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Department of Planning and Environment

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# Guidance on strategic planning outcome – Understanding system capacity, capability and efficiency

Regulatory and assurance framework for local water utilities

November 2022



# Acknowledgement of Country

The Department of Planning and Environment acknowledges that it stands on Aboriginal land. We acknowledge the Traditional Custodians of the land and we show our respect for Elders past, present and emerging through thoughtful and collaborative approaches to our work, seeking to demonstrate our ongoing commitment to providing places in which Aboriginal people are included socially, culturally and economically.

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Published by NSW Department of Planning and Environment

[dpie.nsw.gov.au](https://dpie.nsw.gov.au)

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First published: November 2022

Department reference number: PUB22/935

## Acknowledgements

This guidance was developed in partnership with the local water utilities sector. We particularly acknowledge the contribution of members of the Town Water Risk Reduction Program’s working group on local water utility strategic planning to the development of this guidance.

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# 1. Introduction

Local water utilities can best meet the needs of their customers, and manage key risks, when their decisions and activities are based on effective, evidence-based strategic planning.

The NSW Department of Planning and Environment is committed that all local water utilities should have in place effective, evidence-based strategic planning. This will ensure utilities deliver safe, secure, accessible, and affordable water supply and sewerage services to customers. It will also ensure they can manage key risks now and into the future, and in the event of significant shocks. Local water utilities remain responsible for conducting strategic planning.

The department gives assurance of effective, evidence-based strategic planning. Local water utilities not making dividend payments<sup>1</sup> are encouraged, but not compelled, to use the department's assurance framework, experience and capacity to support effective strategic planning.

Through the department's assurance role under section 3 of the [Regulatory and assurance framework for local water utilities \(PDF, 1613.11 KB\) - Regulatory and Assurance Framework](#) - we establish what outcomes we expect effective, evidence-based strategic planning to achieve (see section 3.2 of the Regulatory and Assurance Framework) and assess if a utility's strategic planning achieves these outcomes to a reasonable standard (see sections 3.3 and 3.4 of the Regulatory and Assurance Framework).

We give separate, optional guidance in the department's guidance [Using the Integrated Planning and Reporting framework for local water utility strategic planning \(PDF, 573.33 KB\)](#) to explain how utilities can achieve the strategic planning outcomes to a reasonable standard using the *Integrated Planning and Reporting Framework* for councils under the *Local Government Act 1993*.

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## 1.1. Purpose of this document

This document supplements the Regulatory and Assurance Framework and gives guidance on achieving the outcome of understanding system capacity, capability and efficiency to a reasonable standard.

This guidance is consistent with the objectives and principles established under the Regulatory and Assurance Framework, including being outcomes focused and risk-based.

This document sets out good practice for **all local water utilities** to apply when doing strategic planning to achieve the outcome of understanding system capacity, capability and efficiency.

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<sup>1</sup> Sections 3 and 4 of the Regulatory and Assurance Framework, are also the Guidelines for council dividend payments for water supply or sewerage services, under section 409(6) of the *Local Government Act 1993*. Before taking a dividend payment from a surplus of the council's water supply and/or sewerage business, a council must have in place effective, evidence-based strategic planning in accordance with section 3 of the Regulatory and Assurance Framework.

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## 1.2. Structure of this document

This guidance is structured providing:

- the expectations for achieving this outcome to a reasonable standard
- an appendix with optional 'how to' guidance that helps utilities achieve assurance expectations.

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## 1.3. Review of this draft guidance

As part of our commitment to continuous improvement, we will review the performance of the Regulatory and Assurance Framework within 2 years from finalisation. There will also be periodic reviews of the full suite of relevant regulatory and assurance documents, which will happen at least every 5 years.

We welcome feedback on this guidance and will update it when needed based on feedback or a 'lessons learned' review following our assessment of strategic planning by local water utilities.

## 2. Oversight of local water utility strategic planning

Under section 3 of the [Regulatory and assurance framework for local water utilities \(PDF, 1613.11 KB\)](#), the department establishes what outcomes it expects effective, evidence-based strategic planning to achieve (see section 3.2) and assesses whether a local water utility's strategic planning achieves these outcomes to a reasonable standard (see sections 3.3 and 3.4).

