will be drawn from the current asset and system baseline results to drive continuous improvement.

The outputs of these performance reports are used to assess the effectiveness of the AMS and prioritise actions relevant to the planning stages outlined in Section 7.

4.3.3 Asset Performance

Asset Performance Index (API) is calculated as a ratio that includes the number of Breakdown Maintenance (BM) and repeated failures within a reporting period compared to 5 years of rolling historical data. This means a lower asset performance index is better. This measure is calculated for an asset cohort and cannot be used for a single asset.

- **Breakdown Maintenance Rate (BM):** this tells us the rate of breakdown maintenance, increasing, decreasing or stable over the five-year period. The intent of this measure is to identify and focus on planned maintenance resourcing and allocation to improve the asset performance by reducing the asset failures. It is calculated as a ratio of number of breakdown maintenance compared to five years rolling average breakdown maintenance, where breakdown maintenance is defined as an activity performed on an asset that has broken down, faulted, or cannot be operated.
- **Repeat Failure Rate:** this tells us the rate of repeat asset failures increasing, decreasing or stable over the five-year period. The intent of this measure is to identify and focus on renewals resourcing and allocation to reduce the repeat failures. It is calculated as a ratio that includes the number of assets that had failed within the past 5 years compared to the number of assets failed within the reporting period.

The graphs below show the asset performance trend (blue line) for water and wastewater assets. The breakdown maintenance ratio is shown in orange and the repeated failure rate in light blue. The red and green arrow on the graph shows the lower the index the better the performance. The aim is to focus initially on a yearly improvement of 10% on a rolling average until Sydney Water better understands its baseline and can establish more tailored targets. The shaded area represents the annual rainfall data for Sydney Water operational area.

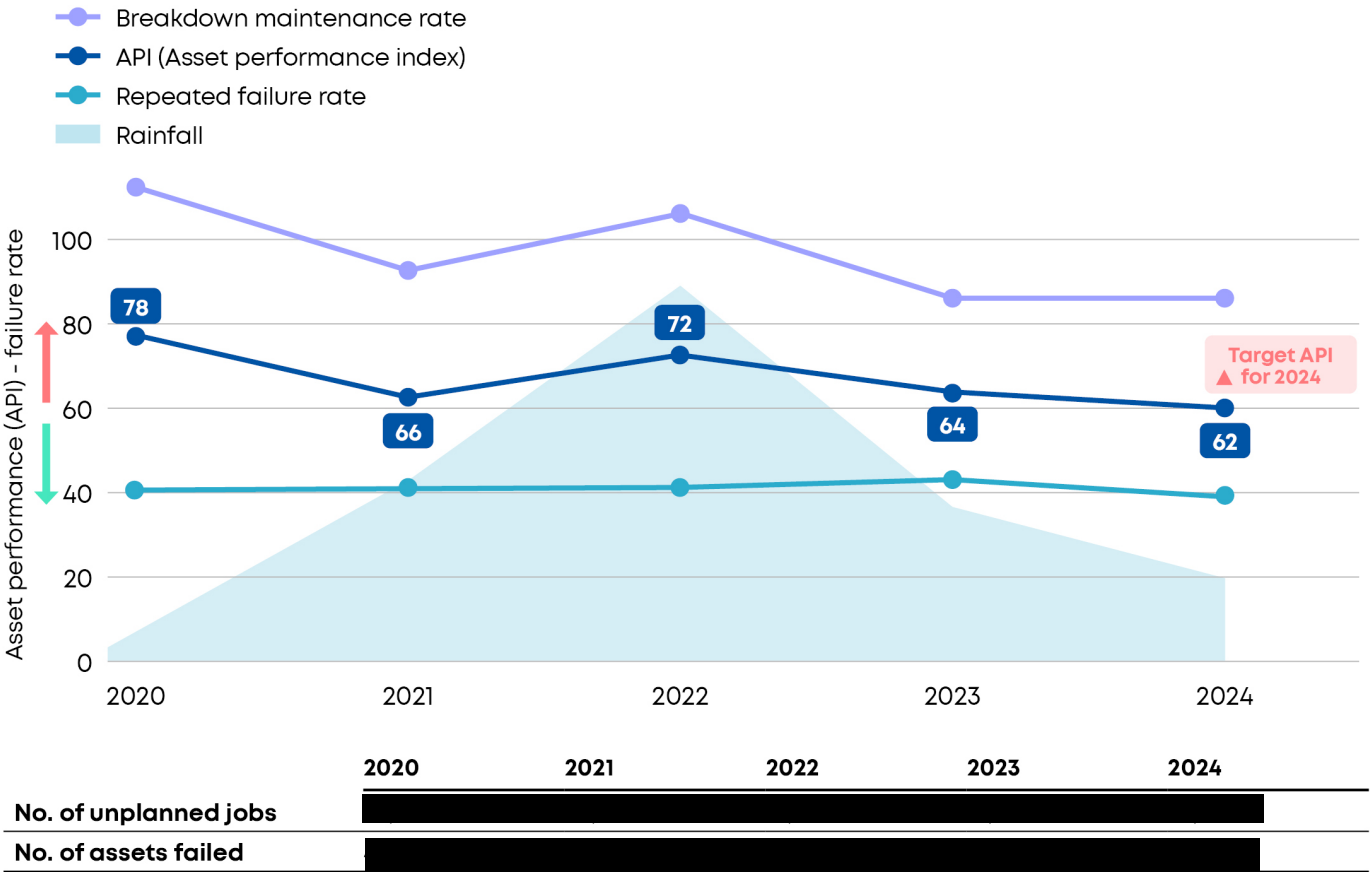


Figure 12: Asset performance of water and wastewater assets as end of FY24

4.4 Asset Management Improvement Program

Sydney Water has developed an asset management improvement program captured through the Service Excellence Roadmap (Figure 13). It outlines the key work streams required to improve the performance and capabilities of existing assets and management systems so that they can address the challenges outlined in Section 2. In addition to the Service Excellence Roadmap, a monitoring dashboard against the key actions identified in Enterprise Risk 05 Asset Safety, Reliability and Capability, has been created to ensure the AMS elements are achieved by being reviewed on a quarterly basis.

Over the long-term, the following benefits are expected from the implementation of these work streams:

- Improved understanding of asset and system health in relation to the risk each poses to service delivery outcomes (environment, public health, and business)
- Integration of asset and system health in proactive forward-looking investment decision making for both maintenance, renewals and growth
- Integration of asset and system health in relation to the customer needs and expectations
- Better assurance around the asset and system health in relation to impact on service outcomes for existing and new assets.

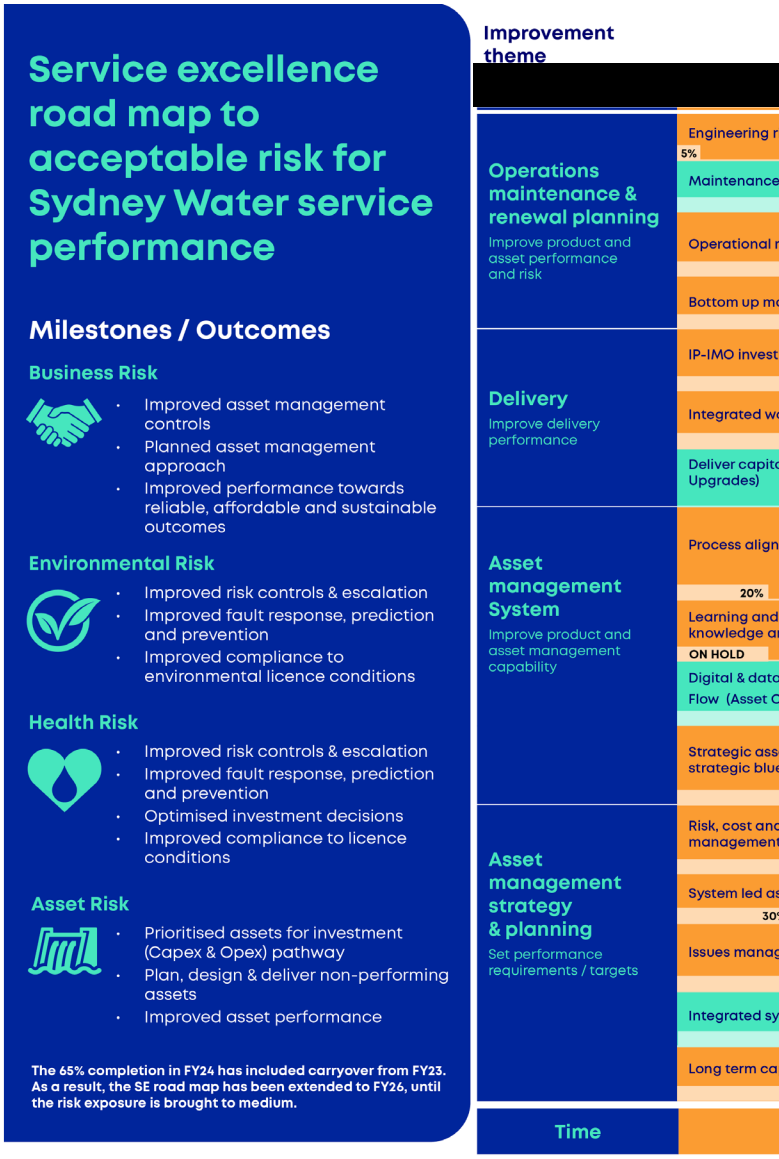
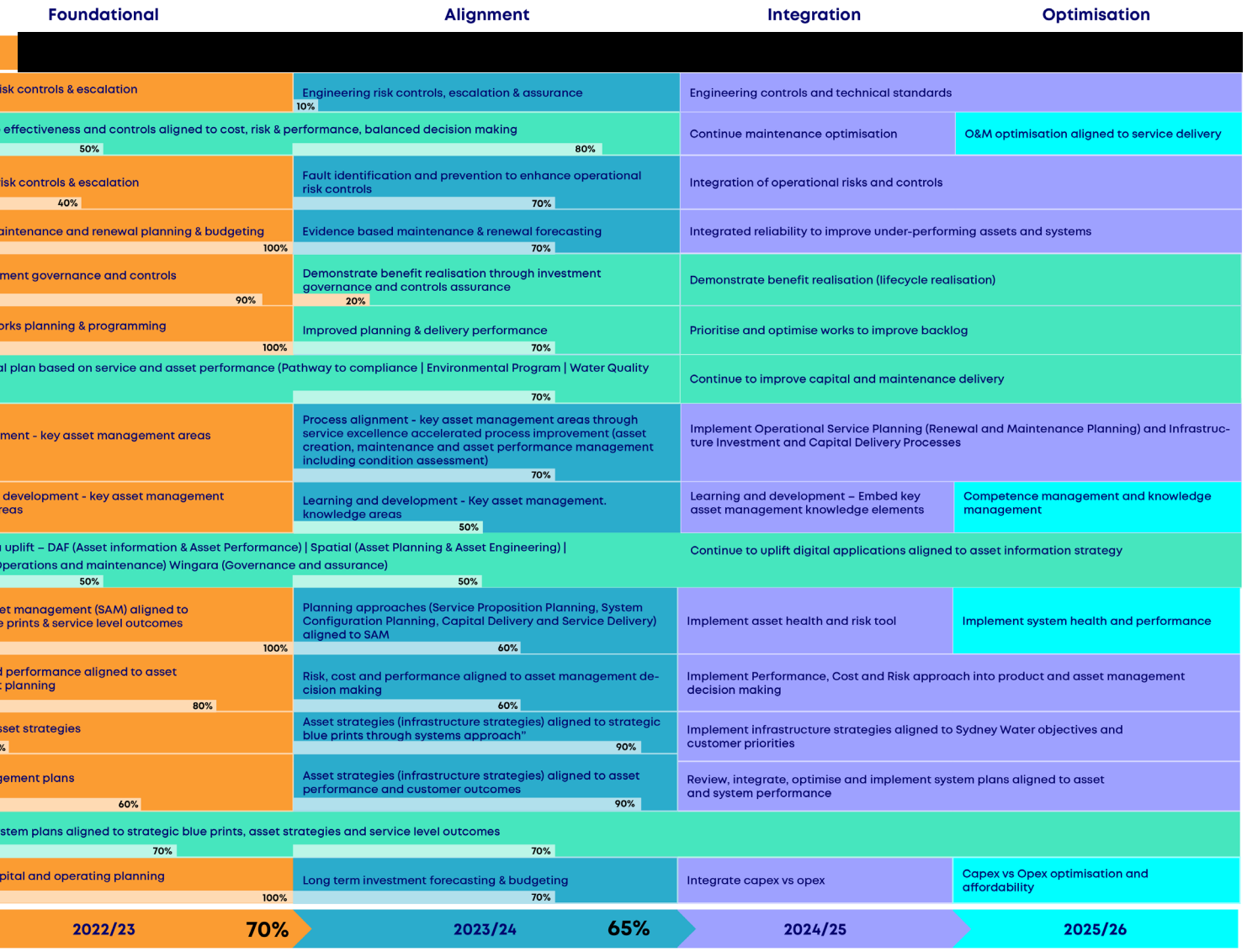


