Department of Planning and Environment

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Guidance on strategic planning outcome – Understanding other key risks and challenges

Regulatory and assurance framework for local water utilities

October 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.

Published by NSW Department of Planning and Environment

dpie.nsw.gov.au

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First published: October 2022

Department reference number: PUB22/906

Acknowledgements

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

Contents

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 keys 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[1] 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*.

1.1. Purpose of this document

This document supplements the Regulatory and Assurance Framework and gives guidance on achieving the outcome of understanding other key risks and challenges 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 other key risks and challenges.

1.2. Structure of this document

This guidance is structured providing:

[1] 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.

- the expectations for achieving this outcome to a reasonable standard
- an appendix with optional guidance for incorporating local water utility strategic planning into the Integrated Planning and Reporting framework
- an appendix with optional how-to guidance that helps utilities achieve assurance expectations
- an appendix providing templates, case studies and tools useful for utilities to achieve assurance expectations.

1.3. Review of this 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 learnt' 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.[2] 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
- Understanding other key risks and challenges **(this guidance)**
- 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
- **robust:** underpinned by evidence that draws on appropriate sources and recognises and rebuts potential alternative interpretations.

[2] 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.

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 other key risks and challenges

Under section 3.2 of the Regulatory and Assurance Framework, the department expects utilities to achieve the strategic planning outcome **understanding other key risks and challenges** to a reasonable standard. Other risks include climate risks, drought, incidents, emergencies and extreme events. A local water utility may also identify key risks and challenges specific to their operating environment. This includes considering:

- How will the local water utility address other key risks in its systems now and into the future?
- How will the local water utility meet relevant regulatory standards?
- How has the local water utility considered climate risks?
- How is the local water utility planning for drought?
- How is the local water utility planning and preparing for incidents, emergencies, and extreme events and ensuring continuity of service?

3.1. Understanding other key risks and challenges

In general, the department's expectations are that a local water utility will understand other key risks and challenges by:

- having a sound understanding of its operating environment and being able to identify the key risks and challenges it faces to deliver services
- having in place an appropriate process for managing these risks.

In the following sections we set out **what** the department's expectations are for **understanding other key risks and challenges** to a reasonable standard. Appendix A shares how utilities can address this outcome through the Integrated Planning and Reporting Framework.[3] In Appendices B and C we give optional guidance on **how** some of these expectations could be met.

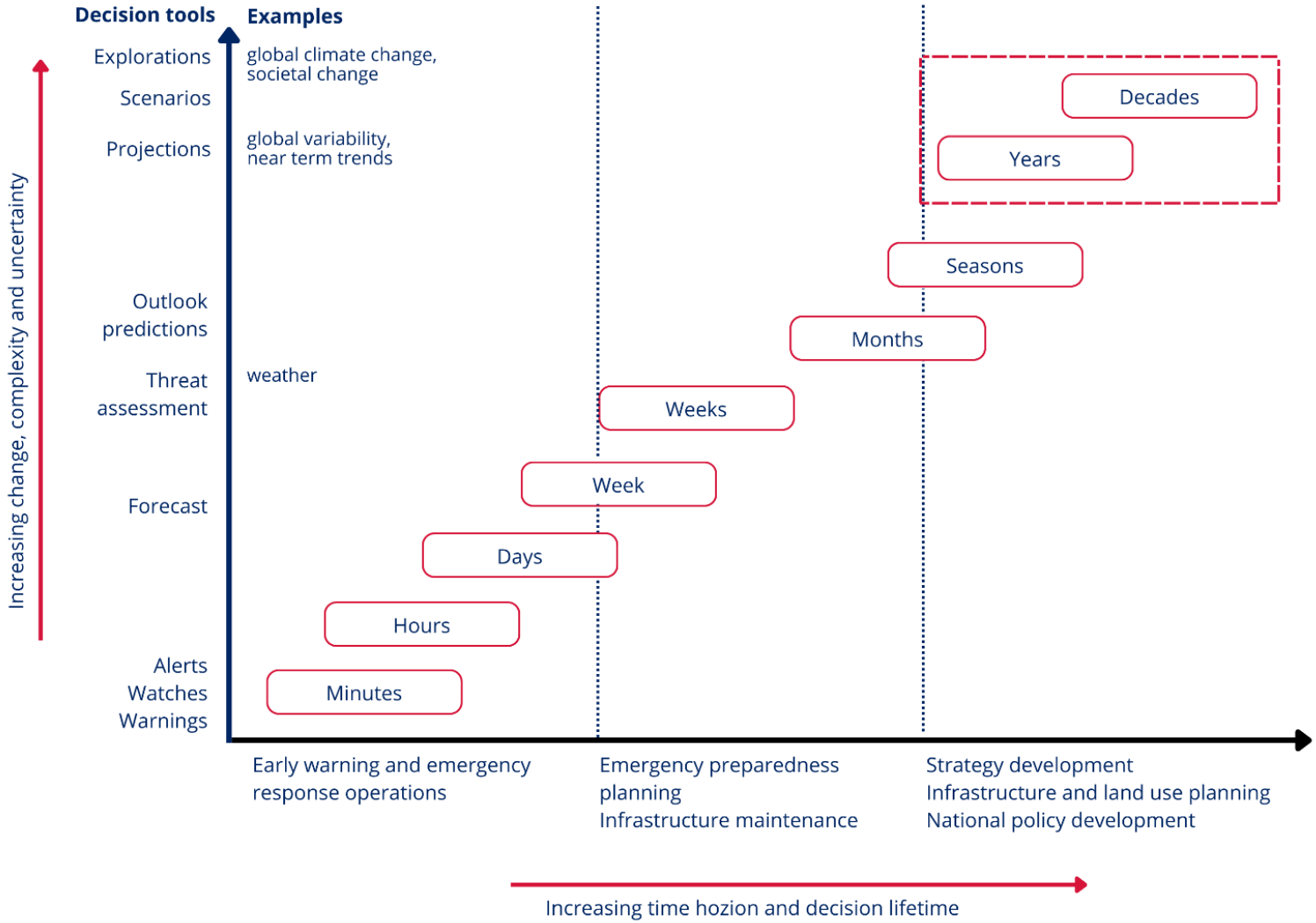
When considering 'other key risks and challenges', the definition of risk is important. AS ISO 31000 (Australian Standard ISO 31000) defines risk as the impact of uncertainty on objectives. Thus, the organisation must know what its objectives are before trying to understand key risks and challenges.

There are also different contexts when considering uncertainties. Figure 1 illustrates the levels of complexity and uncertainty across different timeframes. Different tools are used as the timeframes

[3] We also give separate, optional guidance for all strategic planning outcomes 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*.

and decision lifetimes increase (horizontal axis) and as change, uncertainty, and complexity increase (vertical access). For strategic planning, we are working in the years and decades timeframe. Utilities will also have processes for tactical and operational risk management, but these are not the focus of the strategic assurance process.

Figure 1. Different contexts when considering future uncertainties



Source: Australian Government Department of Home Affairs, *Climate and Disaster Risk: What they are, why they matter and how to consider them in decision making*. 3 Guidance on Scenarios, 2019

3.2. How will the local water utility address other key risks in its systems now and into the future?

A local water utility should identify and understand the risks and challenges relevant to its unique operating context for delivery of water and sewerage services.

Each local water utility has a unique operating context shaped by factors including climate, geography, the natural environment, the existing asset base and the resources available to the water utility. In planning strategically, the local water utility should consider this unique operating context. It should also identify risks and challenges relevant to its business in achieving the strategic planning objectives. This consideration is related to the desired outcome that the local water utility will make and implement sound strategic decisions.

The risks associated with delivery of water and sewerage services are also different in nature to those associated with other council services. Therefore, to be effective, a local water utility's approach to risk management must consider and respond to its individual circumstances.

To identify and understand risks and challenges to a reasonable standard, the local water utility should:

- consider the wide scope of risks and challenges relevant to its water and sewerage services
- maintain the currency of its understanding of its risks and challenges
- gather sufficient evidence about the nature and level of the risk.

A local water utility should have in place systems for managing risks and challenges consistent with good practice

Based on its understanding of the risks and challenges it faces, the local water utility should manage these using its organisational risk management approach and be consistent with good practice. To meet this expectation to a reasonable standard, the local water utility should have in place a risk management system that is appropriate and consistent with industry standards.