Councils making a dividend payment from a surplus of their water and/or sewerage business must meet the expectations set out in section 3 and section 4 of the Regulatory and Assurance Framework.<sup>2</sup> Local water utilities not making dividend payments are encouraged, but not compelled, to utilise the department's assurance framework, experience and capacity to support effective strategic planning.

For effective, evidence-based strategic planning to occur, the department expects strategic planning to achieve the following outcomes to a reasonable standard:

- Understanding service needs
- Understanding water security
- Understanding water quality
- Understanding environmental impacts
- Understanding system capacity, capability and efficiency (**this guidance**)
- Understanding other key risks and challenges
- Understanding solutions to deliver services
- Understanding resourcing needs
- Understanding revenue sources
- Make and implement sound strategic decisions
- Implement sound pricing and prudent financial management
- Promote integrated water cycle management

A **reasonable standard** is met if the utility considers and addresses an outcome in a way that is:

- **sufficient:** underpinned by evidence-based analysis that supports the conclusions reached
- **appropriate:** underpinned by relevant departmental guidance and industry standard approaches to conduct planning and reach conclusions

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<sup>2</sup> Sections 3 and 4 of the Regulatory and Assurance Framework, are also the Guidelines for council dividend payments for water supply or sewerage services, under section 409(6) of the *Local Government Act 1993*. Before taking a dividend payment from a surplus of the council's water supply and/or sewerage business, a council must have in place effective, evidence-based strategic planning in accordance with section 3 of the Regulatory and Assurance Framework.

- **robust:** underpinned by evidence that draws on appropriate sources and recognises and rebuts potential alternative interpretations.

The assessment considerations the department will apply and how these may be addressed are set out in more detail in the Regulatory and Assurance Framework.

# 3. Guidance on understanding system capacity, capability and efficiency

Under section 3.2 of the Regulatory and Assurance Framework, the department expects utilities to achieve the strategic planning outcome **understanding system capacity, capability and efficiency** to a reasonable standard. This includes considering:

- What is the capacity and capability of systems to deliver water (and future capacity and capability needs)?
- What is the capacity and capability of its systems to collect and treat sewerage (and future capacity and capability needs)?
- How will the local water utility consider water efficiency in its systems?

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## 3.1 Understanding system capacity, capability and efficiency

In general, the department's expectations are that a local water utility understands the:

- extent and nature of the assets and systems it uses to deliver service
- ability of the systems to deliver the required water and sewerage service
- actual performance, including efficiency, of the systems in delivering service.

The intent of this outcome is that a local water utility understands its systems, their ability to deliver service, and their actual performance. Having this understanding is an important foundation for strategic planning but also, understanding performance (and efficiency in particular) is part of any plan – do – check – act cycle.

The outcome of understanding system capacity, capability and efficiency is closely related to other strategic planning outcomes of:

- understanding service needs
- understanding solutions to deliver services.

Through strategic planning, service needs are compared with the capabilities of the local water utility's systems and assets and service gaps are identified. Solutions to fill these gaps then are selected through analysis of options and solutions to address them. The guidance on understanding solutions to deliver service also includes more details on asset management, including the expectation that local water utilities maintain sufficient knowledge over their assets and systems to inform strategic planning. Additionally, guidance on understanding service needs gives more detailed guidance on approaches on forecasting demand.



In the following sections set out **what** the department’s expectations are for **understanding system capacity, capability and efficiency** to a reasonable standard. In Appendix A, we provide optional guidance on **how** some of these expectations could be met.

## Definitions for capacity, capability, performance and efficiency

For the purpose of this guidance and in the context of local water utility strategic planning, the definitions for capacity, capability, performance and efficiency are set out in table 1. The table also provides simple examples of each concept as applicable to local water utilities.