Figure 13: Service Excellence Road Map


Foundational
Alignment
Integration
Optimisation
isk controls & escalation
Engineering risk controls, escalation & assurance
10%
Engineering controls and technical standards
effectiveness and controls aligned to cost, risk & performance, balanced decision making
50%
80%
Continue maintenance optimisation
O&M optimisation aligned to service delivery
isk controls & escalation
40%
Fault identification and prevention to enhance operational risk controls
70%
Integration of operational risks and controls
aintenance and renewal planning & budgeting
100%
Evidence based maintenance & renewal forecasting
70%
Integrated reliability to improve under-performing assets and systems
ment governance and controls
90%
Demonstrate benefit realisation through investment governance and controls assurance
20%
Demonstrate benefit realisation (lifecycle realisation)
orks planning & programming
100%
Improved planning & delivery performance
70%
Prioritise and optimise works to improve backlog
l plan based on service and asset performance (Pathway to compliance | Environmental Program | Water Quality
70%
Continue to improve capital and maintenance delivery
ment - key asset management areas
Process alignment - key asset management areas through service excellence accelerated process improvement (asset creation, maintenance and asset performance management including condition assessment)
70%
Implement Operational Service Planning (Renewal and Maintenance Planning) and Infrastructure Investment and Capital Delivery Processes
development - key asset management
reas
Learning and development - Key asset management. knowledge areas
50%
Learning and development – Embed key asset management knowledge elements
Competence management and knowledge management
uplift – DAF (Asset information & Asset Performance) | Spatial (Asset Planning & Asset Engineering) |
Operations and maintenance) Wingara (Governance and assurance)
50%
50%
Continue to uplift digital applications aligned to asset information strategy
et management (SAM) aligned to
e prints & service level outcomes
100%
Planning approaches (Service Proposition Planning, System Configuration Planning, Capital Delivery and Service Delivery) aligned to SAM
60%
Implement asset health and risk tool
Implement system health and performance
d performance aligned to asset
planning
80%
Risk, cost and performance aligned to asset management decision making
60%
Implement Performance, Cost and Risk approach into product and asset management decision making
sset strategies
%
Asset strategies (infrastructure strategies) aligned to strategic blue prints through systems approach"
90%
Implement infrastructure strategies aligned to Sydney Water objectives and customer priorities
gement plans
60%
Asset strategies (infrastructure strategies) aligned to asset performance and customer outcomes
90%
Review, integrate, optimise and implement system plans aligned to asset and system performance
stem plans aligned to strategic blue prints, asset strategies and service level outcomes
70%
70%
pital and operating planning
100%
Long term investment forecasting & budgeting
70%
Integrate capex vs opex
Capex vs Opex optimisation and affordability
2022/23
70%
2023/24
65%
2024/25
2025/26

05

Asset Management System

5. Asset Management System

Sydney Water requires an Asset Management System consisting of the appropriate 'People, Process, Technology and Data (Information)' to ensure that its Asset Management Objectives and ultimately Sydney Water's vision for creating better lives with world-class water services are achieved, as illustrated in Figure 14.

5.1 Overview

Sydney Water's Asset Management System (AMS) provides a framework that links stakeholders' needs, leadership, and corporate outcomes (objectives) to Asset Management Objectives to perform asset management activities.

The Asset Management System Framework (BMIS D0002040) illustrates a structured approach for functioning Asset Management and how Sydney Water will meet the requirements of ISO55001 to establish best practices.

Figure 15 illustrates Sydney Water's Asset Management Framework including the Asset Management functions along with its controls which were determined in line with the Institute of Asset Management (IAM) asset management elements. This will enable the assessment of Sydney Water's asset management maturity in line with ISO55001. Sydney Water's AMS consists of eleven Asset Management (AM) Functions each with associated Asset Management Controls as outlined in Table 7.

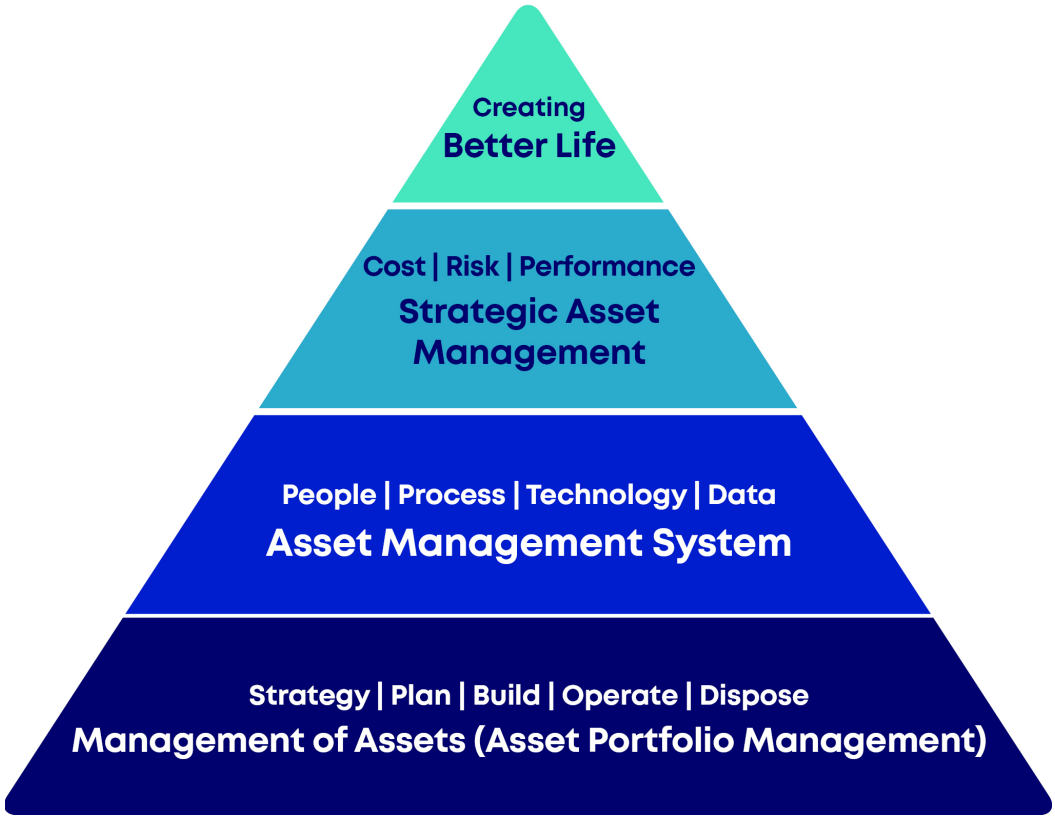


Figure 14: Relationship between Asset Management and the Asset Management System

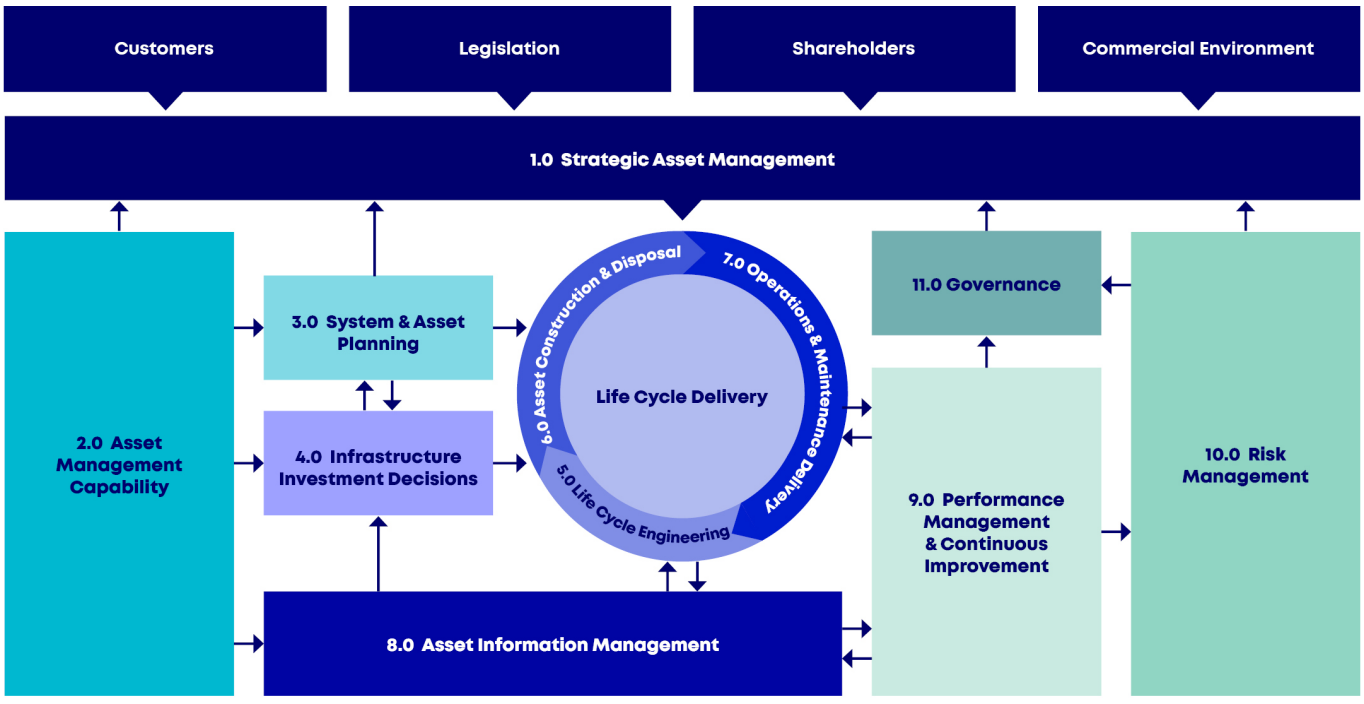


Figure 15: Sydney Water's Asset Management Framework

Table 7: Asset Management System Functions (Elements) and Controls (Sub elements)

Asset Management Functions		Asset Management Functions Description	Asset Management Controls	
1.0	Strategic Asset Management	Align and Deploy Asset Management (AM) actions and processes consistent with the SW business plan to realise the value in service delivery.	1.1 Stakeholder management	⚠
			1.2 Purpose and context of asset management	
			1.3 Asset Management policy	
			1.4 Asset Management Strategy development and deployment (SAMP)	⚠
2.0	Asset management capability	Extent to which SW has developed its people, processes, technology, data, leadership and culture (a set of behaviours) in Asset Management and the extent to which these are integrated to deliver its asset management objectives.	2.1 Asset Management leadership	⚠
			2.2 Asset Management structure	
			2.3 Asset Management culture	
			2.4 Asset Management competence management	
			2.5 Asset Management knowledge management	
			2.6 Process and Change management for Asset Management	
3.0	Asset and Systems Planning	Assess and influence the demand for, and level of service from, Sydney Water's assets into the future.	3.1 Demand analysis	
			3.2 Sustainable development	
			3.3 Planning	⚠
4.0	Infrastructure Investment Decisions	The governance processes and decisions to manage scenarios related to prioritised and optimised investment decision making.	4.1 Asset costing and valuation	
			4.2 Investment decision-making	⚠
			4.3 Resourcing strategy and management	⚠
			4.3 Lifecycle value realisation	
5.0	Lifecycle Engineering	An interdisciplinary, collaborative approach to derive, evolve, and assure an integrated engineering approach.	5.1 Technical standards and legislation	⚠
			5.2 Management of change	⚠
			5.3 Systems engineering	
			5.4 Integrated reliability	⚠
6.0	Asset Construction and Disposal	Processes for the acquisition, creation, installation, commissioning and disposal of assets.	6.1 Asset creation and acquisition	⚠
			6.2 Asset decommissioning or disposal	
			6.3 Shutdown and outage strategy and planning	⚠
7.0	Operations & Maintenance Delivery	The management of operational and maintenance activities including both preventive and corrective maintenance for reliable service delivery.	7.1 Asset operation	⚠
			7.2 Maintenance delivery	⚠
			7.3 Incident management and response	⚠
			7.4 Supply chain management	⚠

Asset Management Functions		Asset Management Functions Description	Asset Management Controls
8.0	Asset Information Management	The processes for the management and governance of the data and information.	8.1 Asset Management data and information strategy
			8.2 Asset Management data and information standards
			8.3 Asset Management data and information management
			8.4 Asset Management data and information systems
			8.5 Configuration management ⚠
9.0	Performance management and continuous improvement	Processes and measures to assess the performance of its assets, system and asset mgmt.	9.1 Outcomes and impacts of asset management
			9.2 Monitoring ⚠
			9.3 Continuous improvement
10.0	Risk Management	Identification, evaluation, and prioritization of risks followed by coordinated and economical application of resources to minimize, monitor, and control the effect of uncertainty on objectives.	10.1 Contingency planning and resilience analysis ⚠
			10.2 Management of Asset Risk ⚠
11.0	Governance	The manner in which SW allocates responsibility for and makes decisions about asset management related projects, tasks, actions and issues.	11.1 Asset Management System (AMS)
			11.2 Asset Management assurance and audit

⚠ Key control

5.2 Asset Management System Scope

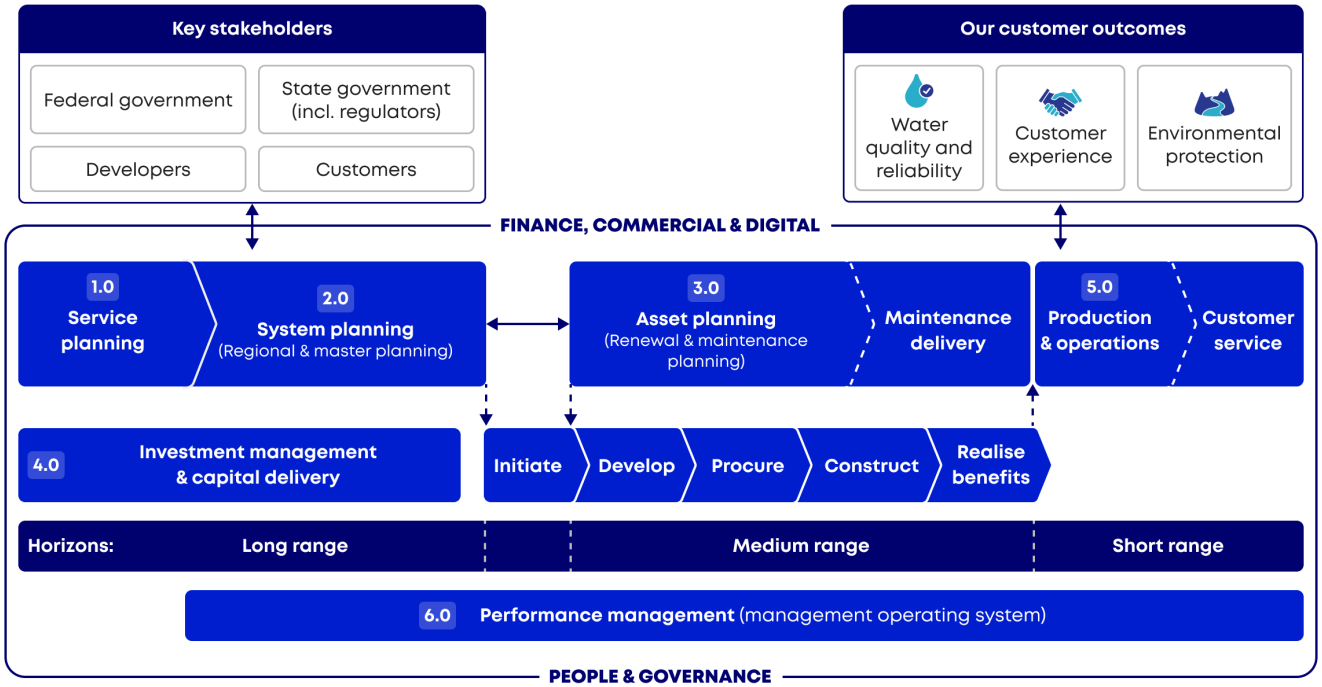
Sydney Water's Asset Management System has been developed to align with ISO55001 requirements. The Asset Management System Scope is outlined in Table 8.