For local governments, the *Local Government Act 1993* and supporting regulation and guidance, particularly the Integrated Planning and Reporting Framework, are an important reference point. The department would consider that meeting the requirements of the *Local Government Act 1993* and the Integrated Planning and Reporting Framework under the Act satisfies this expectation to a reasonable standard, if the local water utility can demonstrate that it has considered the risks and challenges unique to its water and sewerage business and not applied a generic approach.

More generally, a risk management system implemented to a reasonable standard to support a local water utility's strategic planning would:

- be consistent with relevant Australian standards for risk management. For local water utilities, this is the international standard AS ISO 31000: Risk management
- have defined responsibility and accountability relevant to strategic planning
- be an integral part of strategic planning activities and decision-making
- include review and continual improvement to help ensure that the system and understanding of risks remains appropriate for the local water utility.

A local water utility's understanding of key risks and challenges should integrate with its overall approach to strategic planning and should manage key risks and challenges alongside other outcomes such as water quality and water security

A local water utility's management of risk will be more effective if it identifies and manages risks in an integrated way across its business. The Integrated Planning and Reporting Framework requires local governments to manage risks effectively and proactively. To manage risks in an integrated way to a reasonable standard, the local water utility should consider risks for water and sewerage services alongside and consistently with the wider operations of the local government. Further, risks for water and sewerage services should not be considered in isolation, as many have interrelated consequences and mitigation measures. For example, when drought affects water security, the quality of water sources is often also affected and interest in recycled water (including higher quality uses) increases.

To demonstrate that it manages risks and challenges in an integrated way to a reasonable standard, a local water utility's risk management approach should include consideration of:

- hazards across all its local government services and operations that are interrelated and that might cause cascading risks more widely than the initial area of impact
- risks to business systems, processes and resources which might otherwise be considered outside of the scope of water and sewerage services
- synergies in mitigation measures that might address multiple risks across water and sewerage services and the wider local government business.

3.3. How will the local water utility meet relevant regulatory standards?

A local water utility should understand the scope and implications of the regulatory standards that are relevant to strategic planning for its water and sewerage services

For its strategic planning to be effective, a local water utility should be aware of, and understand, the relevant regulatory standards for its water and sewerage services. Regulatory standards mean legislation, regulation, guidelines and codes relevant to the local water utility.

There is a wide range of regulatory standards that are relevant to local water utilities. Different standards may also be relevant to utilities in different operating environments. Important regulatory standards that apply to all local water utilities include:

- *Water Management Act 2000*
- *Protection of the Environment Operations Act 1997*
- *Dams Safety Act 2015*
- *Public Health Act 2010*
- *Workplace Health and Safety Act 2011.*

Regulatory standards will set requirements that may need to be considered in strategic planning. The local water utility will also need to manage the risk of not meeting those relevant regulatory standards.

To meet this expectation to a reasonable standard, a local water utility should keep up to date with the continually changing regulatory environment. A utility should scan for changes in the operating environment as part of a regular operating rhythm. However, the department would expect the local water utility to know in advance about substantial changes.

The local water utility has in place processes for monitoring compliance and performance against relevant regulatory standards and for implementing corrective actions when required

A local water utility should have in place effective controls that help demonstrate its compliance with regulatory standards relevant to its water and sewerage services. To meet this expectation to a reasonable standard, the local water utility should monitor and review controls and be able to demonstrate that these are effective.

Where the local water utility's compliance with regulatory standards relevant to its water and sewerage services is identified as deficient, there should be a process for implementing corrective actions that address the deficiencies effectively. The local water utility should be able to proactively identify deficiencies though its own internal controls and be able to respond to those identified by other organisations.

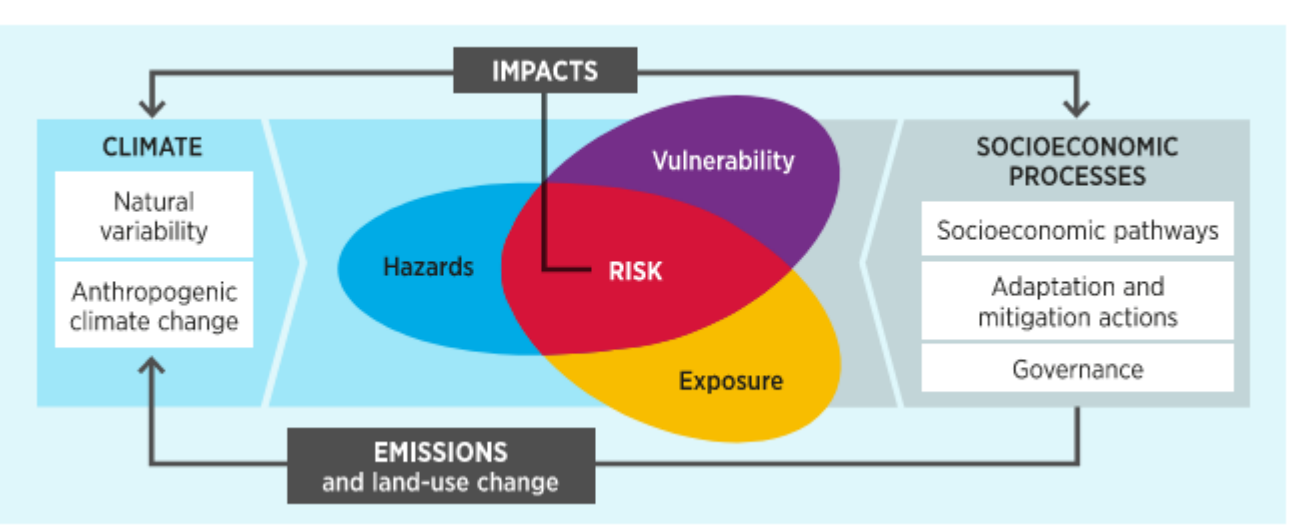
3.4. How has the local water utility considered climate risks?

A local water utility should identify and assess climate risks within its overall risk management approach while recognising the unique features of climate risks

Climate risks can be managed by a local water utility in its overall approach to risk management. However, the utility's management of risks should recognise the unique features of climate risks. Good practice for managing climate risks (IPCC 2014) recognises that hazards are not the sole driver

of climate risk, but that vulnerability and exposure are also factors in assessing risk.[4] This is illustrated in **Error! Reference source not found.**.

Figure 2 Illustration of how the concept of climate risk results from an interaction of climate related hazards, and the vulnerability and exposure of human and natural systems



Source: IPCC 2014 in the *Climate Risk Ready NSW Guide*, 2020

Potential challenges to managing climate risks (different to other risks) that a local water utility should consider include[5]:

- uncertainty about the precise nature and timing of climatic changes, particularly at regional and local scales
- uncertainty about societal, economic and technological changes that may influence global emissions over time
- long-term horizons that may not align to other planning timeframes
- dispersed governance of the functions and roles that can help governments effectively adapt, and of the systems that may be affected by climate
- capacity for transitional or transformational adaptation.

A local water utility should use robust data in planning to respond to climate risks

Our understanding of future climate and the impacts of climate change is improving with more data collection, analysis and modelling. Accordingly, a local water utility should base its climate risk management on robust data. To meet this expectation to a reasonable standard, the local water utility should get data from appropriate sources such as the climate data that AdaptNSW manages and makes available.

This does not imply that a local water utility should be reacting and updating its assessment of climate risks whenever new data is available – the utility's understanding of its circumstances

[4] IPCC, *Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*, 2014 [Core Writing Team, RK Pachauri and LA Meyer (eds.)]. Geneva, Switzerland, p 151

[5] Former NSW Department of Planning, Industry and Environment (now the Department of Planning and Environment), *Climate Risk Ready NSW Guide, Practice guidance for the NSW Government sector to assess and manage climate change risks*, 2020

should drive the timing and frequency of assessments. The local water utility should be able to demonstrate that the information it uses to assess climate risks supports its strategic planning.