Table 1. Capacity, capability, performance and efficiency

Definition	Example
<p><b>Capacity</b></p> <p>The physical characteristics of an asset that are relevant to it providing service.</p>	<ul style="list-style-type: none"> <li>• The reservoir has a 1 ML capacity.</li> <li>• The pump has two 5 kW motors in duty/standby arrangement.</li> <li>• The pipe is 300 mm in diameter.</li> </ul>
<p><b>Capability</b></p> <p>The ability of a system or network of assets to provide service. Capability may vary depending on the operating conditions.</p>	<ul style="list-style-type: none"> <li>• The reservoir can supply the town population in average conditions.</li> <li>• The pump can deliver the required pressure of 20 m head to all customers in the supply zone.</li> <li>• The pipe is able to contain 5 x average dry weather flows.</li> </ul>
<p><b>Performance</b></p> <p>A measurable result that we are interested in. AS ISO55001: 2014 Asset management – Management systems – Requirements, states that performance is of interest for:</p> <ul style="list-style-type: none"> <li>• assets (which include asset systems)</li> <li>• asset management</li> <li>• the asset management system</li> </ul>	<ul style="list-style-type: none"> <li>• Two customers reported low water pressure and on investigation, it was found that around 10 more were impacted for a period of 4 hours.</li> <li>• An overflow from the sewer network occurred during a storm and approximately 0.5 kL of sewage was surcharged.</li> <li>• The frequency of blockages/chokes in the sewer network was 13 per 100 km last year.</li> </ul>
<p><b>Efficiency</b></p> <p>A particular aspect of performance which is a measure of the proportion of an input required to deliver the output produced.</p>	<ul style="list-style-type: none"> <li>• Non-revenue water in the supply system for the town is 13% of the total water supplied.</li> <li>• The water booster pump is used for an average of 1 hr per day over the last two years.</li> </ul>

## 3.2 How will the local water utility understand the capacity and capability of systems to deliver water, and collect and treat sewage (and future capacity and capability needs)?

### The utility's knowledge of the capacity of its water and sewerage systems should adequately cover its assets, be sufficiently accurate and current

Water and sewerage services are delivered by individual assets that work together in systems and networks. The scope and nature of the water and sewerage assets should be understood to a reasonable standard to support strategic planning. There is a cost to capturing and managing asset information and this cost needs to be weighed against the benefits of the information.

It would never be expected that a local water utility has perfect information regarding its assets. Instead, a local water utility should have knowledge of the physical assets that:

- adequately covers the assets and the important characteristics of the assets based on the criticality of the assets (see following for further information on criticality)
- is sufficiently accurate for the purpose of which the knowledge is used
- the currency of which is maintained appropriate to the context in which the knowledge is used.

This expectation is consistent with that outlined in the guidance on the outcome of understanding solutions to deliver services.

### The utility should understand the current capability of its water and sewerage systems

Capability describes the ability of a system or network to provide the service expected and relies on the capacity of the assets that comprise those systems and the configuration of the assets.

The capability of the water and sewerage systems need to meet the service needs of customers (refer to the guidance on the outcome of understanding service needs). This relationship between assets, systems and network levels is illustrated in Figure 1. Accordingly, service requirements need to be determined at the asset, system and network levels and capability needs to also be assessed at these levels.

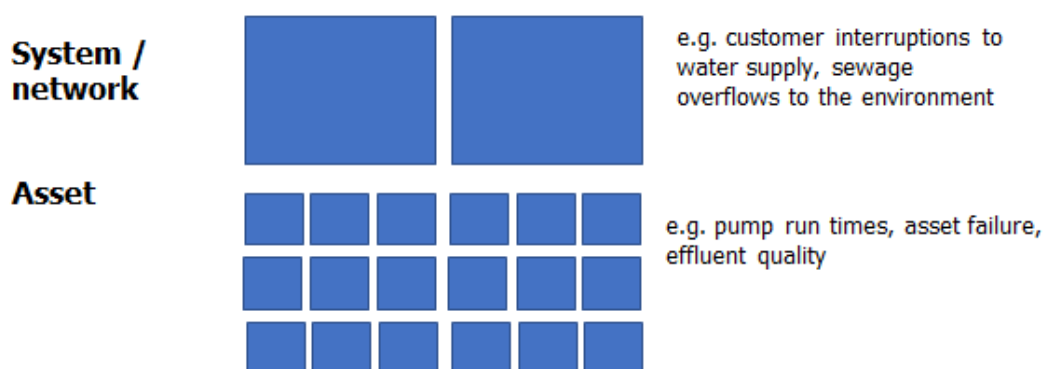


Figure 1. Understanding performance at asset, system and network level

To determine the capability of its assets, systems and networks, the utility should understand how assets work together to deliver service. Some water and sewer networks may operate as relatively simple linear systems but often, water and sewerage systems are more complex. Therefore, the local water utility needs to consider the impact of factors such as redundancies, interdependencies and contingencies on the capability of its water and sewerage systems. The level of understanding should be appropriate to the complexity of the systems.