Table 8: Asset Management System Scope

Asset Management System Scope Item	Description
Area of Operation	Sydney Water's operations covers 12,870 km^2 and includes Sydney, the Illawarra and the Blue Mountains regions.
Assets	The assets within the AMS are related to the delivery of the products and services to customers and include an integrated network of various asset categories. They are: • Primary Assets – Water, wastewater, recycled water and stormwater infrastructure assets are listed in Table 4. • Secondary Assets – System Instrumentation, Control and Telemetry (ICT) assets. This includes hardware and software supporting the operation and maintenance of water, wastewater and stormwater services such as SCADA, communications, telemetry, technology for facility maintenance, and condition monitoring. Software supporting asset data management, inventory management, works management systems, customer service systems, project and program management, and asset management-related decision support tools.
Functions	The eleven Asset Management Functions and the associated forty Asset Management Controls described in Section 5.1, are all within the scope of the AMS.
Business Units	The Product and Asset Management Systems team is responsible for the management and further development and improvement of the AMS. However, the responsibilities covering the individual forty Asset Management Controls are shared across the entire business. The roles and responsibilities for each of the forty Asset Management Controls are shown in full detail in Appendix 4.
External Service Providers	Sydney Water engages external service providers under contractual and outsourcing arrangements to undertake activities which may influence Asset Management outcomes. The management of the suppliers and service providers is within the scope of AMS, ensuring that the outcomes provided meet Sydney Water's Asset Management objectives. The key services provided by external parties are: • Build own and operate (BOO) water filtration plants. • Engineering design. • Infrastructure planning (Optioneering). • Integrated works plan delivery. • Facilities, mechanical and electrical asset maintenance. • Various aspects of maintenance support.
Interaction with Other Management Systems	See Section 5.4.

5.3 Service and asset management value chain

Figure 16 outlines the Sydney Water's service and asset value chain where asset management activities progress in order to deliver services of value to our customers.



Function	Definition
1.0 **Service Planning**	Define stakeholder requirements and secure the social licence to deliver.
2.0 **System planning**	Develop the optimal long term system configuration to deliver on stakeholder expectations (eg LTCOP, regional and system planning).
3.0 **Asset planning**	Determine the optimal management approach for maintaining service delivery cost effectively on the existing infrastructure for our current customers eg. renewals and maintenance planning.
4.0 **Investment management & capital delivery**	Developing and constructing new and renewed infrastructure and system reconfiguration on schedule and within budget to meet specifications and underpin service performance.
5.0 **Production & operations**	Safely deliver services and products in the immediate term through delivery of planned operations and maintenance works, and response to incidents and emergencies in an effective and efficient manner.
6.0 **Performance management** (management operating system)	Improve the decision-making process to manage service/product, system, asset and works delivery performance and improve availability, reliability and resilience to achieve customer outcomes.

Figure 16: Sydney Water's service and asset value chain

Table 9: Information System Description

System Area	Comments
People	People are part of the information system as they develop and share information. The capability of people is covered by the AMS.
Process and data management	Structured data, and data capture processes and accountabilities, enable quality data that is fit for business processes e.g. data standards, data capture procedures and data accountabilities. Data quality is managed through the application of standards, conventions and dictionaries for data capture and creation. It is monitored in scorecards and managed through services and projects under the Data Quality Framework.
Technology	Technology includes: • A series of applications that manage the data and business process workflow; and • Technologies that source data and which must be integrated into the asset information system. The central application is Maximo, the Enterprise Asset Management (EAM) system. Sydney Water's asset information is derived from data stored in various databases, including but not limited to: • Maximo – Asset and work order data. • Hydra – Linear asset geo location data. • SCADA – Sensor monitoring, and alarm system include Change and Config Management Database (CCMDB). • IICATS – Asset system telemetry data (network). • SAP Business Objects – Data Warehouse with replicated data from Maximo, Hydra, IICATS and SCADA for analysis.

5.3.1 Asset Management People

Roles and responsibilities of personnel involved in managing the forty Asset Management Controls are further described in Appendix 4. This includes responsible business units across Sydney Water which have been nominated to continuously drive, measure, analyse and improve the controls to achieve the business outcomes. For more detail on process level accountabilities and responsibilities, refer to the relevant Asset Management documentation e.g. procedures and work instructions.

5.3.2 Asset Management Processes

Asset Management Processes as shown in Figure 17 are defined as the interactions between the eleven Asset Management Functions and its forty Asset Management Controls as described in Table 7.

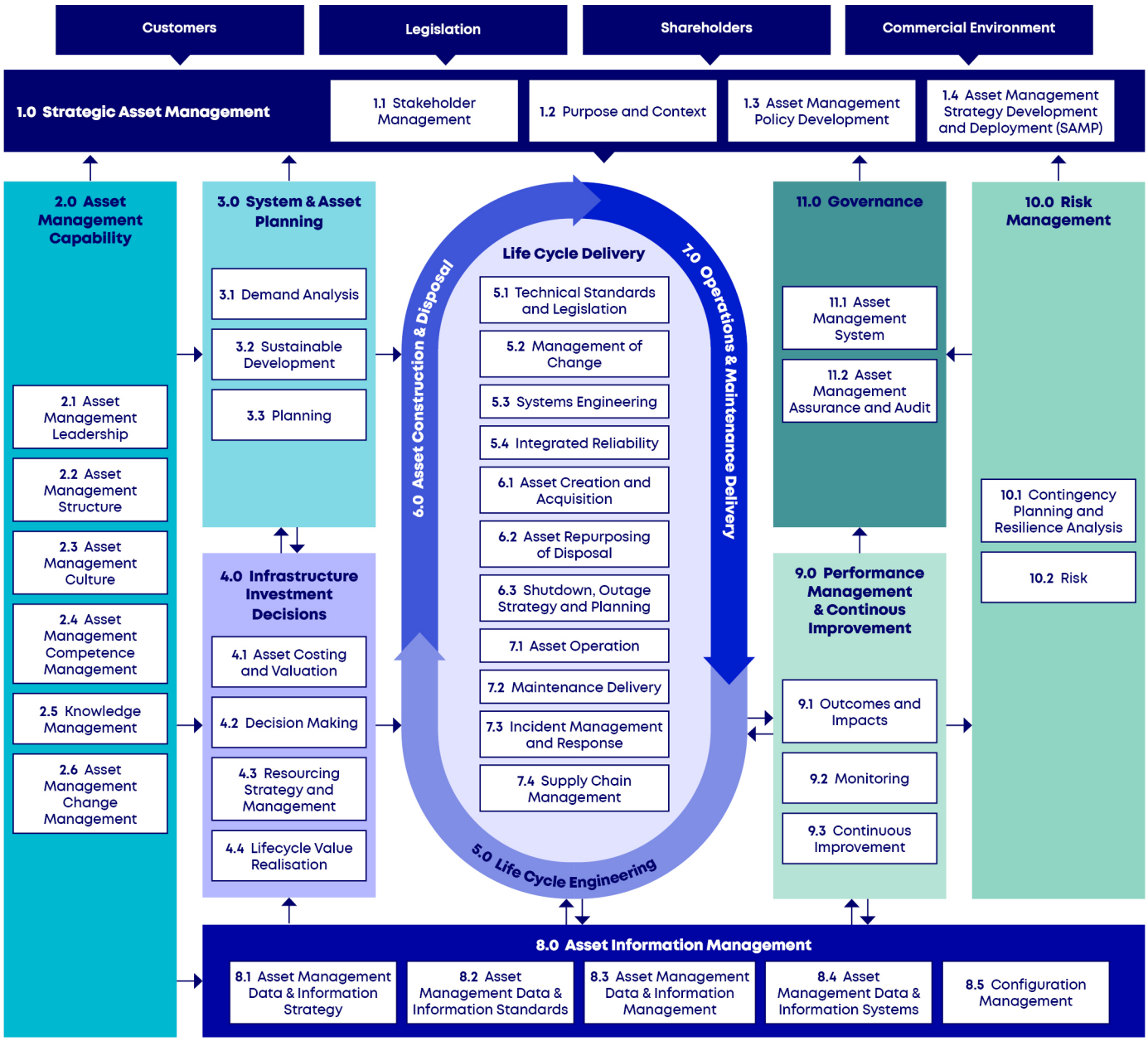


Figure 17: Sydney Water's Asset Management System Processes

5.3.3 Asset Information Management and Technology

Asset Information Management

Figure 18 shows the Asset Information Flow that enables the people, process and technology for effective decision making. For more details on the Asset Information management, including the asset information management framework, refer to Sydney Water's Asset Information Management Strategy.

Asset Information Management (AIM) is a key enabler for effective Asset Management. Appropriate information is a necessity to understand performance, drive improvement, and make informed and effective decisions.

It achieves this by identifying:

- What information is required to support decision-making.
- How asset information is managed throughout its lifecycle.
- How the quality of asset information is measured and assured (in view of the criticality of the information).
- Who has information governance accountability/ responsibility; and
- How asset information supports capability (across people, processes, and technology).

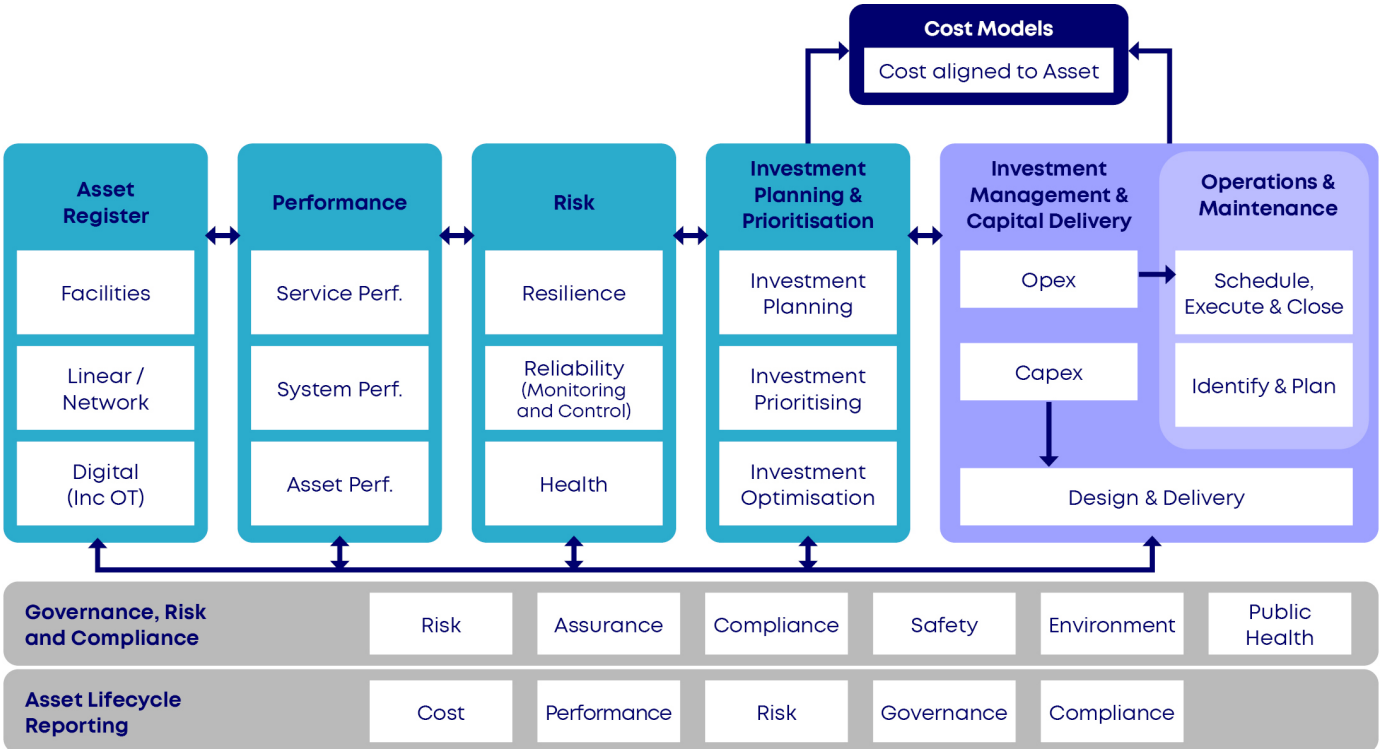


Figure 18: Asset Information Flow

Technology Landscape

The ability to make evidence-based decisions is one of the opportunities Sydney Water has identified in its journey to improving its Asset Management and Digital Systems maturity. Digital Transformation Plan focuses on enhancing the technology landscape (Figure 19) to enable processes for the management and governance of physical assets.