A local water utility should assess climate risks holistically and across its business and value chain

Climate risks are varied in nature and their impact. Therefore, to meet this expectation to a reasonable standard, a local water utility should assess climate risks holistically and across its business and value chain. This means considering:

- Direct risks and opportunities – risks such as increased likelihood of drought and flooding and opportunities such as increased resource efficiency and resilience
- Indirect risks and opportunities – for example, effects on suppliers and customers and changes to energy sources
- Interdependencies – where water and sewerage services rely on other infrastructure and services. For example, effects on power supply infrastructure.

Considering direct, indirect and interdependent risks may be challenging. A local water utility should draw on existing understanding of risks published in government guidance and industry standards. It should seek input from different perspectives in assessing the risks to its business.

3.5. How is the local water utility planning for drought?

A local water utility should undertake tactical planning to respond to drought as a component of the strategic-level approach to water security planning

State and federal governments consider a range of factors in addition to rainfall when they declare a drought. The Bureau of Meteorology defines serious and severe rainfall deficiencies as:

- Serious rainfall deficiency: rainfall lies above the lowest 5% of recorded rainfall but below the lowest 10% (decile range 1) for the period in question
- Severe rainfall deficiency: rainfall is among the lowest 5% for the period in question.

To meet this expectation to a reasonable standard, the local water utility should first strategically plan to meet the outcome for understanding water security. The utility should then extend this strategic planning to tactical planning to determine measures for short-term protection against running out of water. The local water utility will play a role in establishing levels of service for water security that are appropriate to its operating environment and include levels of service for drought response.

A local water utility should engage with its customers and community to obtain feedback on its proposed responses to drought

Measures to mitigate against the impacts of drought will often have material effects on residential and commercial customers. Therefore, the local water utility should engage with customers when determining how it will respond to drought so it can base its tactical drought planning on sound evidence.

Responses to drought will seek to balance the cost of responses with the benefit of water availability. However, the costs of measures such as restrictions are difficult to quantify. By engaging with customers and the community, the local water utility will gain information that it can consider in its drought planning. Engaging with customers and the community also allows them to make informed decisions about the measures that they might take to mitigate against the effects of drought.

A local water utility's planning for drought should be consistent with its planning for incidents, emergencies, and extreme events

The nature and effects of drought are similar to other incidents and emergencies that a local water utility faces. Therefore, a utility's planning for drought should be consistent with, and integrated with, planning for incidents, emergencies and extreme events (below). To meet this expectation, a local water utility should be able to demonstrate that it has considered in an integrated way its response to drought alongside other incidents, emergencies and extreme events.

A local water utility should consider risk holistically across its whole business when planning for drought

The effects of drought are often not confined to water availability. In planning for drought, the local water utility should consider the risks to its business holistically and plan accordingly. There are a range of risks to a local water utility arising from drought that go beyond water availability and include:

- Revenue impacts – drought will inevitably be associated with lower water consumption and accordingly, lower revenue for the local water utility. As a significant proportion of the costs of the local water utility are fixed, these represents a short-term and long-term risk to its financial sustainability
- Social contract – the local water utility's reputation for being a trusted service provider may be affected when water becomes less available. Further, community resistance to alternative supply sources such as lower quality groundwater or recycled water may affect the social licence between the water utility and its customers and community.

3.6. How is the local water utility planning and preparing for incidents, emergencies, and extreme events and ensuring continuity of service?

The prevention, preparedness, response and recovery (PPRR) model is widely adopted by Australian state, federal and emergency service agencies. This section of the guidance addresses the strategic planning and preparation for disruptions (see Figure 4. Systems in place to identify, prepare for, plan for, respond to and recover from incidents, emergencies and extreme events).

The strategic objective: 'Understanding solutions to deliver services: How are the preparedness and resilience management during extreme events considered?' addresses developing and carrying out infrastructure improvements for resilience. The utility will also have tactical and operational plans, processes, and systems for managing threats to their services.

A local water utility should understand the resilience of its infrastructure and organisation and should identify the events that could impact continuity of service

Utilities that have a strong understanding of their infrastructure and organisation, their resilience and criticality to service provision, are better able to respond to events. Infrastructure resilience concerns the resilience planned for, designed, and built into assets, networks and systems. The goal of improved infrastructure resilience is safer and more reliable physical infrastructure that provides service under all conditions, especially emergencies. At its core, infrastructure resilience is the ability to reduce the magnitude and/or duration of disruptive events.[6]

Organisational resilience refers to an organisation's ability to adapt and evolve as the internal and external environments are evolving. A resilient organisation absorbs, deflects, responds to, and recovers from short-term shocks – be they natural disasters or internal business disruptions – and adapts and shapes itself to respond to longer-term challenges brought about by changes. These changes may happen across multiple domains including technology, regulatory environments, climate, social and economic conditions.[7]

Resilience is achieved through the commitment of an organisation's leaders to driving the right culture and capability within that organisation, not through unimplemented plans.[7]

The NSW Critical Infrastructure Resilience Strategy states that the goal of improved infrastructure resilience is safer and more reliable physical infrastructure that provides service under all conditions, especially emergencies. The elements of infrastructure resilience include:

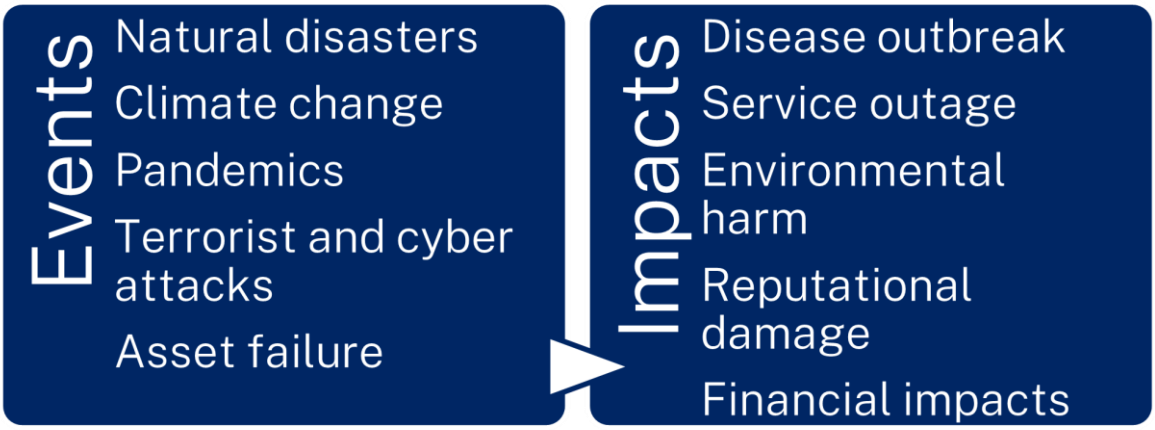
- Resistance: physical protection
- Reliability: capability of infrastructure to maintain operation in a variety of conditions
- Redundancy: adaptability of an asset or network to cope with loss of individual components
- Enhancing Response and Recovery: ability to recover from disruptions.

A local water utility should identify critical infrastructure and assess the degree of resilience in the system. The utility should understand the types of incidents, emergencies and extreme events that could happen in their operational area and the effects that these would have on maintaining water and sewage services (Figure 3).

[6] Resilience NSW, NSW Critical Infrastructure Resilience Strategy Guide – Infrastructure resilience guide, 2021

[7] Resilience NSW, NSW Critical Infrastructure Resilience Strategy Guide– Organisational resilience guide, 2021

Figure 3. Events and impacts



The utility should have a documented assessment of system resilience that identifies:

- critical infrastructure and organisational processes
- the events that could affect continuity of service
- the consequence of failure.

This analysis should be sufficiently detailed to inform emergency and incident planning.

The assessment should consider:

- local conditions, events and impacts
- asset design life
- technical standards
- extreme operating modes and recovery of the assets.

The local water utility should consider assets and resources across the following areas:

- water supply systems
- wastewater systems
- power supply
- IT systems
- communications infrastructure
- procurement supply chains (such as chemical treatment); including disposition of council assets
- delegated authorities.

Resilience assessment should be appropriate to the identified events and impacts. Both current and future risks events should be considered. Scenarios may be used to consider effects on system resilience (see how-to guidance).