### **The utility's understanding of capability should be proportionate to the criticality of assets and systems**

The level of understanding of the capability of water and sewerage systems should be appropriate to the criticality of the assets and systems and balance the cost of capturing this information with the benefit.

### **The utility should anticipate the future capability of its water and sewerage systems**

To meet future service needs, the local water utility needs to anticipate the future capability of its water and sewerage systems which, will inform future performance forecasts of the water and sewerage systems. The appropriate measure of capability and performance will depend on the aspect of service being considered and the nature of the system. For example, infiltration is a reduction in capability that impacts on hydraulic conveyance performance of the sewerage network, which in turn impacts on the service need to minimise overflows from the sewerage network.

Understanding future performance with respect to supply and demand is a broad subject and is covered by separate guidance material.

The understanding of future capability and performance should be appropriate for the criticality of the assets and systems and the costs of anticipating future performance.

### **The utility should understand the criticality of its water and sewerage systems**

Criticality is a measure of the importance of an asset, system of assets or activity to meeting the local water utility's objectives.

The local water utility should evaluate and document the criticality of its water and sewerage assets and systems. The assessment of criticality should be based on evidence of the consequences that the failure of the asset would result in. Within systems of water and sewerage assets there are redundancies, interdependencies and contingencies that need to be considered when assessing criticality.

Criticality is also a consideration relevant to the outcome of make and implement sound strategic decisions.

## **The utility should understand the performance of its water and sewerage systems**

Performance is the measure of what we expect assets and system to achieve.

The local water utility should understand and document:

- the aspects of performance it needs to monitor and measure
- the methods of monitoring and measuring performance
- when the results of monitoring and measurement of performance are analysed and evaluated.

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## **3.3 How will the local water utility consider water efficiency in its systems?**

### **The utility should understand the efficiency of its water supply system**

Efficiency is the measure of the proportion of an input required to deliver the output produced. A related concept is utilisation, which is a measure of the proportion of the capacity of an asset or system that is required to deliver service.

To inform strategic planning, the local water utility should periodically measure the efficiency and utilisation of water, its assets and delivery systems using industry standard approaches. Efficiency should be recorded and monitored over time. The measurement of efficiency should be supported by appropriate measures of water supplied into the system and water delivered to customers.

### **The utility should compare its efficiency in relation to its peers**

The local water utility should compare its efficiency in relation to its peers to understand its relative level of performance and identify causes of this level of performance. Understanding the drivers of its performance should then be used to inform strategic planning.

# Appendix A: Optional ‘how to’ guidance for understanding system capacity, capability and efficiency

To support utilities in achieving the strategic planning outcome **understanding system capacity, capability and efficiency** to a reasonable standard, we offer the following optional how-to guidance.

The optional how-to guidance in this section covers a variety of areas that may help address one or more of the expectations set out in section 3 of this guidance document.

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## How to determine minimum asset information requirements

The scope of asset information that is required to support understanding capacity, capability and efficiency of water and sewerage systems needs to be determined by the local water utility. While there will always be a temptation to record more information, a smaller and more relevant data set of higher quality is likely to provide more value to the organisation than a larger data set of lower quality and less relevance. A smaller data set will also have lower costs to maintain and manage.

To determine the scope of data that is required, the local water utility needs to understand the information required to support strategic planning and the sources of this information. This may be documented in an asset information strategy. A commonly used starting point for local water utilities to assist in establishing asset information requirements is the International Infrastructure Management Manual published by the Institute of Public Works Engineers Australasia.

*The International Infrastructure Management Manual* identifies the following groups of asset information that may be useful to support infrastructure owners achieving their objectives:

- asset identifiers, location and descriptors
- detailed technical data
- valuation data
- maintenance data
- contract management
- condition data
- predictive data
- Performance data
- risk data
- optimised lifecycle data.