5.4 Interaction with Management Systems

To further improve effectiveness and efficiencies, Sydney Water is moving towards an integrated management system called 1MS, shown in Figure 20 below. The Asset Management System Framework sits within a hierarchy of similar Frameworks which are grouped by common themes. The Asset Management System Framework sits under the Management Processes Framework as they all are grouped by the management of individual safety systems across Sydney Water.

5.4.1 Scope Exclusions

Excluded from the Asset Management Scope are:

- Assets that are not directly delivering service outcomes to customers (e.g., non-operational heritage assets)
- System land, market land, leasehold property, plant and equipment and computer equipment, where:
  - System land is the land upon which the various system asset categories are located and which has no other alternative use.
  - Market land is property held and owned by the corporation that has the potential for alternative use.
  - Leasehold property is a property held by the Corporation under a 99-year lease.
  - Plant and equipment are assets that comprise vehicles, office equipment and operating plant and machinery.
  - Computer equipment is assets that comprise non-operations-related or business-related computer software and hardware, such as servers, desktop computers, laptops, and other computer peripherals.
  - Operational site offices, and office spaces/ facilities/ properties.

It is intended that some of the asset classes currently excluded will progressively be brought within the scope of the AMS as part of continual improvement and as the maturity of the management of these asset classes develops.

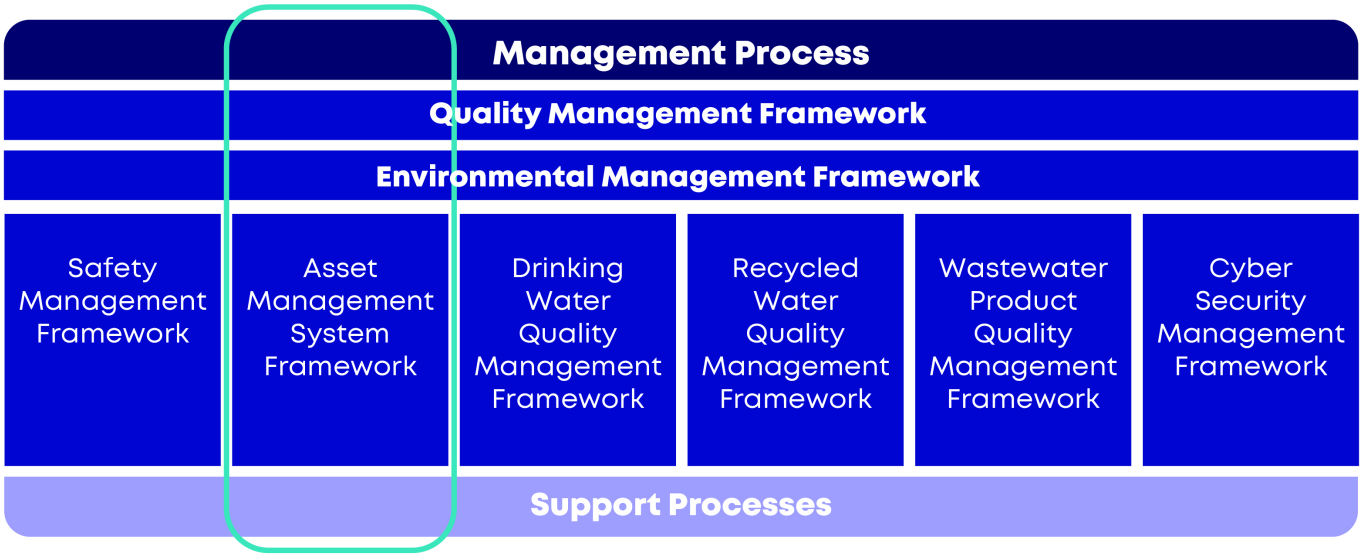


Figure 20: 1MS Integrated Management System Process

5.5 Asset Management System Governance

As discussed in Section 5.1, the AMS is part of a larger integrated system and framework (1MS) and is governed by a Steering Committee. The Steering Committee will also ensure the SAMP undergoes regular revisions and is formally developed and updated by the Asset Lifecycle team as required.

Figure 21 shows the asset management system governance framework, which includes various groups and forums at different levels of the organisation that own governing responsibilities.

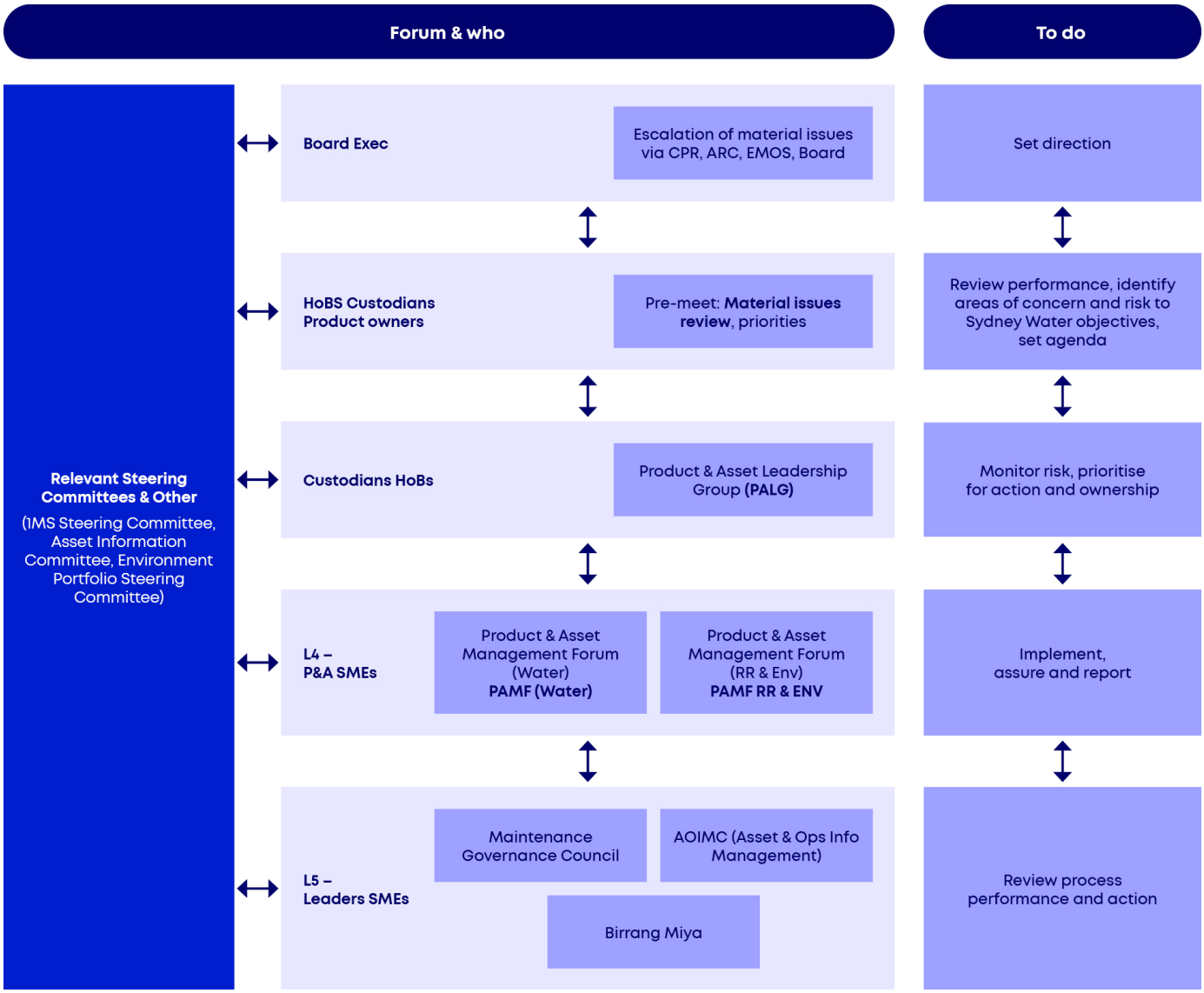


Figure 21: Asset Management System Governance Framework

06

Decision Support Framework and Criteria

6. Decision Support Framework and Criteria

The Decision Support Framework and Criteria is a key element of the Asset Management System and is designed to support asset management related decision-making and selection of the optimal asset management approach based on risk, performance, and cost (value) drivers, refer to Sydney Water's Performance, Cost and Risk (PCaR) Framework.

6.1 Performance, Cost and Risk (PCaR) Balance

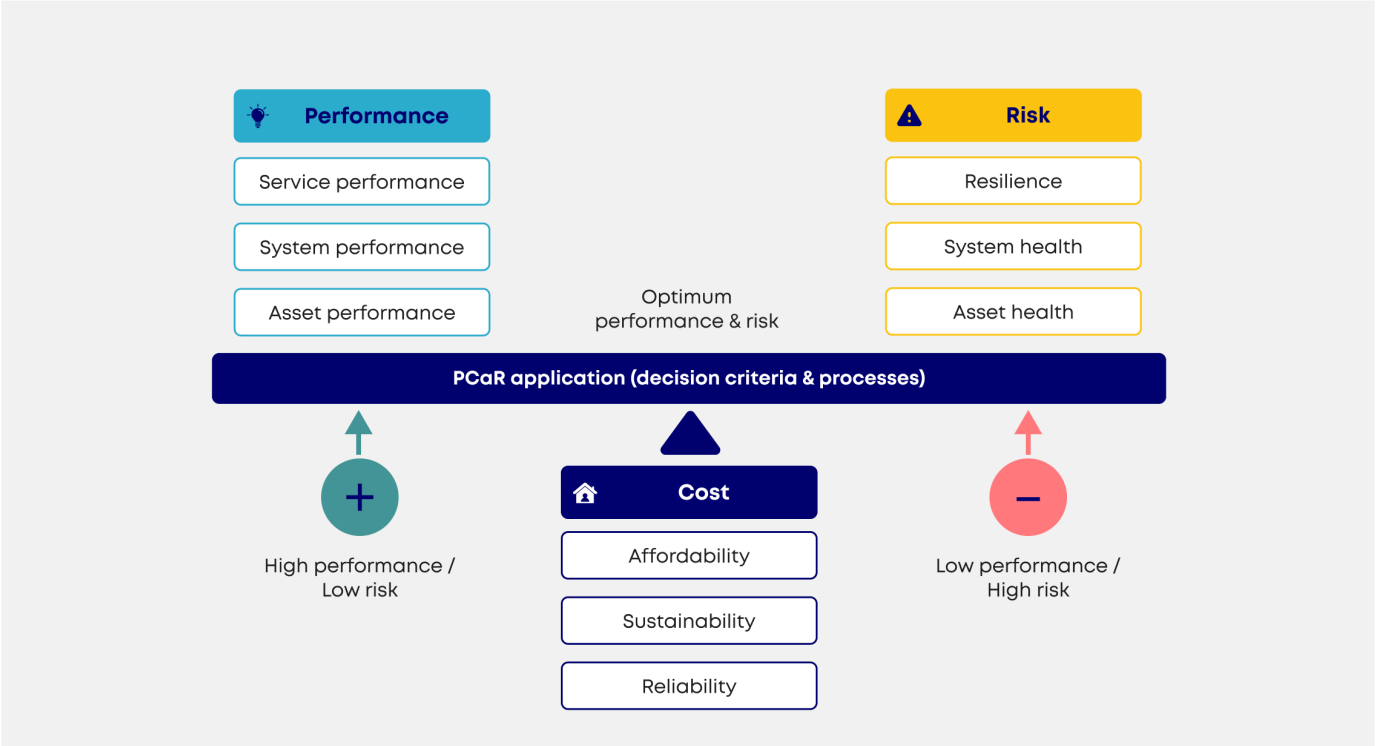
The Decision Support Framework is designed to consider Asset and System Performance, Risk, and Cost (Value) criteria (Figure 22) when making asset management related decisions. This ensures an optimal scenario for all stakeholders as service delivery is upheld without compromising asset performance, introducing high-potential risks and cost overruns.

The Decision-Making Support Framework (Figure 23) is composed of three key areas: the Decision-Making Criteria (left-hand side), Integrated Planning & Delivery Process (middle) and Key Planning Documents (right-hand side). Beneath each of the three areas are key steps aligned to four process stages i.e., objectives, strategy, planning and delivery. These steps provide a specific pathway for decision-makers to ensure they make risk-based decisions informed by current asset performance/health and an understanding of the available resources and AMS capability to support improvement initiatives.

The Decision-Making Support Framework (Figure 23) is composed of three key areas: the service and asset value chain elements (left-hand side), PCaR decision making criteria (middle) and PCaR application (right-hand side). These steps provide a specific pathway for decision-makers to ensure they make risk-based decisions informed by current performance/health and an understanding of the available resources and AMS capability to support improvement initiatives.