A local water utility should have systems and processes in place to identify, prepare for, plan for, respond to and recover from incidents, emergencies and extreme events

The prevention, preparedness, response and recovery model is a key risk management approach in business continuity planning:

- Prevention: requirements that aim to reduce or eliminate the likelihood of an incident or emergency (see 'Understanding solutions to deliver services: How are the preparedness and resilience management during extreme events considered?')
- Preparedness: steps taken before an incident to ensure effective response and recovery
- Response: containment or minimisation of the impacts of an incident
- Recovery: minimisation of disruption and time taken to return to business as usual.

Key principles for emergency management include:[8]

- Protection of the safety and wellbeing of communities
- Strong governance
- Integral and tailored management
- Decision-making, informing prioritisation of investment and addressing uncertainty
- Best available information and common approaches
- Transparent and inclusive approach
- Locally driven management
- Builds on strengths, facilitates continual improvement
- Integrated, coherent, systematic approach
- Dynamic, iterative management that is responsive to change.

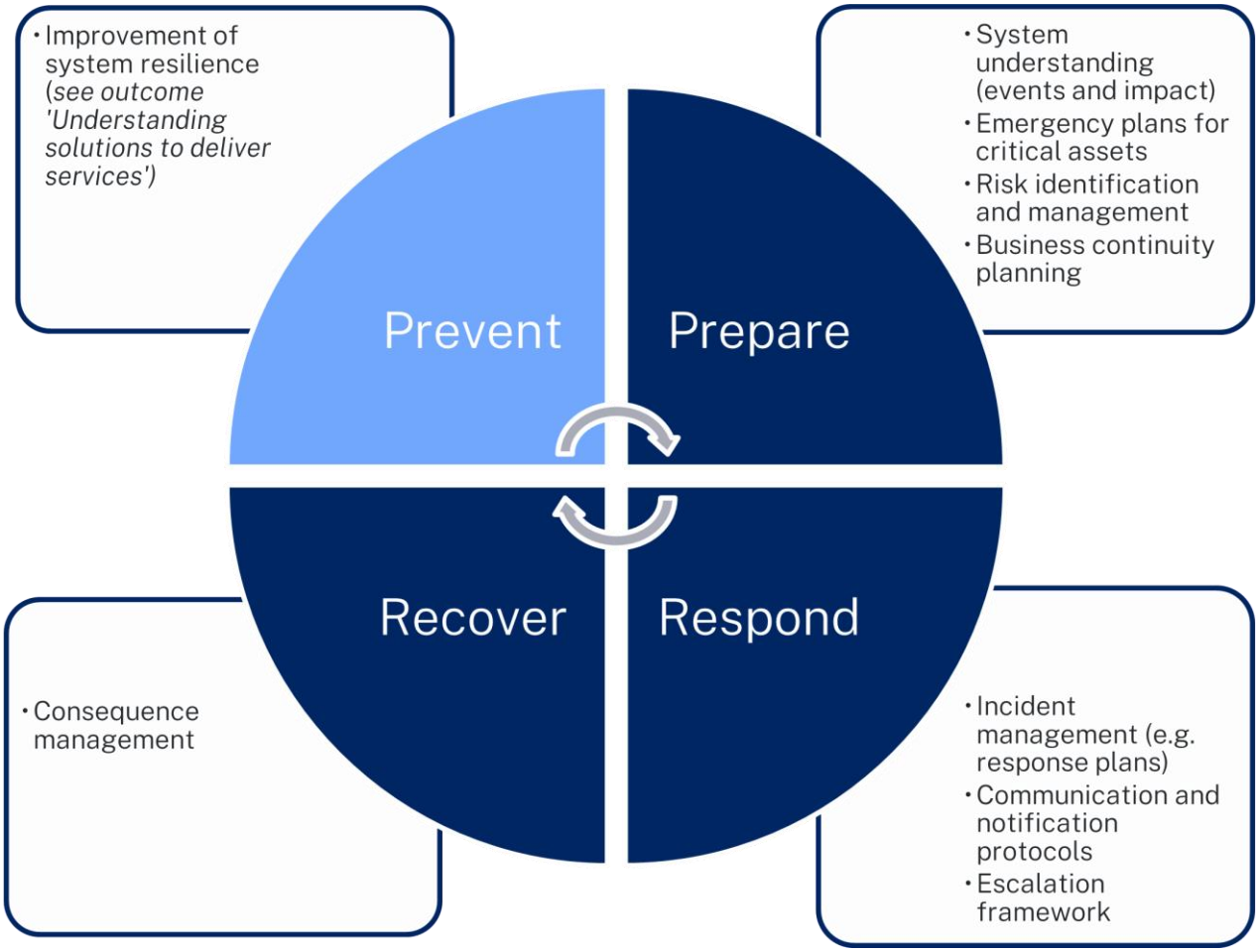
Local water utilities have a range of obligations to prepare incident and emergency response plans.

The local water utility should have a documented approach to identify, prepare for, plan for, respond to and recover from incidents, emergencies and extreme events (Figure 4). The documented approach should be consistent with the Australasian Inter-Service Incident Management System (AIIMS), and the local water utility should also have in place a Drinking Water Quality Management System and local flood plans. At a minimum, local water utility processes should ensure all plans are in place, current and exercised.

Processes should ensure integration and consistency with other emergency planning within the organisation and the local area.

[8] Emergency Risk Management Framework, NSW Office of Emergency Management, 2017

Figure 4. Systems in place to identify, prepare for, plan for, respond to and recover from incidents, emergencies and extreme events



Key outcomes from the incident planning process should include proactive preparation and effective responses to current, and future, incident and emergencies through an integrated risk management approach.

Appendix A: Optional guidance on using the Integrated Planning and Reporting Framework

To support utilities in achieving the strategic planning outcome of understanding other key risks and challenges to a reasonable standard by using the Integrated Planning and Reporting (IP&R) Framework, Table 1 and

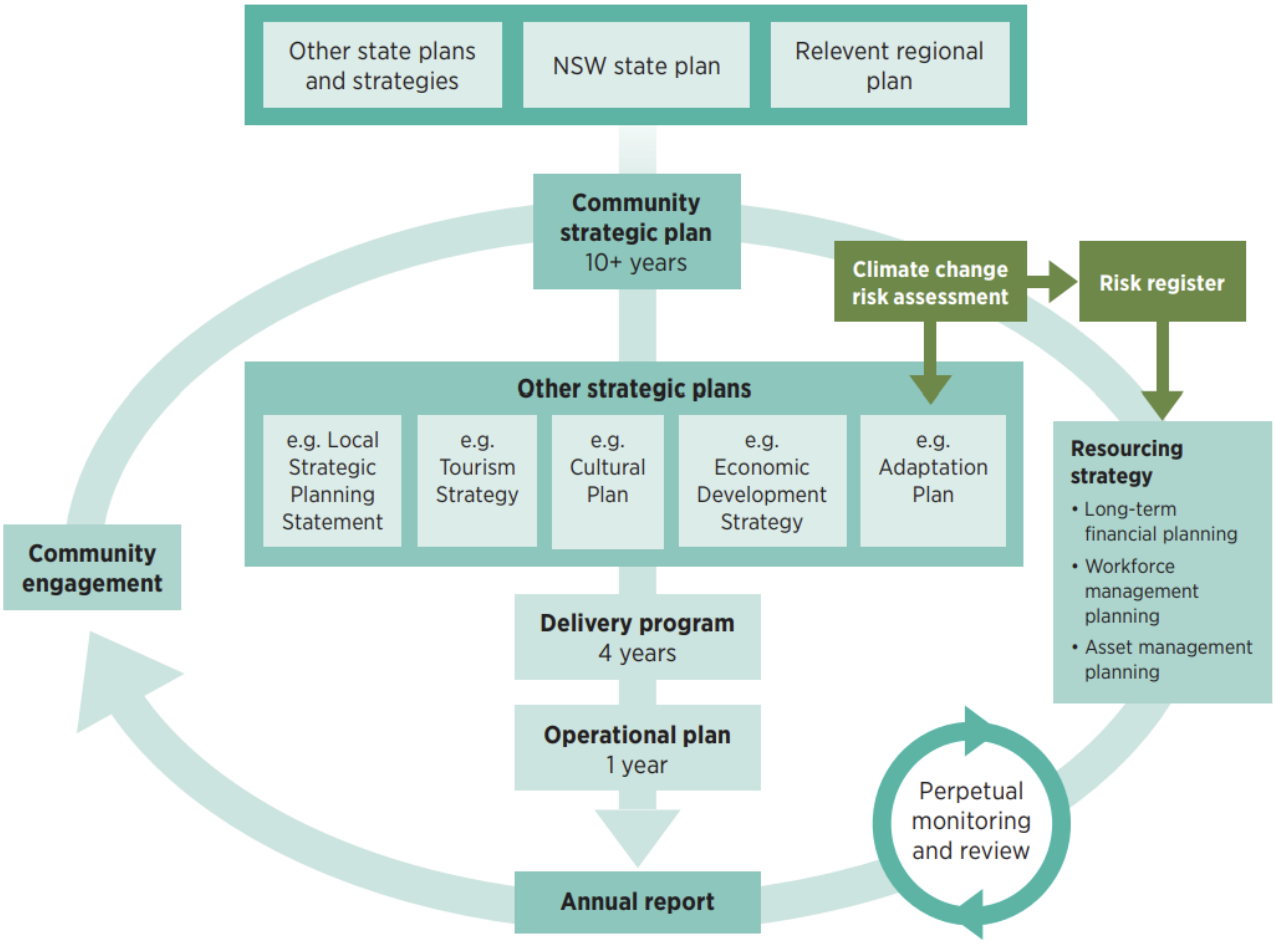
Figure 5 give optional how-to guidance.