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## How to determine asset and system criticality

Criticality is a measure of the importance of an asset, a system of assets or activity that meets the local water utility's objectives. A commonly used approach for local water utilities and the International Infrastructure Management Manual is to determine criticality, based on assessment of the consequence of failure of the asset. The consequence of failure of a system can also be assessed where this accounts for how the assets operate together within the system.

Consequence of failure is often assessed with a local water utility's risk management approach. It is helpful to consider consequence across different types of impacts such as:

- service delivery
- financial
- environmental
- health and safety (for workers and the public)
- reputational.

Because of the different aspects of asset criticality, it is often useful to undertake an initial assessment in a workshop style approach which accounts for different perspectives. However, the desktop assessments should be validated where possible through the experience of the local water utility, e.g. through lessons learned reviews following incidents and emergencies.

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## How to determine measures of performance

Consistent with AS ISO55001: 2014 Asset management – Management systems – Requirements, measures of performance should encompass the performance of assets (which can be extended to systems), as well as the performance of the organisation in managing the assets. Measures of performance should include both technical, asset focused measures, and customer focused, service delivery measures.

While there is often an initial desire to measure many performance indicators, a smaller set of indicators that is robust and that is well understood to inform decision making is more value than a large data set.

Different performance measures will often be relevant to different roles and levels within an organisation and where possible, a line of sight or aggregation of performance information may be included in reports to provide a more comprehensive view of performance.

Section 8 of the Regulatory and Assurance Framework sets out what information the department collects to monitor and report on performance. The department also publishes information on local water utility performance at: [Local water utility performance monitoring - Water in New South Wales \(nsw.gov.au\)](https://www.nsw.gov.au/local-water-utility-performance-monitoring).

## How to determine water system efficiency

Measures of water efficiency are included in the scope of Urban Water National Reporting. Section 8 of the Regulatory and Assurance Framework requires local water utilities to provide reporting data in support of national performance reporting. The relevant measures of water system efficiency are:

- A9 – Infrastructure leakage index
- A10 – Real losses: service connections
- A11 – Real losses: water mains
- W10.1 – Volume of non-revenue water.

The definitions of the efficiency measures are included in the National urban water utility performance reporting framework: Indicators and definitions handbook which are based on the following references which provide more information:

- Lambert A. and Hirner W. (2000): Losses from Water Supply Systems: Standard Terminology and recommended Performance Measures.
- Water Services Association of Australia (2001). Benchmarking of Water Losses in Australia.

The water balance which underpins the measures of system efficiency is shown in Figure 2.

System Input Volume (corrected for known errors)	Authorised Consumption	Billed Authorised Consumption	Billed Metered Consumption (including water exported)	Revenue Water
			Billed Unmetered Consumption	
		Unbilled Authorised Consumption	Unbilled Metered Consumption	Non-Revenue Water (NRW)
			Unbilled Unmetered Consumption	
	Water Losses	Apparent Losses	Unauthorised Consumption	
			Customer Metering Inaccuracies	
		Real Losses	Leakage on Transmission and/or Distribution Mains	
			Leakage and Overflows at Utility's Storage Tanks	
	Leakage on Service Connections up to point of Customer metering			

Figure 2 The International Water Association 'best practice' water balance

In measuring the efficiency of its water supply systems, local water utilities can determine the level of confidence it wishes to measure or estimate each component. Some components cannot be measured and the local water utility is likely best to rely on industry standard assumptions.

However, the system input volume and billed meter consumption are material components and are likely to be important areas of focus. In providing robust estimate of system input volume, the local water utility should consider:

- Is the system supply location and network configuration known with confidence? For example, are there recycle loops, major transfers or interconnections that make measuring system input more complicated?
- How is the system input measured and what is the approach to flowmeter calibration and validation?
- How are recording of system input recorded and what are the processes for estimating data where measurement is unavailable?

Billed metered consumption will be measured through customer meters or estimated where customers are not metered. Some meters have a bias to under-register consumption and this should be known by the local water utility and included in the water balance, typically using industry standard assumptions.

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## Other sources of guidance

There is a range of guidance available to support local water utilities on understanding capacity, capability and efficiency, including:

- International Infrastructure Management Manual, 5th edition, 2015, Institute of Public Works Engineers Australasia
- Condition Assessment and Asset Performance Guidelines for Water Supply and Sewerage, 2016, Institute of Public Works Engineers Australasia.