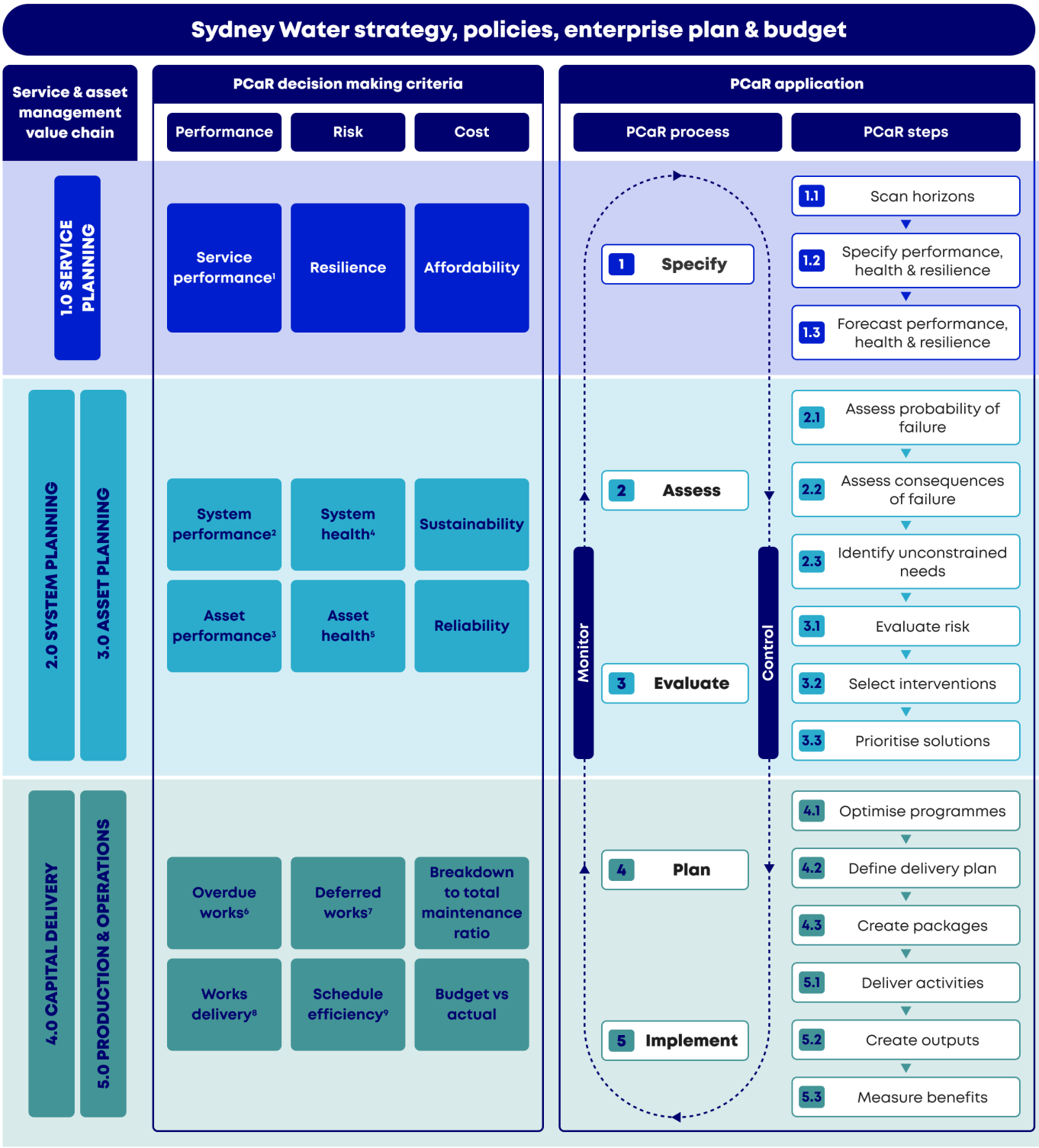
Risk assessment and evaluation as well as identification of control measures in line with 5R resilience framework and points of escalation will be conducted in line with the Enterprise Risk Management (ERM) Framework. At the individual asset level, selection of the appropriate asset management approach is critical to match the risk level and infrastructure approach. This is further outlined in Section 6.2.

Key inputs into the risk management process will include performance and cost factors which are described in Section 4 and Section 7 respectively. Key planning documents including this SAMP plus integrated planning and delivery documents will be revised on a regular basis to ensure the critical asset management strategic challenges and opportunities are prioritised.



PCaR category	Description
Service performance	A measure of outputs or objectives that an organisation is required to deliver to customers and stakeholders
System performance	A measure of an infrastructure system to consistently meeting its required specifications
Asset performance	A measure of the extent to which an asset is fulling its intended function
Resilience	A measure of an infrastructure system to deliver its function outside normal condition, considering external pressure and forcing factors from its environment
System health	A measure of an infrastructure system t deliver its function under and outside of normal conditions, over a period of time
Asset health	A measure of where an asset is along its useful life from commissioning through to the end of its life
Affordability	A measure of the capacity of customer to pay water rates that reflect the full costs of providing water service
Sustainability	A measure of an organisation's ability for using water in a way that meets current, ecological, social and economic needs without compromising the ability to meet those needs in the future
Reliability	A measure of an asset's ability to delivery its function under normal conditions

Figure 22: PCaR Balance



PCaR category	Key Performance Indicators (KPI)
Service performance	Water quality | Water continuity | Wastewater (WW) dry weather overflow
System performance	Water pressure | Water leakage | WW load and concentrations non- compliances | WW dry weather overflows L1.3
Asset performance	Asset performance index | Repeat failure rate | Maintenance effectiveness
System health	Capacity and capability
Asset health	Asset condition | Backlog
Overdue works	Overdue capital works | Overdue maintenance works
Deferred works	Deferred capital works | Deferred maintenance works
Works delivery	OMD – capital works | Works order delivery – maintenance works
Schedule efficiency	Planning efficiency – capital works | Mean time to repair – maintenance works

Figure 23: Decision Support Framework

6.2 Asset Risk Management Approach

The Asset Risk Management Approaches outlined in Table 10 involves risk-based decision-making and prioritisation of assets based on both the consequence and likelihood of failure. Also included in Table 10 is an indicative budget forecasting approach depending on the level of risk. Section 6.3 provides more information on the financial approaches depending on the asset management decision to be made.

As discussed in Section 2, having a more proactive asset management approach for aging infrastructure is becoming increasingly critical as the proportion of aging assets within Sydney Water's asset portfolio grows over time. In addition to aging, there are other technical end-of-life factors that can trigger early replacement or retirement of assets. These include commercial, economical and compliance redundancies.

Table 10: Lifecycle Decision-Making Approach

Risk Level	Asset Risk Management Approaches	Budget
Very High	Rigorous inspection and condition assessment to avoid failure – Monitoring and control	History-based + predictive forecasting for budgeting and resourcing
	Preventive and predictive replacement and enhancements	
	Prepare to enact Response and Recovery procedures	
High	Operate to "Potential Failure" with spares	History-based forecasts for budgeting and resourcing
	Periodic Scheduled Maintenance or Usage Based Maintenance	
	Predictive failure modelling and condition assessment to determine targeted infrastructure/asset cohorts for proactive intervention	
	Correct the root cause of failures	
Medium	Operate with Spares	Contingency Budgets
	Periodic Basic Maintenance, Periodic Scheduled Maintenance or Usage Based Maintenance	
	Monitor for "Infant Mortality"	
	Monitoring condition to inform Probability of Failure	
Low	Plan to Repair	Contingency Budgets
	Inspection to identify hidden failures where applicable	
	Maintain where cost effective	
	Correct the root cause of failures	

6.3 Financial Decision-Making Approach

There are two key approaches to financial decision making. The approach chosen will depend on the decision being made and the operating trade-off being managed, as shown in Table 11.

Table 11: Different types of decisions and their appropriate financial analysis

Decision Type	Key Trade-off	Appropriate Approach
Capital options assessment (i.e., comparison of different build options) – the consideration of alternative asset options once the decision to build a new asset has been made.	The whole of life cost of the alternative asset options.	**Net Present Value (NPV)** – shows the net present value whole of life cost of the alternative asset options.
Service maintenance on existing assets (i.e., should we continue to maintain or renew?).	The marginal cost in the next year of continuing to maintain vs renewing.	**Economic Value Add (EVA)** – shows the financial implication to customers in the next period[8] of the cost of continuing to maintain vs renewing.

The decision framework for each asset class will be underpinned by either one of these two approaches, depending on the key operating trade-off that needs to be managed. For decisions where the options being considered have similar lifespans/decision timeframes, an NPV analysis is appropriate as NPVs are designed to assess comparable options. However, decisions such as whether to maintain or renew an asset compare options with different commitment periods. If this year, the decision to continue maintaining is made, then realistically the decision can be revisited in the following year. However, if this year the asset is renewed, then realistically the decision won't be revisited until years later. These types of decisions require an EVA analysis, which is designed to assess options with dissimilar timeframes by comparing their associated costs over a one-year period.

Taking the water reticulation network as an example, the fundamental management decision is whether to continue maintaining or to renew sections of the network. Assume there is a 250m section of 100mm pipe that has just experienced its third failure in the last 2 years. It is now being considered for renewal and has the characteristics shown in Table 12.

An EVA financial analysis can be performed to help determine the optimal decision for customers by assessing the customer bill impact of each option. The analysis is shown in Table 13, where the right-most column shows the net impact of renewing on the customer bill in the next year period. A positive net total cost indicates that maintaining is the better option for customers, whereas a negative net total cost indicates that renewing is the better option. In this particular example, since the net total cost is positive, maintaining would be preferred option. An EVA analysis accounts for the full economic costs and benefits associated with a decision, which allows for a comprehensive trade-off assessment.

The risk and cost management approaches outlined in Sections 6.2 and 6.3 when combined with the asset and system performance in Section 4 will enable prioritisation of investment for service outcomes.

8 Period here refers to a one-year period. However, note that it may vary depending on the decision-making timeframe.

Table 12: Assumptions around the characteristics of the 250m section of pipe and its associated maintenance and replacement costs as of 2023

	Existing pipe	New pipe (if choose to renew)
Asset install year	1947	2023 (this year)
Asset current age	76 years	–
Asset expected life[9]	80 years	100 years
Cost of pipe at time of installation	$300/m	$1,500/m
Capital investment (i.e., cost of install)	$75,000	$375,000
Depreciation rate	$937.50/year	$3,750/year
Current asset value	$3,750	$375,000
Weighted average cost of capital (WACC)	5%	5%
Capital charge	$187.5	$18,750
Maintenance cost for the next year[10]	$7,200	$0

Table 13: Example – financial analysis using an EVA approach

	Cost to Maintain Existing Asset	Cost to Renew Asset	Impact of Renewal on Customer Bill in Next Period
Depreciation ($AUD)	937.50	3,750	2,812.50
Capital charge ($AUD)	187.50	18,750	18,562.50
Write-off cost ($AUD)	–	3,750	3,750
Total asset cost p.a. ($AUD)	**1,125**	**26,250**	**25,125**
Maintenance cost for the next year ($AUD)	7,200	0	(7,200)
Total cost for the next year ($AUD)	**8,325**	**31,875**	**17,925**

9 The new pipe is predicted to have a longer expected pipe due to differences in pipe material (i.e., new pipes tend to be plastic).
10 The cost of maintaining the existing pipe next year is estimated based on the assumption that maintenance costs escalate 5% every year.

07

Integrated Planning and Delivery

7. Integrated Planning and Delivery

There are three integrated levels of planning to support efficient service delivery in light of the high-level strategic challenges discussed in Section 2.4, (Figure 24):

1. **Service Planning** – the planning function responsible for understanding the long-term stakeholder and operating environment requirements and liaising with System Configuration Planning, Operational Service Planning, and stakeholders to ensure the right solutions are delivered.
2. **System Planning** – the planning function responsible for designing the long-term business and infrastructure system configuration required to meet evolving community needs.
3. **Asset Planning** – the planning function responsible for determining the optimal operational management practices to maintain efficient service delivery on existing infrastructure, whilst supporting efficient transition to the long-term system configuration.

Each infrastructure strategy introduces the structured approach as outlined in Figure 24 to provide intervention pathways to manage performance gaps across service, system and asset levels.

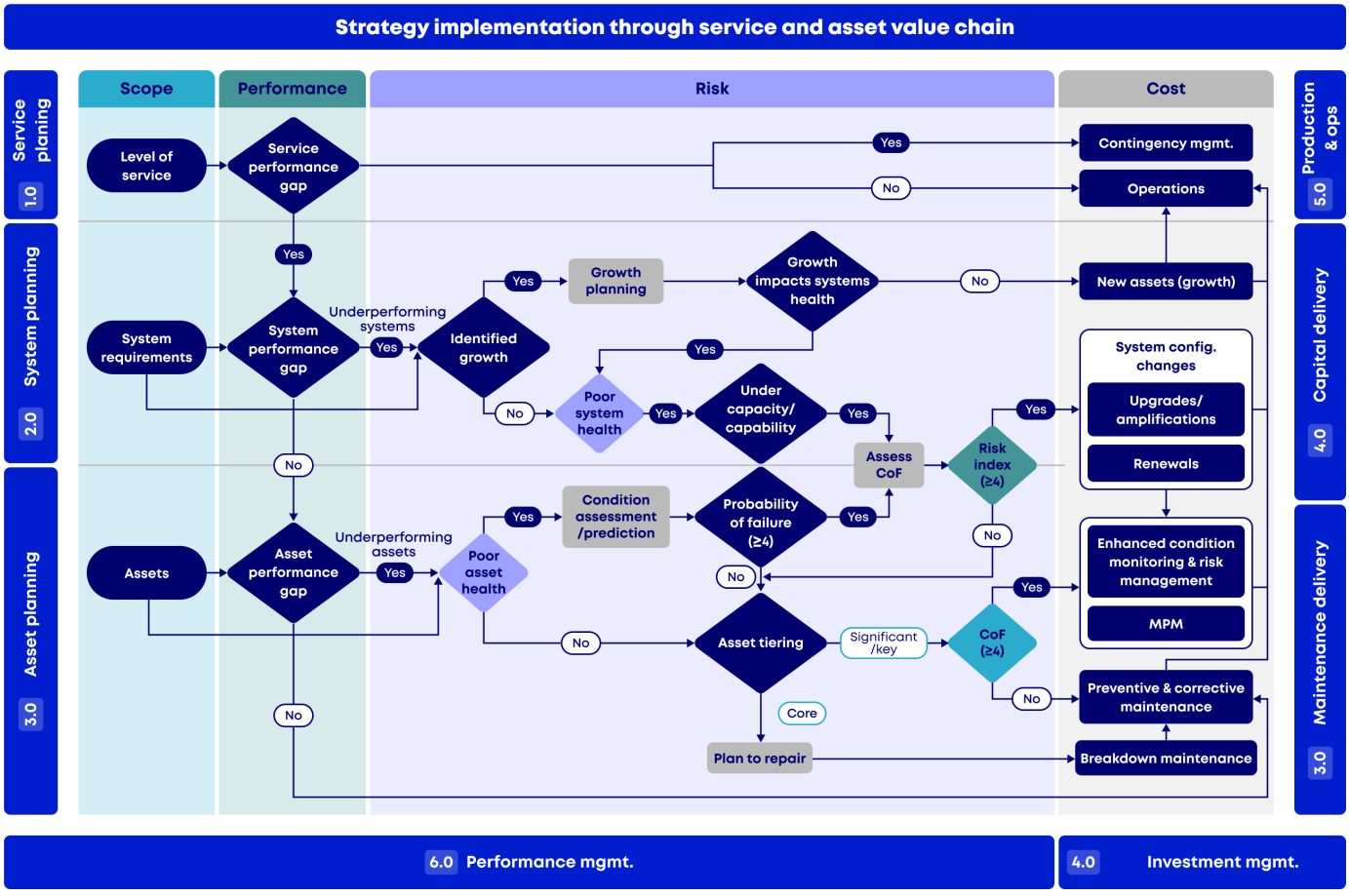


Figure 24: Intervention Pathways aligned to service and asset value chain

The interactions between these functions and the broader elements of the AMS is shown in Figure 25.