Table 1. Understanding other key risks and challenges and relevant IP&R framework components

Outcome	Description (sub-outcomes)	Relevant IP&R framework components
Understanding other key risks and challenges	How will the local water utility address other key risks in its systems now and into the future?	• Long-term financial plan (testing assumptions through a risk assessment process) • The community strategic plan (assessment needs to include an assessment of strategic risks and challenges facing the community) • Workforce management planning (areas of risk have been considered)
	How will the local water utility meet relevant regulatory standards (for example, such as on-dam safety)?	The community strategic plan may encompass planning for regulatory standards and these should be operationalized in the operational plan
	How has the local water utility considered climate risks?	See Figure 5 for guidance on including climate change in the Integrated Planning and Reporting Framework
	How is the local water utility planning for drought?	• A drought response plan may be included as a supporting plan to the main Integrated Planning and Reporting framework documents • The community engagement strategy and other engagement activities under the Integrated Planning and Reporting framework may be used to engage with customers and gain feedback on the local water utility's proposed responses to drought • Risks relating to drought may be considered under the IP&R risk management approach

Outcome	Description (sub-outcomes)	Relevant IP&R framework components
	How is the local water utility planning and preparing for incidents, emergencies, and extreme events and ensuring continuity of service?	• Resourcing strategy (delivery and operational plans, workforce management planning, asset management planning) • Asset management planning: Including an asset management strategy and asset management plans (for all assets; key asset management improvement actions, including resources and timelines). Example outlines of asset management plans are included • As part of the IP&R, councils are encouraged to consider the local emergency management plan as part of the IP&R process to ensure that resource implications for prevention of, preparation for, responding to and recovering from emergencies are considered • Councils are also encouraged to develop a recovery plan for their local government area as part of the IP&R process

Figure 5. The IP&R framework, showing how climate change can be integrated into it



Source: Former NSW Department of Planning, Industry and Environment (now the Department of Planning and Environment), *Guide to Climate Change Risk Assessment for NSW Local Government*, 2019. Figure 1 The Integrated Planning and Reporting (IP&R) framework – modified to integrate climate change and risk assessment

Appendix B: Optional how-to guidance for understanding other key risks and challenges

To support utilities in achieving the strategic planning outcome **understanding other key risks and challenges** 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. The areas are also interrelated and complementary.

How to understand your operating environment to identify key risks and challenges

An understanding of the operating environment includes the external and internal environment now and into the future, including megatrends. Megatrends are sustained, global forces that shape society and the economy and that have the potential to affect local water utilities. For example, Melbourne Water's latest environmental scan (see case study in appendix C) identified the following top megatrends for it to consider:

- Climate change
- Acceleration of technology and business
- Work 2.0.

To do an environmental scan, an organisation adopts a framework for categorising influences and trends to give the exercise structure and scope. Commonly used frameworks include:

- PESTLE – political, economic, social, technological, legal and environmental
- STEEP – social, technological, economic, environmental and political.

The framework is populated based on evidence from a variety of sources. These might include:

- desktop research
- industry forums or reports related to future trends
- interviews with external stakeholders
- staff surveys and workshops.

Based on the evidence that it has gathered, an organisation populates an analysis template to document the implications. Table 2 shows an example PESTLE analysis template the organisation will use to record the opportunities and threats associated with the identified factors.

In identifying opportunities and threats, it is useful to consider different perspectives such as varying:

- timescales
- geography (local, regional statewide, national, global)
- internal and external stakeholders, particularly customers and suppliers.

Table 2. Example PESTLE analysis template

Category	Factor	Opportunity	Threat
Political			
Economic			
Social			
Technological			
Legal			
Environmental			

This first step builds the evidence base that supports understanding of the operating environment. The next step is to assess the implications for the local water utility. The implications are shaped by the internal strengths and weaknesses of the local water utility, which influences its readiness to respond to the factors in its environment.

A common tool used in this next step is SWOT (strengths, opportunities, weaknesses, threats) as shown in Table 3. The organisation takes the opportunities and threats from the first stage and considers them against the strengths and weaknesses internal to the business.

Table 3. Example SWOT analysis template

Strengths (internal, positive factors)	Weaknesses (internal, negative factors)
Opportunities (external, positive factors) • Political • Economic • Social • Technological • Legal • Environmental	Threats (external, negative factors) • Political • Economic • Social • Technological • Legal • Environmental

The environmental scan builds the evidence for the local water utility to understand risks and challenges. The local water utility needs to refresh the evidence periodically and take the results into strategic planning and risk management.

How to manage risks

Risk management is a requirement of the Integrated Planning and Reporting Framework, and many local water utilities have existing risk management processes. This guidance on strategic planning does not require local water utilities to adopt new risk management processes. Instead, local water utilities should use their existing risk management processes to demonstrate that they can understand key risks and challenges to a reasonable standard.

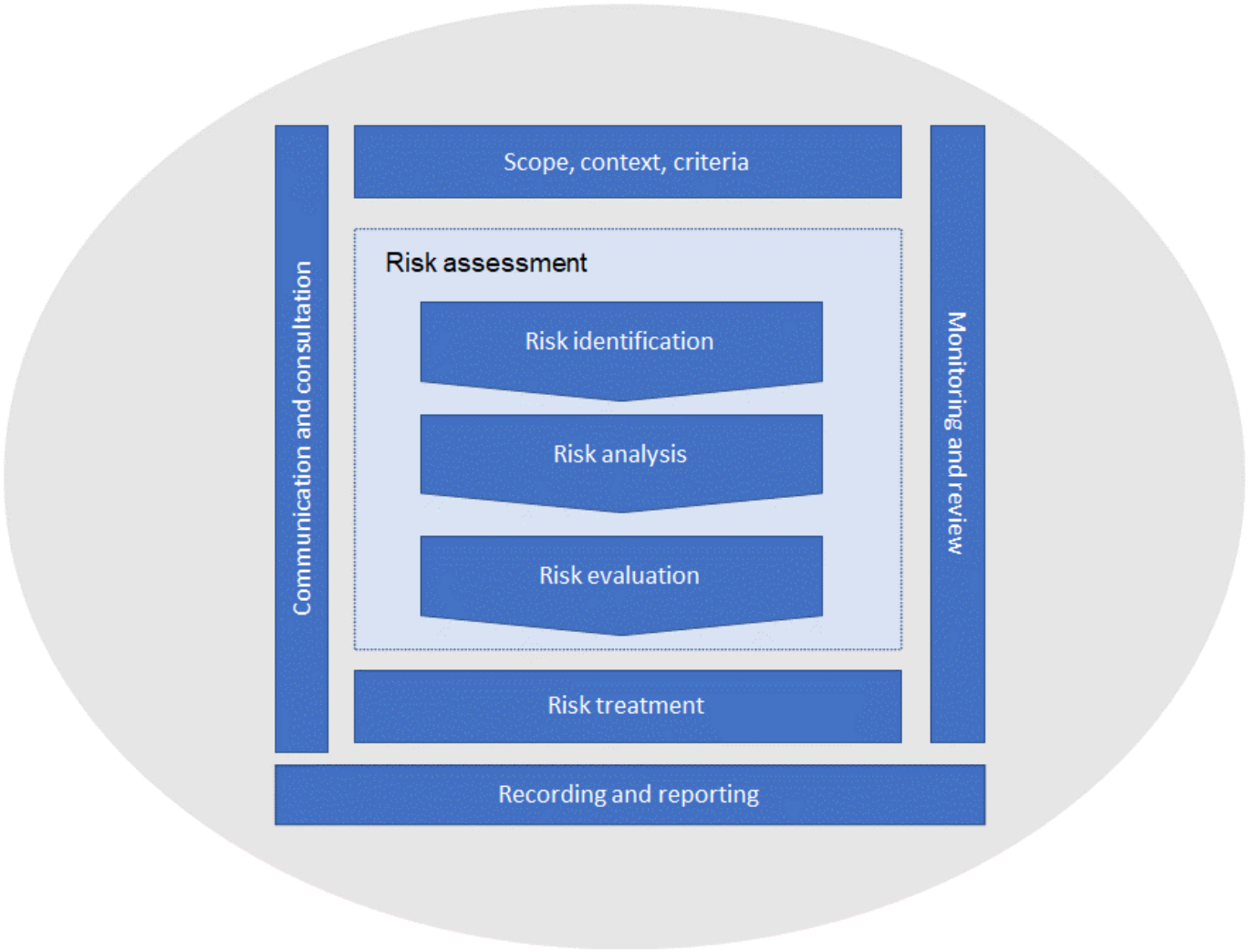
The following guidance is a high-level overview of the industry-accepted approach to risk management. Local water utilities should consult more detailed guidance where required.

AS ISO 31000:2018 defines:

- Risk as the effect of uncertainty on objectives, and further, where an effect is a deviation from the expected. It can be positive, negative or both, and can address, create or result in opportunities and threats
- Risk management as coordinated activities to direct and control risk for an organisation.

AS ISO 31000 details a systemic process to identify, assess and prioritise risks, as well as how to document and communicate these. The AS ISO 31000 risk management process is shown in Figure 6. AS ISO 3100 risk management processFigure 6. AS ISO 3100 risk management process.

Figure 6. AS ISO 3100 risk management process



The components of the risk management process are:

- Defining the scope of the risk management activities.
- Establishing the internal and external context. Note that there is likely overlap in this step with the local water utility understanding its operating environment, as discussed previously.
- Defining criteria for successful risk management. For local water utilities, these are likely to consider successfully achieving strategic planning objectives as well as managing the risk of non-compliance with regulatory standards. Also, the local water utility should consider the level of risk that it will take on.
- Assessing risks to identify those that need to be managed.
- Treating risks by identifying and implementing effective mitigation measures.
- Documenting the risk management process and outcomes so that they can be communicated to staff and stakeholders.

The risk management process is subject to ongoing monitoring and review of the process itself and the performance of the process.

References:

1. Guidelines for Risk Management and Internal Audit for Local Government in NSW, NSW Office of Local Government, former Department of Planning, Industry and Environment, 2021

2. TPP12-03b Risk Management Toolkit for NSW Public Sector Agencies: Volume 1, NSW Treasury, 2012
3. AS ISO 3100:2018 – Risk management

How to define different types of risks in strategic planning

As detailed above, risk is the effect of uncertainty on objectives. A local water utility needs to identify its organisational objectives, plan to achieve them, and understand the risks to achieving them.

While the department has defined its own objectives for the local water utility sector, each local water utility must determine its own objectives relevant to its own community and operating environment. The strategic outcome to make and implement sound strategic decisions is relevant in this regard.

Organisational objectives cover the full range of activities an agency does. Figure 7 sets out a framework for categorising different types of organisational objectives. There will be different risks associated with each of the different types of objectives. A local water utility needs to consider what applies to the requirement for effective and evidence-based strategic planning. While most focus might be at the strategic level, there are likely to be multiple relationships to consider such as strategic planning to meet compliance requirements.

Figure 7 Typical organisational objectives

Strategic	High level objectives aligned with the organisation's mission
Operational	Effective and efficient use of resources, including safeguarding assets from misappropriation or misuse and the mitigation of hazards
Reporting	ensuring the reliability and timeliness of financial and management information
Compliance	Adherence to internal policies and procedures, and laws and regulations
Projects	Ensuring project objectives are met

Source: NSW Treasury, *TPP12-03b Risk Management Toolkit for NSW Public Sector Agencies: Volume 1*, 2012

For guidance on how to manage risks related to climate change, a useful reference is *AS 5334:2013 Climate change adaptation for settlements and infrastructure - A risk-based approach*.

How to determine level-of-service objectives for drought planning

Local water utilities play an important role in the development of regional water strategies, which include setting objectives for the level of service for water security. The following guidance outlines guiding principles to inform and help local water utilities in setting and maintaining level-of-service objectives for drought response.

The high-level objective for a local water utility to provide a safe and reliable water supply has 3 components:[9]

1. The supply system having capacity to maintain an adequate level over supply over most periods in the long-term
2. When drought happens, a drought response plan provides short-term protection against running out of water
3. In cases of extreme drought, a contingency or emergency plan exists that ensures that basic water needs for a community can be met during the emergency.

The first objective is directly related to the strategic outcome for understanding water security. The second and third objectives sit within this strategic outcome. However, planning to meet these objectives should not be done in isolation: there are obvious and important overlaps between each.

These level-of-service objectives define the community's expectation for receiving reliable water supply and the maximum frequency, duration and severity of water restrictions that they can expect when there is a shortage. Defining the level of service is fundamental in establishing the yield of a supply system and in turn, the probability that it cannot provide that yield.

The level-of-service objectives for drought are generally expressed in terms of:

- Frequency – that is, how often restrictions are expected to happen
- Severity – that is, expected magnitude of the restrictions, the reduced level of water use sought
- Duration – that is, how long the restrictions are expected to last.

To make community expectations and urban water supply planning clear, severity should be defined as a maximum usage target based on one person's daily use. The local water utility can determine this rate of supply based on an acceptable percentage reduction of urban water use from the expected unrestricted demand.

In addition to restrictions that reduce demand, drought response planning often involves identifying options that increase supply. Supply options may be temporary or permanent and will have different lifecycle costs and provide different levels of yield.

In determining the level-of-service objectives, there is a trade-off between the cost of providing a given level of service and the cost of not providing that level of service. These will include direct and

[9] This framework is based on the Water Services Association of Australia (WSAA) *Framework for Urban Water Resource Planning, WSAA Occasional Paper No. 14, June 2005 and Urban Water Planning Framework and Guidelines, WSAA Occasional Paper No. 19, 2014.*

indirect costs for the local water utility and the community. Understanding the full costs can be challenging. Cost may include:

- loss of aesthetics (for example, public spaces and landscaping not being maintained)
- inconvenience (for example, not being able to water gardens during the day)
- loss of assets (for example, lawns)
- loss of income (for example, reduction in tourist numbers or effects on the home gardening industry).

Costs to reduce the frequency and severity of droughts will often be associated with supply infrastructure. However, the full costs of new supply to consider will include the cost of social and environmental impacts in addition to the capital and operating costs.

Water restriction policies must be simple to understand and clear to the community. If a restrictions policy is too complex it will be difficult to communicate and enforce. Local water utilities in NSW have traditionally applied a '5/10/10 rule' which comprises:

- Duration: Restrictions should not exceed 5% of the time; that is, an average of 6 months over a 10-year period.
- Frequency: Restrictions are not applied in more than 10% of years; that is, an average of one restriction event in 10 years.
- Severity: The water supply system can meet 90% of the unrestricted water demand under conditions of the worst drought on record, starting with storage down to triggering restrictions.