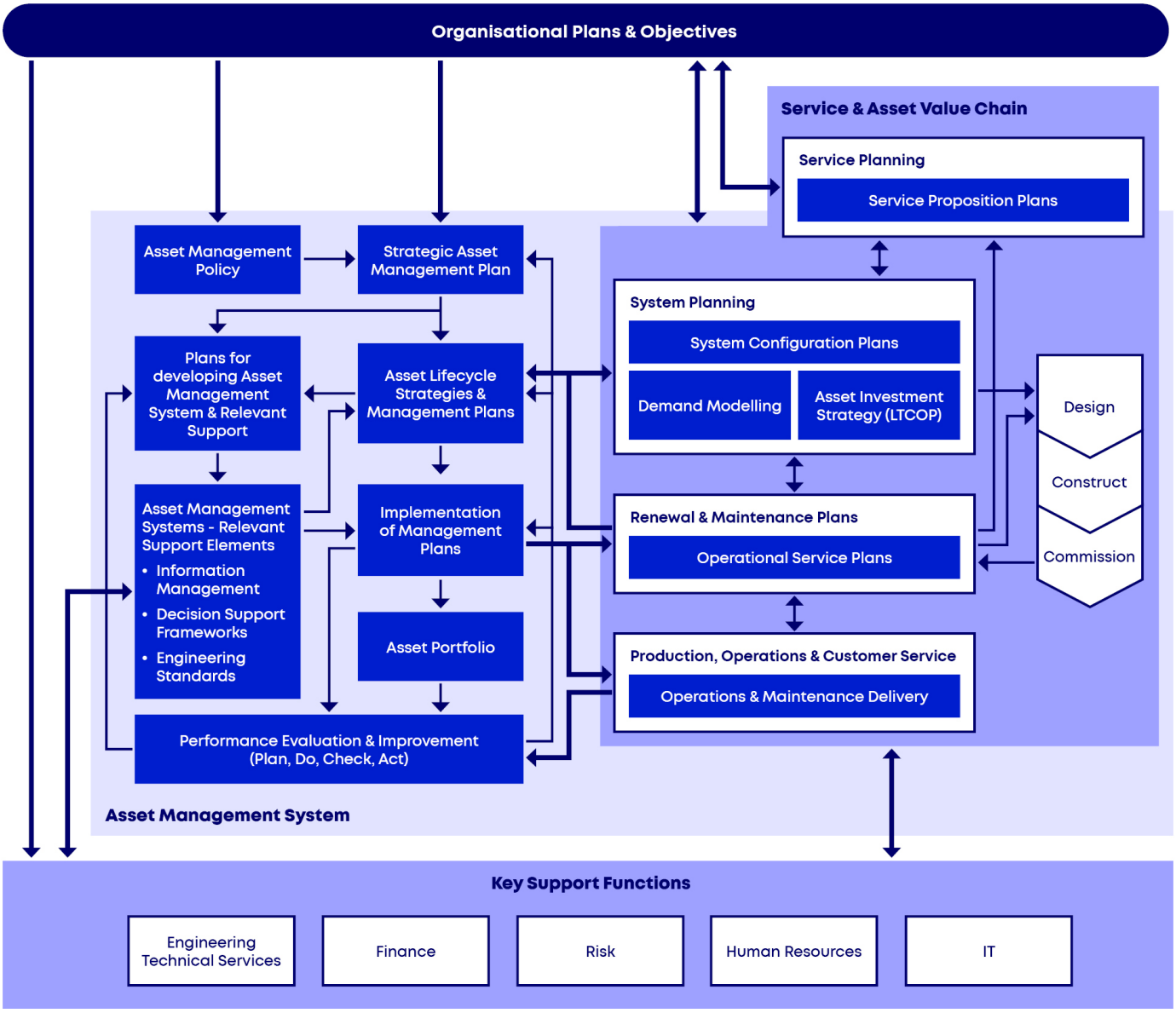


Figure 25: The AMS System boundaries and interactions with the wider business

7.1 Service Planning

Service Planning acts as the interface between Sydney Water and the stakeholders, and is responsible for:

- Engaging stakeholders and regulatory bodies to define their service requirements.
- Working with the Community stakeholders to determine Sydney Water's ongoing role in meeting current and emerging community needs.
- Engaging regulatory bodies to ensure that the regulatory environment adapts over time to support the delivery of the required solutions
- Consulting System Planning and Asset Planning to understand what is technically and financially feasible to deliver.
- Managing and shaping stakeholder expectations to obtain the social license to implement the required system solutions.

Service Planning influences Asset Management outputs, such as the SAMP and Asset Management Plans, by playing a key role in defining the organisational plans and objectives. Service Planning also influences the outputs produced by other key support functions to ensure business wide activities align with stakeholder requirements.

7.2 System Planning

System Planning is a planning function important for businesses managing long-lasting assets. Its core function is to translate stakeholder requirements into long-term business configuration plans. As part of this, it is responsible for:

- Engaging Service Planning to understand changes in stakeholder requirements and to provide advice on what would be technically and financially feasible solutions.
- Determining the long-term business system configuration changes required to ensure the service delivery system can continue to meet stakeholder needs in the long run.
- Engaging with Asset Planning to ensure solutions developed are operable, maintainable, and resilient to short-term shocks.
- Providing inputs to the capital delivery process to ensure the right assets are built.

System Planning requires inputs from Asset Management as well as other key support functions. One of the key inputs is the Long-Term Capital and Operational Plan (LTCOP).

7.2.1 Long-Term Capital and Operational Plan (LTCOP)

The Long-Term Capital and Operational Plan (LTCOP) aims to be an optimised defendable expenditure profile for sustainable growth, renewals and operational costs for the next 25 years. This plan will guide Sydney Water's approach regarding outcomes and investments to meet changing demand.

The LTCOP will inform System Planning by providing a high-level indication of timelines and costs for renewals, growth and large infrastructure projects in advance to ensure the right investment decisions are made at the right time. It will also help Sydney Water better understand urban water policy challenges over the long-term and be aware of future changes to water policy that will involve the procurement, use and disposal of assets. Additionally, the LTCOP will determine the future levels of service that will be used by Sydney Water to determine what demand needs to be met.

Key inputs to the LTCOP include population growth and water demand projections as shown in Figure 26 and Figure 27 respectively. These graphs show a forecasted increase in water demand which is consistent with increasing population growth which remains one of the challenges asset management faces moving forward.

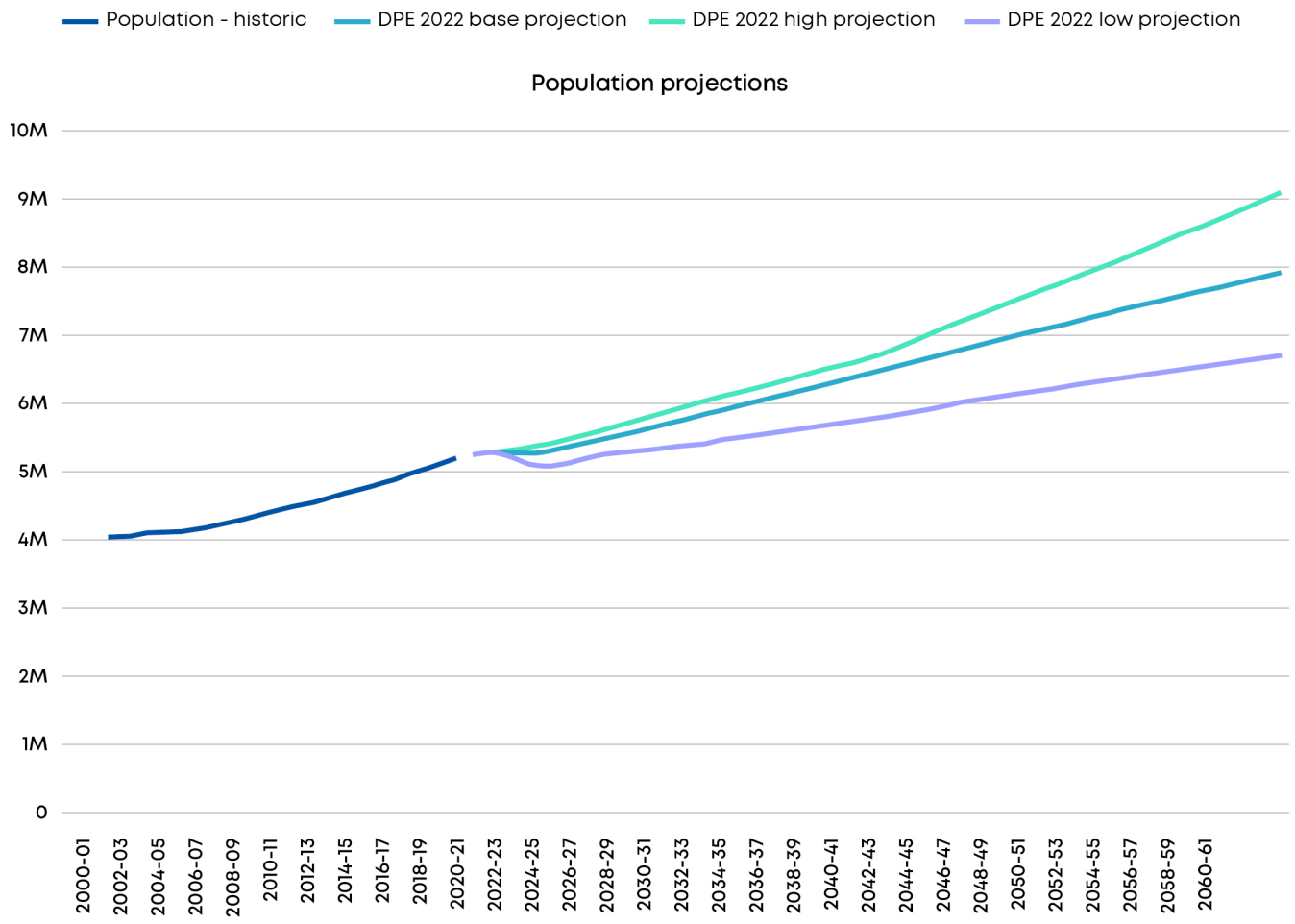


Figure 26: Population Projections from 2021 to 2061

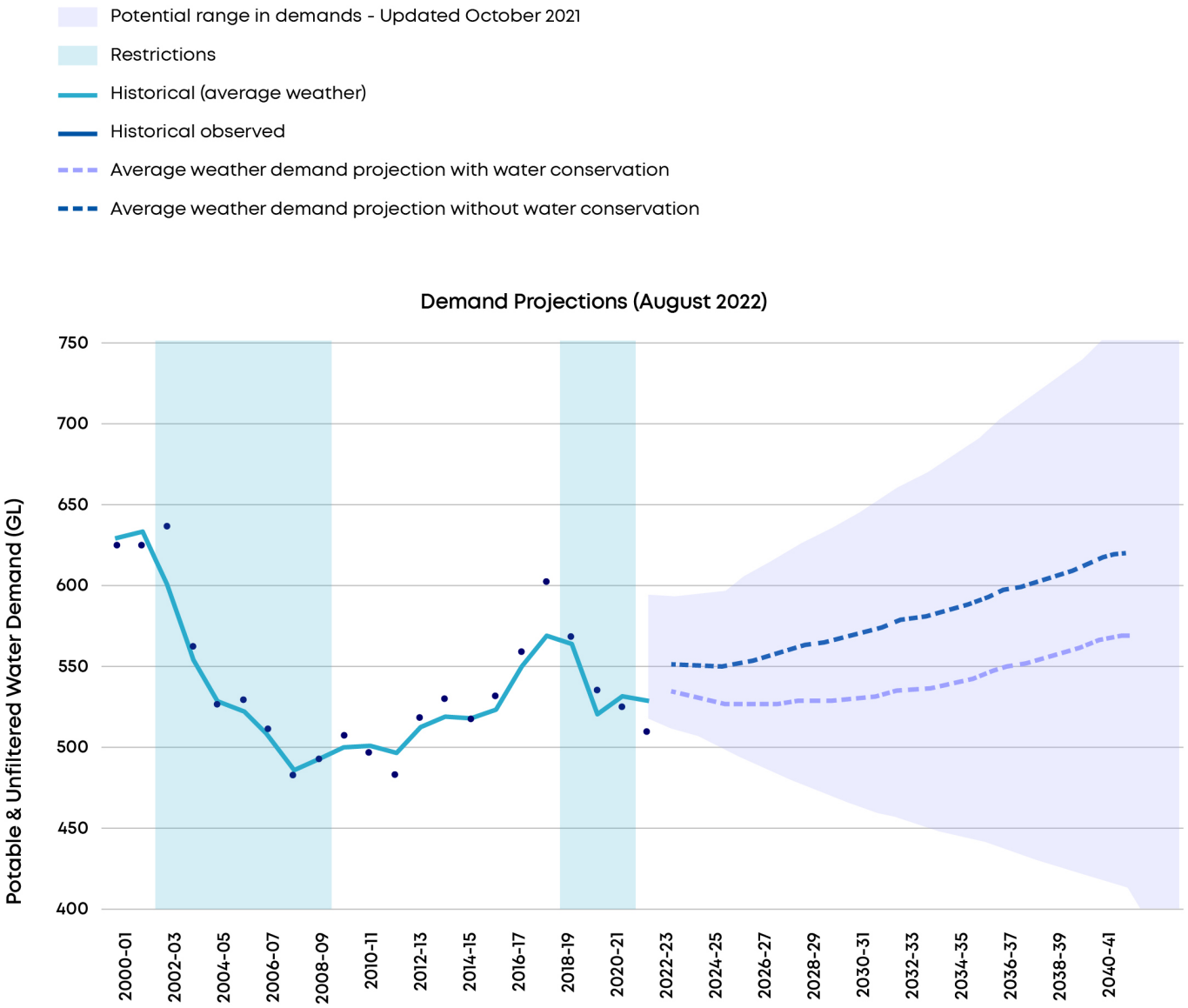


Figure 27: Demand Projections to 2041 (as of August 2022)

7.3 Asset Planning

Asset Planning's core objective is to determine the optimal management approach for maintaining cost-effective service delivery on existing business systems and infrastructure whilst ensuring efficient integration of long-term configuration solution.