However, a local water utility need not apply restrictions through a one-size-fits-all approach. A water restriction policy should account for the unique characteristics of the operating area and may also reflect different characteristics of communities within that area. An example of how 2 communities with different characteristics might arrive at different levels of services is illustrated in Figure 8.

Figure 8 Example level-of-service (LOS) considerations for 2 different communities

Considerations	Community A	Community B
Characteristics of community	Large storage with the capacity to supply several years of water demand	Small storage which relies on seasonal inflows (e.g. weather dependent storages)
	Generally consistent inflows with potential drought conditions preceded by a long period of low inflows	Short lead time between 'normal' supply conditions and 'drought' conditions
	Potentially significant economic impact on local industry under drought conditions	Large industries that rely on water supply, so possible economic impact under drought conditions
	Restrictions only occurred once in the last 20 years, therefore the community is not used to restrictions	Residential restrictions regularly implemented before beginning of dry season as preventative measure, therefore the community is used to restrictions
Potential characteristics of restrictions	Restrictions could be infrequent, but potentially with high level of severity, depending on the potential economic impact of the restrictions and the willingness of the community to reduce their water use in drought	Restrictions could be implemented on residential water use as a frequent, seasonal basis as a pre-emptive measure
Potential LOS objectives	Restrictions will be less than once every 25 years and will not be more severe than 350 L/c/d (220 L/p/d for residential water use) on average	Low level residential water restrictions (maximum of 250 L/p/d) will occur for an average of 6 weeks every year

Source: Queensland Department of Natural Resources, Mines and Energy, *Water security level-of-service objectives- Guidelines for development*, April 2018 Key: L/c/d: Litres per connection per day and L/p/d: Litres per day

How to carry out adaptive planning

Adaptation is where an organisation adjusts its state, form or structure in response to a modified environment. Adaptation can be a response to a wide variety of risks relevant to strategic planning for local water utilities and for this guidance, climate change in particular. This type of planning identifies options for adaptation. This in turn helps to identify trigger points when a decision for an option must be progressed with uncertainty. This has wide application for strategic planning for local water utilities.

Adaptation planning (or adaptive planning) is the NSW Government's preferred approach for responding to climate change. For the local water utility sector, an important reference is the Water Services Association of Australia's Climate Change Adaptation Guidelines.

The 4 stages of adaptive planning are to:

1. **assess** the risks of climate change in your region. This involves assessing exposure and vulnerability
2. **identify options and plan** to manage or reduce the effects of climate change on local people, environments, economy, assets, services and operations
3. **fund and implement** plans in consultation with local communities and stakeholders
4. **monitor and review** plans and results regularly for ongoing updates and improvements.

For more detail on how to implement an adaptive planning approach, refer to the Climate Change Adaptation Guidelines and AdaptNSW.

How to understand your system and undertake resilience assessments

A local water utility should assess system resilience and identify critical infrastructure and organisational processes, the events that could affect continuity of service and the consequences of failure.

The objectives of a resilience assessment should be to:

- understand systems and which components are critical to its operation
- identify the mode of failure for these components and the impact of the failure
- determine the risk of each failure mode
- provide documented outcomes that clearly show the most critical components and recommended controls.

Events to consider as part of a resilience assessment include:

- weather-related incidents
- IT outages
- cybersecurity incidents
- power outages
- natural disasters
- onsite fires
- bushfires
- facility management incidents
- security-related issues
- workplace safety incidents
- public health emergencies
- travel and supply chain disruptions
- emerging contaminants.

The assessment should also consider broader organisational and societal changes that may include:

- population changes
- economic effects
- knowledge retention (such as from retiring staff)
- regulatory changes.

People with appropriate knowledge should have input into an assessment of events. This is best done in a workshop format to ensure a wide breath of experience and knowledge is considered. The standard IEC (International Electrotechnical Commission) 31010:2019 Risk management – Risk assessment techniques gives guidance on assessment methods including cause and consequence analysis, bow tie analysis and scenario analysis. Scenario analysis is discussed in more detail in the following section.

This assessment should consider challenges and opportunities identified as part of regional water strategies.

When assessing resilience, local water utilities can reference the NSW Critical Infrastructure Resilience (CIR) Strategy Guide (Resilience NSW, 2021) , which includes the following suite of documents:

- NSW Critical Infrastructure Resilience Strategy
- NSW Critical Infrastructure Resilience Strategy Guide
- CIR Strategy: Criticality assessment guide
- CIR Strategy: Infrastructure planning guide
- CIR Strategy: Infrastructure resilience guide
- CIR Strategy: Organisational resilience guide
- CIR Strategy: Design operation and maintenance guide

The assessment method for criticality may include:

1. Understanding existing information: consider existing documentation, data and operational knowledge. This may include interviews and site visits to understand which components of each system are more critical or more likely to fail.
2. Assessing criticality: The IEC 31010:2019 Risk management – Risk assessment techniques gives guidance on assessment methods including Failure Mode Effects Analysis, event tree analysis, cause and consequence analysis, bow tie analysis and scenario analysis.
3. Documenting the assessment: Prepare a report summarising the assessment of asset criticality. This analysis should be detailed enough to inform emergency and incident planning.

Local water utilities should continually review system resilience to ensure that any emerging threats or increased understanding are appropriately considered. The NSW CIR Strategy Infrastructure Resilience Guide includes an iterative method that utilities could follow to ensure improved infrastructure resilience that includes the following elements:[10]

- Understand: Your organisation, your community, your infrastructure, risks and vulnerability
- Plan: Investigate resilience options, effort and investment
- Respond: Establish baseline metrics, project management method, ongoing metrics for reliability, security, cost
- Review and improve: Record lessons learnt.

Scenario analysis

The changing nature of climate and extreme events is leading to new and emerging risks that are difficult to anticipate. To consider these risks, we need scenarios that characterise a range of potential future conditions that do not rely solely on historical records and past experiences.

Scenarios can be an effective technique to support decision-making when considering uncertainty. Scenarios can help to analyse and test assumptions and inform strategic planning. There are many different types of scenarios and different ways to apply them to emergency and extreme events risk management.[11]

Scenarios may be used to consider effects on system resilience.

Figure 9 illustrates 4 different scenario types that can be used to explore resilience and decisions about incident and emergency risk management.

What will, or is likely to, happen? Based on the simple assumption of existing trends and current thinking or practices continuing unchanged into the future (that is, predictive scenarios)

What could happen? Under combinations of potential, uncertain and largely uncontrollable drivers of change (that is, exploratory scenarios)