This includes:

- Engaging Service Planning to ensure service delivery outcomes are aligned with stakeholder requirements.
- Optimising operations, maintenance, renewals, resilience, and workforce management to maintain service outcomes.
- Leveraging intelligent network solutions, such as monitoring technologies, to improve accuracy of management and intervention decisions.
- Developing efficient customer management processes to minimise impact of field operations.
- Engaging System Planning to ensure long-term configuration solutions will be operable, maintainable, and resilient
- Providing inputs to the capital delivery process to ensure the right assets are built at the right time
- Ensuring new system and infrastructure solutions are smoothly integrated into existing service delivery systems.

Similar to System Planning, Asset Planning requires inputs from Asset Management as well as other key support functions.

7.4 Service Delivery

Service Delivery refers to the aspect of the service and asset value chain where operational and maintenance plans are actioned to deliver a service to stakeholders. The evaluation of asset performance provides information on the effectiveness of implemented operational and management plans and allows areas for improvement to be identified. This will result in the revision/update of relevant service management plans or support frameworks to ensure improved service delivery. The 'plan, do, check, act' methodology provides a structured approach to continuous improvement (the feedback loop is illustrated in Figure 23).

Sydney Water has proven service delivery teams to operate and maintain assets. In addition, Sydney Water has a Major Projects team as well as a partnering model for both planning and delivery services for capital and opex investment - Partnering for Success (P4S).

The aim of this model is to:

- Simplify the supply chain and reduce the administrative burden on procurement and management
- Improve delivery efficiency through scale, work continuity and optimization; and
- Bring cost savings through incentivised performance.

The P4S model includes:

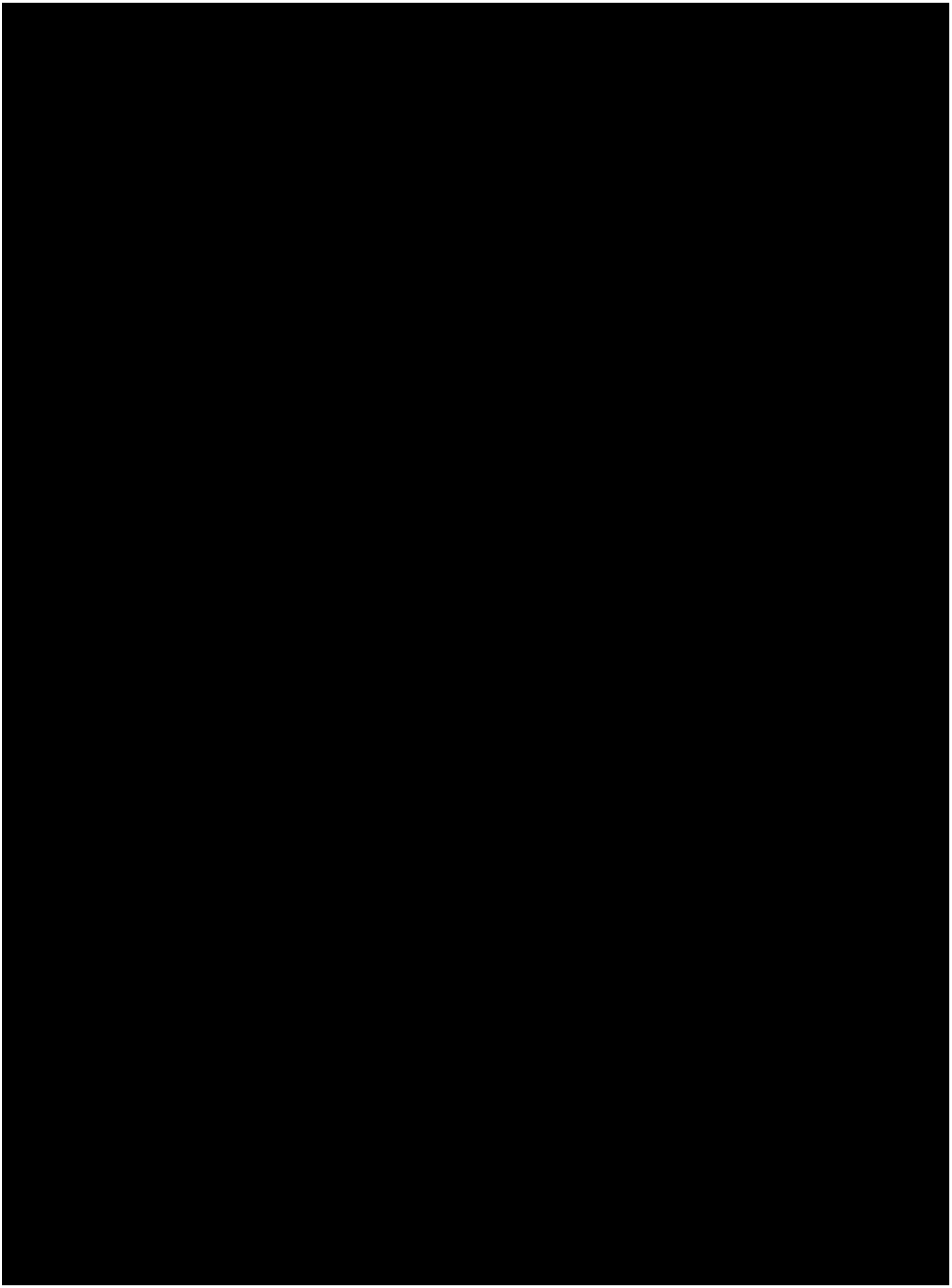
- Engineering partners for centralised planning – who are integrated with Sydney Water's team on planning and early design for projects; and
- Regional delivery partners for detailed design, construction, operations and maintenance, and facilities management – who work with Sydney Water project management staff in three regional integrated delivery teams.

7.4.1 Investment and Resourcing

A summary of Sydney Water's investment outcomes for each investment driver, including how they contribute to achieving the AMOs is shown below in Table 14.

Table 14: Investment Outcomes

Investment Drivers	Investment Outcomes
Water Network	A needs-based investment is expected to: • Sustain compliant performance for continuity for water services. • Optimise programs of investment and lifecycle costs. • Increase the health of the asset base by the end of the planning period such that further investment needs can be accommodated through routine programs of work.
Wastewater Network	Investments are expected to: • Sustain compliant performance for continuity for wastewater services. • Align with Wastewater treatment strategies to improve performance to a compliant level for dry weather overflows to waterways. • Further improve performance for dry weather non-compliant overflows to ensure targets are met. • Optimise programs of investment and lifecycle costs. • Improve the health of the asset base by the end of the planning period such that further investment needs can be accommodated through routine programs of work. • The wet weather overflows program specifically addresses performance in this area with a strategy that includes extensive works on privately owned infrastructure to reduce inflows and infiltration and hence overflows. This, along with works in the treatment programs is intended to improve compliance performance in this area.
Water Treatment	Investments are expected to: • Able to treat raw water of a lower quality and restore full compliance of water treatment plants with ADWG. • Optimise programs of investment and lifecycle costs. • Improve the health of the asset base by the end of the planning period such that further investment needs can be accommodated through routine programs of work.
Wastewater Treatment	For wastewater treatment, there is significant investment. Assets exist in poor condition and many treatment plants are non-compliant. The current strategies are expected to. • Restore compliant performance. • Optimise programs of investment and lifecycle costs. • Improve the health of the asset base by the end of the planning period such that further investment needs can be accommodated through routine programs of work.
Stormwater	Stormwater assets are generally in good condition and performing well. Current strategies are expected to sustain this.
Growth	The growth strategies seek to ensure that Sydney Water is able to continue to supply reliable and resilient water and wastewater services to new customers into the future in line with capacity needs and maintain acceptable service levels.



08

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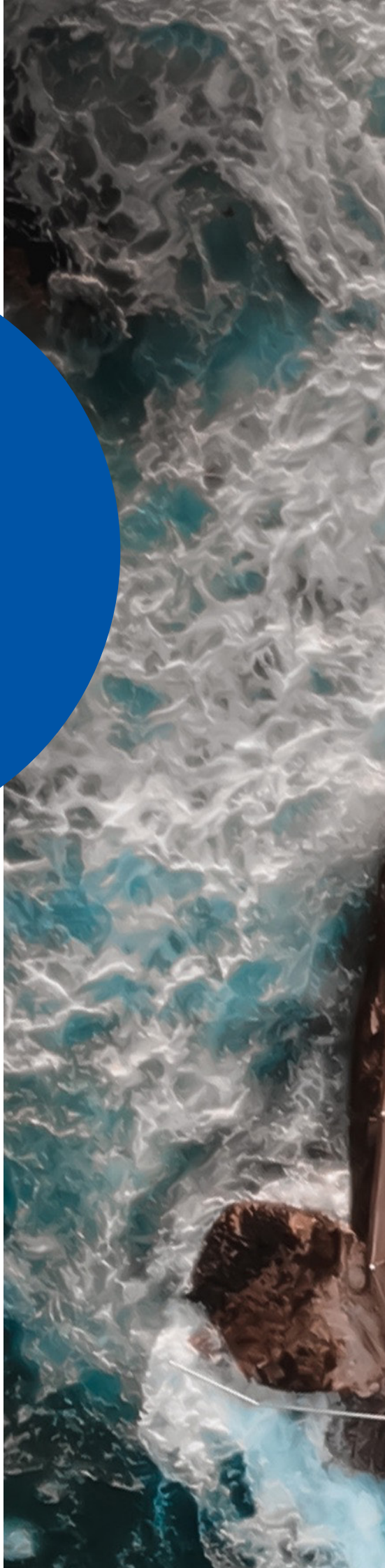
09

Document Control



9. Document Control

> This document has been developed in collaboration with major asset management stakeholders across Sydney Water. This SAMP is intended to be a living document, reviewed and updated as information changes. The SAMP should have a formal review and update every 2 years to ensure alignment throughout the document.

9.1 Document Ownership

Table 15: Document Ownership

Role	Title
Group	Water and Environment Services
Owner	Executive General Manager (EGM), Water and Environment Services (WES)
Author	Principal Manager Strategic Product and Infrastructure Performance

10

Appendices

10. Appendices

Appendix 1 – Acronyms

Table 17: Acronyms

Term / Acronym	Description
AIM	Asset Information Management
AM	Asset Management
AMO	Asset Management Objective
AMS	Asset Management System
BM	Breakdown Maintenance
BOO	Build Own and Operate
CAPEX	Capital Expenditure
CCMDB	Change & Configuration Management Database
CCTV	Closed-Circuit Television
CIP	Capital Improvement Plan
EAM	Enterprise Asset Management
EP	Environment Protection
EPA	Environment Protection Agency
EPL	Environment Protection Licence
ERM	Enterprise Risk Management
EVA	Economic Value Add
FTE	Full-Time Employees
FY	Financial Year
GSIP	Growth Servicing Investment Plan
GSWS	Greater Sydney Water Strategy
Hi-PO	High Potential Incidents

Term / Acronym	Description
IAM	Institute of Asset Management
ICT	Information and Communications Technology
IICATS	Asset System Telemetry Data (Network)
IPART	Independent Pricing and Regulatory Tribunal
KPI	Key Performance Indicator
LTCOP	Long-Term Capital and Operational Plan
NPV	Net Present Value
NSOOS	Northern Suburbs Ocean Outfall Sewer
NSW	New South Wales
OPEX	Operational Expenditure
P4S	Partnering For Success
RAG	Red, Amber, And Green
SAMP	Strategic Asset Management Plan
SAP	System and Asset Planning
SCADA	Sensor Monitoring and Alarm System
SFP	Single Failure Point
SOCI	Security Of Critical Infrastructure
SPS	Sewage Pumping Stations
SWSOOS	South Western Suburbs Ocean Outfall Sewer
TRIFR	Total Recordable Injury Frequency Rate
WACC	Weighted Average Cost of Capital

Appendix 2 – Definitions

Table 18: Definitions

Term / Acronym	Definition / Description
Infrastructure Strategies	Sizeable action statements defined at the infrastructure system level to achieve Asset Management Objectives in the long-term.
Asset Information Management	The management approach to the definition, collection, maintenance, reporting and overall governance of asset information necessary to support the implementation of Sydney Water's Asset Management Objectives.
Asset Management Key Result Areas	A set of asset management areas identified as crucial where results will assist in the achievement of the set Asset Management Objectives.
Asset Management Objectives (AMOs)	An Asset Management Objective is a strategic, tactical or operational result that an organisation aims to achieve within the context of an Asset Management System. An Asset Management Objective is consistent with an organisation's Asset Management Policy and organisational objectives and achieves measurable results.
Asset Management Policy	A governing artefact endorsed by Sydney Water's managing director which outlines the Asset Management Principles.
Asset Management System (AMS)	An Asset Management System is a set of interrelated and interacting elements of Sydney Water to establish the Asset Management Policy and Asset Management Objectives and the processes needed to achieve those objectives. In this context, the elements of the Asset Management Systems should be viewed as a set of tools, which includes policies, plans, business processes and information systems, which are integrated to enable an assured delivery of asset management activities.
Capital Charge	The cost of capital, which includes both the cost of borrowing and the cost of equity. Calculated by multiplying the value of the asset base with the weighted average cost of capital (WACC).
Economic Value Add (EVA)	A financial metric based on residual wealth, calculated by deducting a firm's cost of capital from operating profit.
Greater Sydney Water Strategy	The strategy sets out priorities and actions for the delivery of water, wastewater, recycled water and stormwater services into the future to support a sustainable, liveable and productive Greater Sydney.
Level of Service	The defined service quality for a particular service/activity against which service performance may be measured. Service levels usually relate to quality, quantity, reliability, responsiveness, environmental impact, acceptability and cost.

Term / Acronym	Definition / Description
Long Term Capital & Operational Plan – LTCOP	The LTCOP outlines a plan based upon a range of investment options, in the context of a growing population and a changing climate, enabling effective planning to service Greater Sydney's needs over a 20-year horizon. It provides: • System wide view to meet Sydney's future water needs • A consistent and clear platform for setting future capital and operational investments for Greater Sydney • Significant inputs to develop Greater Sydney Water Strategy The LTCOP will be a key input to the Greater Sydney Water Strategy (GSWS) and WaterNSW and Sydney Water will work collaboratively with DPIE to ensure alignment of the LTCOP with the GSWS.
One Strategy	A corporate strategy is a documented record of an organisation's mission, values, vision, long term goals, definition of success, strategic success measures, targets and business model over the planning horizon. The planning horizon for Sydney Waters corporate strategy is five years. (Documents and Records Management Procedure)
Asset Planning	The planning function responsible for determining the optimal operational management practices to maintain efficient service delivery on existing infrastructure, whilst supporting efficient transition to the long-term system configuration.
Service Excellence Roadmap	An outline of the key focus areas and work streams required over the next few years to improve the asset management capability to improve the asset management risk at the enterprise level
Reticulation network and customer management	Refers to the system of assets which: • Distribute water from the water delivery system to customers through the reticulation network[11], • Remove sewage from the customers to the sewage transfer system • Interface with the customer, both physical and virtual.
Service Planning	The planning function responsible for understanding the long-term stakeholder and operating environment requirements and liaising with System Planning, Asset Planning, and stakeholders to ensure the right solutions are delivered.
Sewage Transfer System	The system of assets which transfer, treat and dispose sewage and by-products of the process, including major gravity trunk network, pumped transfer systems, treatment plants and disposal of solids and liquids.
Strategic Asset Management Plan (SAMP)	Strategic Asset Management Plan refers to documented information that specifies how organisational objectives are to be converted into Asset Management Objectives.
System Planning	The planning function responsible for designing the long-term business and infrastructure system configuration required to meet evolving community needs.
Total Asset Cost	The sum of depreciation and capital charge

11 Commonly defined as sub 300mm pipes.

Term / Acronym	Definition / Description
Integrated Water System	The system of water treatment and transfer network including treatment plants, trunk pipelines, pump stations and storage reservoirs for the maintaining supply to reticulated customers.
Weighted Average Cost of Capital (WACC)	Represents a firm's average after-tax cost of capital from all sources including common stock, bonds, and other forms of debt.
Weighted Average Price Cap	A Weighted Average Price Cap is an approach to pricing that "means all tariffs within a 'basket' of regulated services are set every year by the firm [Sydney Water], with approval by the regulator, subject to a cap on the overall weighted average increase in charges. Prices for each service could be adjusted as long as the overall cap is met. Firms can apportion costs between services and set prices to reflect costs. Year-on-year, prices can be adjusted (rebalanced) so that efficiency and revenue are maximised" (Best Practice). A Weighted Average Price Cap was implemented in response to "the need for better economic regulation of the urban water sector" (Best Practice Regulation). It is used "to vary the types and levels of tariffs charged to customers during the regulatory period, subject to suitable pricing guidelines and, if necessary, side constraints" (Review Prices 2014).

Appendix 3 – Roles and Responsibilities

Table 19: Roles and Responsibilities

Asset Management Functions	Asset Management Controls	Asset Management Controls Description	Driver
1.0 Strategic Asset Management	**1.1** Stakeholder management ⚠	Provides a framework for the development and implementation of the strategic asset management plan (SAMP) and the setting of the asset management objectives.	WEIP
	1.2 Purpose and context of asset management	Define the scope and boundaries of AM and the Sydney Water objectives that AM aims to deliver.	WEIP
	1.3 Asset Management policy	Provide the principles that direct the development and implementation of the strategic asset management plan (SAMP) and the establishment of Asset Management Objectives.	WEIP
	1.4 Asset Management Strategy development and deployment (SAMP) ⚠	• Translates Sydney Water objectives into AM objectives, • Defines Sydney Water's AMS • Defines the performance, cost and risk (PCaR) approach • Outlines the infrastructure strategy requirements to deliver the AM objectives.	WEIP
2.0 Asset Management Capability	**2.1** Asset Management leadership ⚠	Promote a whole life AM approach to delivering Sydney Water strategic success measures and AM objectives.	WEIP
	2.2 Asset Management structure	Facilitate an effective AM culture by ensuring roles and responsibilities clearly contribute to the achievement of AM objectives.	WEIP
	2.3 Asset Management culture	How Sydney Water people think and behave in response to the organisation's vision, mission and values.	P&C | WEIP
	2.4 Asset Management competence management	Develop, and maintain competent and motivated people who understand how to perform the AM activities needed to achieve the objectives.	P&C | WEIP
	2.5 Asset Management knowledge management	Identifying, capturing, organizing, and retaining knowledge, transforming tacit knowledge into explicit knowledge.	R&A | WEIP
	2.6 Process and Change management for Asset Management	Supports individuals through changes to AM processes, technology, organizational alignment, and culture in a structured way to sustain desired changes.	SC&BP | WEIP

Asset Management Functions	Asset Management Controls	Asset Management Controls Description	Driver
3.0 Asset & Systems Planning	**3.1** Demand analysis	The processes used to evaluate, analyse, and influence servicing demands and to perform the evaluation and analysis of the capability of assets to meet demand.	G&D | SP&LA | ETS
	3.2 Sustainable development	The holistic approach to balance economic activity, environmental responsibility, social governance, and progress to ensure all activities are sustainable over multiple timeframes while supporting objectives.	SP&LA
	3.3 Planning ⚠	Specifies the detailed activities and resources, responsibilities, time horizons, and risks for the achievement of AM objectives.	SP&LA | ETS
4.0 Infrastructure Investment Decisions	**4.1** Asset costing and valuation	Asset Costing is the end-to-end process for defining, capturing, and utilising the TOTEX (Total Expenditure) of physical assets or systems of assets throughout their life cycle. This includes the costs associated with planning, design, acquisition, construction, operation, maintenance, renewal, and disposal. Asset Valuation is Sydney Water's end-to-end process for quantifying the financial value of assets in accordance with accounting standards.	IDO | CF
	4.2 Investment decision-making ⚠	Comprises the principles and criteria, decision-support techniques, information, and processes to address risks or opportunities through the development of costed alternatives and the selection of value for money solutions across the full life cycle.	WEIP
	4.3 Resourcing strategy and management ⚠	Determining the strategies, management of activities and processes to be undertaken to engage people acquire and use assets (e.g., tools, equipment), materials and services to deliver the AM objectives.	WS&P | WRR | NO | NM | PD | MP
	4.4 Resourcing strategy and management	Activities to ensure the best total value from investments and benefits in different physical and non-physical assets across all asset life cycle stages.	IIP
5.0 Lifecycle Engineering	**5.1** Technical standards and legislation ⚠	The process used by an organization to ensure all its AM activities Compare compliant with relevant technical standards, regulations, and legislation.	ETS
	5.2 Management of change ⚠	The systematic approach to Sydney Water's processes for the identification, assessment, implementation, and communication of changes to processes and assets.	WS&P | WRR | NO | ETS
	5.3 Systems engineering	A methodical, disciplined approach for the design, realisation, technical management, operations and retirement of an infrastructure system.	ETS
	5.4 Integrated reliability ⚠	It is an approach that applies engineering principles and techniques to identify and mitigate potential failure modes, minimise downtime, and optimise performance throughout the whole life cycle.	ETS

Asset Management Functions	Asset Management Controls	Asset Management Controls Description	Driver
6.0 Asset Construction & Disposal	**6.1** Asset creation and acquisition	Encompasses activities and supporting processes around the planning, acquisition, design, supply, construction, commissioning and handover of assets.	MP | PD
	6.2 Asset decommissioning or disposal	Decommissioning and disposal of assets at end of useful life.	MP | PD
	6.3 Shutdown and outage strategy and planning	The identification, planning, scheduling, execution, and control of work related to shutdowns, turnarounds, or outages (STOs). It includes management of events that ensure effective business continuity management.	MP | PD | NM
7.0 Operations & Maintenance Delivery	**7.1** Asset operation	Encompasses the processes and procedures used to operate Sydney Water assets and achieve AM objectives. It includes the development and management of plans for communicating instructions on how to operate the assets within their required parameters.	WS&P | WRR | NO
	7.2 Maintenance delivery	Encompasses the management of maintenance work activities for tangible and intangible assets throughout their intended life cycle. It also manages asset data and information record keeping within the maintenance environment, and updating maintenance strategies.	PD | NM
	7.3 Incident management and response	Encompasses the entire incident life cycle, including incident identification, escalation, reporting, response, investigation, remediation, and data gathering.	PS&EM | WS&P | WRR | NO | CH
	7.4 Supply chain management	Provisioning of all equipment, tools, and resources to perform AM activities.	P&SC
8.0 Asset Information Management	**8.1** Asset Management data and information strategy	The strategic approach to the definition, collection, management, disposal, analysis, reporting and overall governance of AM data and information necessary to support the implementation of Sydney Water's AM strategy and objectives.	WEIP
	8.2 Asset Management data and information standards	The specification of a consistent structure and format for the acquisition, maintenance and use of fit for purpose data and information required to support AM activities, including defining and monitoring its purpose, quality and value to the organization.	ETS
	8.3 Asset Management data and information management	Management and governance of all AM data and information. It includes the work processes and procedures related to treatment of data and information as an asset, including data governance and security over the life cycle of the data and information.	ETS
	8.4 Asset Management data and information systems	Supports AM activities and decision-making processes in accordance with the Asset Information Strategy and in support of all AM processes.	ETS
	8.5 Configuration management	Disciplined technical and administrative direction and monitoring to identify and document functional and physical characteristics of an asset (eg physical, location, O and M instructions), control any changes to those characteristics and record/report changes in status.	ETS | Digital

Asset Management Functions	Asset Management Controls	Asset Management Controls Description	Driver
9.0 Performance management & continuous improvement	**9.1** Outcomes and impacts of asset management	Assess the extent to which the implementation of AM activities achieves AM objectives and therefore Sydney Water objectives to meet stakeholder and regulator expectations.	WEIP | ETS
	9.2 Monitoring ⚠	A dynamic process that relies on the effective use of data and metrics (financial and non-financial) to continuously evaluate the effective management of assets throughout their life cycle.	WEIP
	9.3 Continuous improvement	An ongoing process of analysing performance, identifying opportunities, and making incremental changes to increase the value generated by assets.	SC&BP | WEIP
10.0 Risk Management	**10.1** Contingency planning and resilience analysis ⚠	The policies, plans, processes, and systems established by Sydney Water to respond and recover from a hazard event, crisis, or disaster. This includes ensuring continuity of critical functions, services, and assets during the crisis, as well as resumption of normal operations thereafter.	PS&EM | WS&P | WRR | NO | CH
	10.2 Management of Asset Risk ⚠	The management of uncertainties on Asset Management objectives through policies and processes for identifying, quantifying, mitigating risk and exploiting opportunities associated with existing and future Sydney Water and Asset Management objectives.	WS&P | WRR | NO | ETS | R&A | WEIP
11.0 Governance	**11.1** Asset Management System (AMS)	A set of interacting elements within Sydney Water to establish, update, and sustain asset management, AM policies, AM objectives and the processes to achieve those objectives.	SC&BP | WEIP
	11.2 Asset Management assurance and audit	Assuring and auditing the effectiveness of its assets, asset management practices and AMS to ensure Sydney Water's Asset Management objectives are being achieved and its assets fulfil their required purpose.	R&A | WEIP

Legend

⚠ Key control

WEIP – Water, Environment, and Infrastructure Performance | **SP&LA** – System Planning and Land Acquisition | **G&D** – Growth and Development | **ETS** – Engineering and Technical Support | **IIP** – Infrastructure Investment Programs | **IDO** – Infrastructure Delivery Office | **PD** – Program Delivery | **MP** – Major Projects | **WS&P** – Water Supply and Production | **WRR** – Water Resource Recovery | **NO** – Network Operations | **NM** – Network Maintenance | **SC** – Supply Chain | **SC&BP** – Strategy, Change and Business Performance | **CH** – Customer Hub | **Comp. & Reg.** – Competition and Regulation | **CF** – Corporate Finance | Digital | **PS&EM** – Protective Security and Emergency Mgmt. | **P&C** – People and Culture | **R&A** – Risk and Assurance | **P&SC** – Procurement and Supply Chain

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