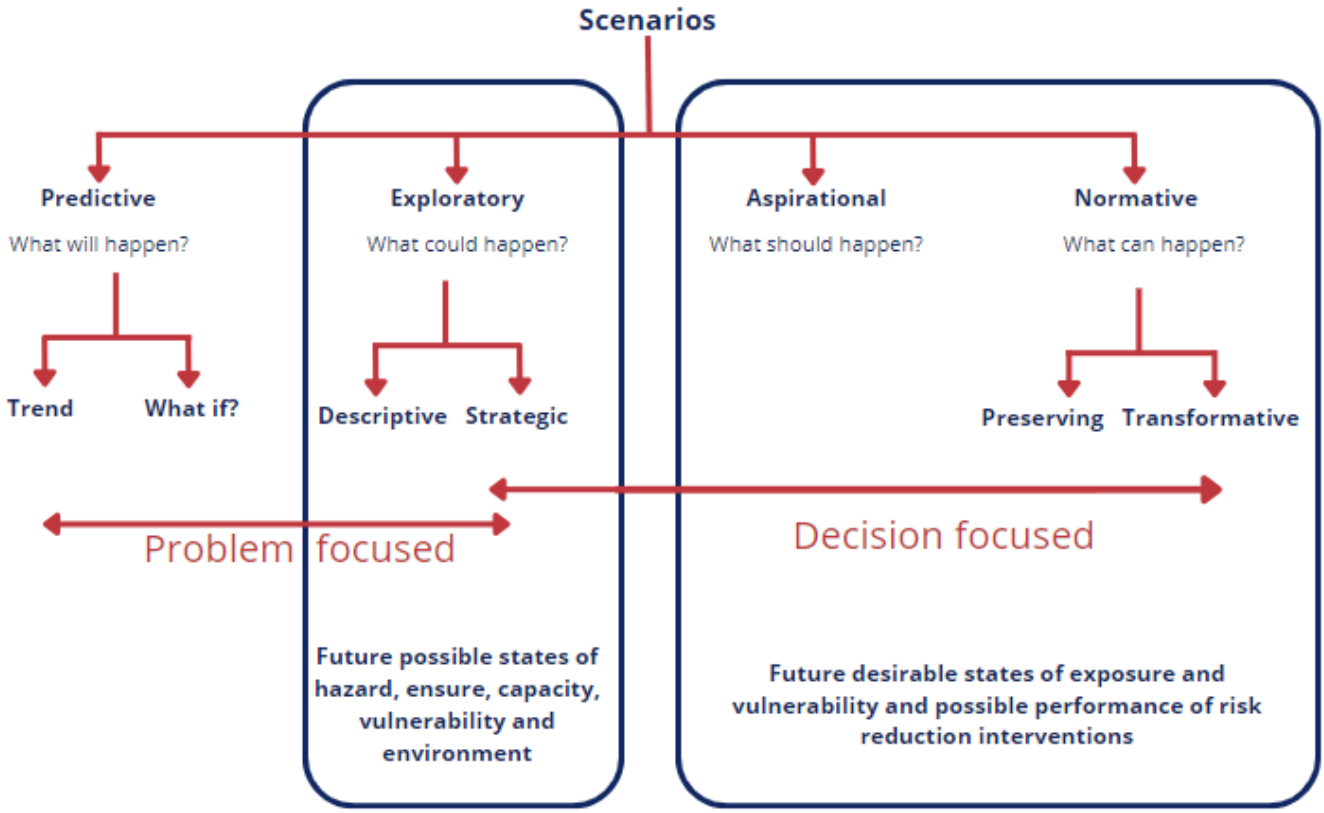
What should happen? Based on what the desired future is or a vision that then gives or defines the goals to guide interventions (that is, aspirational scenarios)

What can happen? Based on what happens with proactive interventions to change things (that is, normative scenarios)

[10] NSW CIR Strategy Infrastructure Resilience Guide – Appendix A

[11] Australian Government Department of Home Affairs, *Climate and Disaster Risk: What they are, why they matter and how to consider them in decision making*. 3 Guidance on Scenarios, 2019

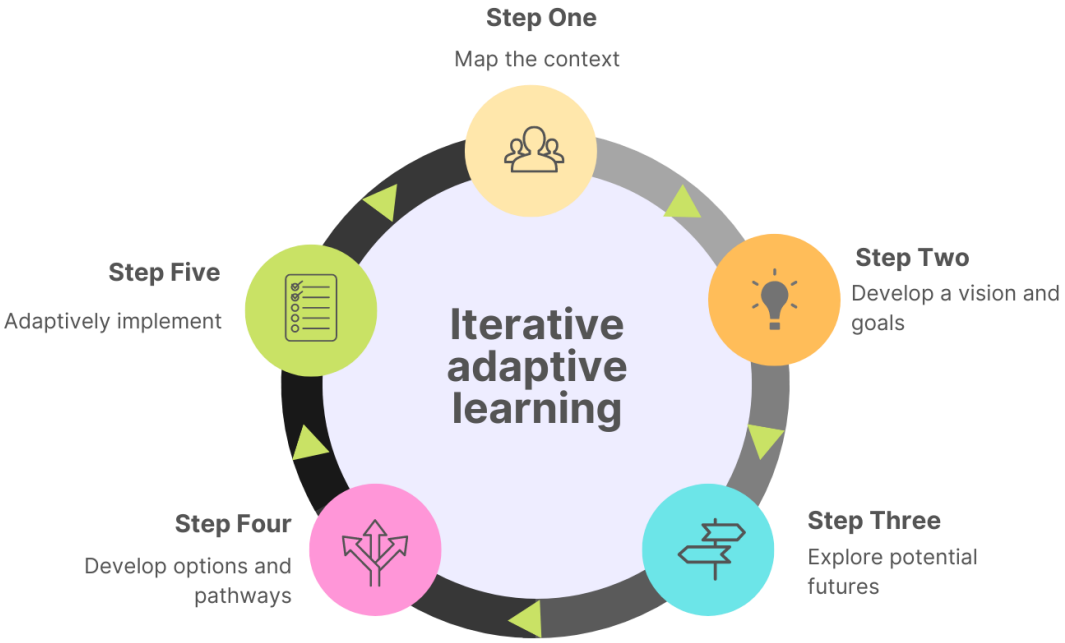
Figure 9. Scenario understanding



Source: Australian Government Department of Home Affairs, *Climate and Disaster Risk: What they are, why they matter and how to consider them in decision making*. 3 Guidance on Scenarios, 2019

A local water utility can apply the scenario analysis using a 5-step approach to emergency and extreme events risk management, as shown in Figure 10.[11] Refer to the Climate and Disaster Risks Guidance on scenarios for more information. Climate and Disaster Risks Guidance (Figure 3 page 12) also recommends a methodological response for different forms of knowledge deficits.

Figure 10. A 5-step approach to strategic climate and disaster risk assessment



Source: Australian Government Department of Home Affairs, *Climate and Disaster Risk: What they are, why they matter and how to consider them in decision making*. 3 Guidance on Scenarios, 2019

How to develop systems and processes to identify, prepare for, plan for, respond to and recover from incidents, emergencies and extreme events

A local water utility should understand the systems and process to identify, prepare for, plan for, respond to and recover from incidents, emergencies and extreme events specific to the utility.

An example system is shown in Table 4.

Table 4. Example systems and process to identify, prepare for, plan for, respond to and recover from incidents, emergencies and extreme events

Step	Details

Prepare (Understand your system)	• Risk assessments to understand area specific events and impacts to continuity of services:
	  ○ Risk assessment's scope and objectives are clear to inform incident and emergency planning
	  ○ The appropriate people are consulted to inform the assessment of risk
	  ○ Resilience objectives are defined to appropriately assess the level risk
	• System resilience assessment to identify and assess critical infrastructure (see guidance above, How to understand your system and undertake resilience assessments)
	• Processes to identify regulatory requirements (refer to How will the local water utility meet relevant regulatory standards?)

Prepare (Planning for incident and emergency responses)	• Planning to identify required plans and allocate roles and responsibilities for development, implementation, and document ownership. Develop incident and emergency response framework that details required plans and how they are integrated across the organisation
	• Processes to ensure that plans are fit for purpose: they have considered the risks, guidelines, standards, and systems resilience
	• Responsibilities and roles are clearly documented and understood
	• Processes are investigated to manage the failure of critical assets, such as:
	  ○ back-ups and alternative supply options
	  ○ mutual aid agreements

Respond	• Incident management response plans (tactical and operational plans) • Incident response resource plan • Communication and notification protocols • Escalation framework

Step	Details
Recover	• Identify scope of recovery planning needed • Recovery plans for critical infrastructure under different event scenarios • Recovery response resource plan

Minimum required plans and processes would include:

- Risk identification processes and assessments
- System resilience assessments
- Business continuity plans, including specific subplans for water and sewer
- Incident and emergency communication plans and protocols (considering responsibilities, delegations and internal and external notification requirements)
- Emergency response plans for critical infrastructure and resources (including an escalation framework, and tactical and operational plans)
- Recovery plans.

Figure 11 shows an example structure of identified plans for a drinking water supply.

Figure 11. Example incident management system structure for water supply

Refer to the Incident and Emergency management for local water utilities framework guidance for standards for developing emergency and an escalation framework. A summary of existing guidelines is shown in Table 5.

Table 5. Existing incident and emergency response guidance

Area	Guidance	Details
Emergency risk management	Emergency Risk Management Framework, NSW Office of Emergency Management, 2017	The framework provides an approach for emergency risk management. It includes principles, outcomes and process for emergency risk management.
	BS EN 15975-1:2011 Security of drinking water supply – Guidelines for risk and crisis management	Standard describes good practice principles of drinking water supply management in the event of a crisis, including preparation and follow up measures
Critical infrastructure resilience assessment	NSW Critical Infrastructure Resilience Strategy Guide – • Criticality assessment guide • Infrastructure planning guide • Infrastructure resilience guide • Organisational resilience guide • Design operation and maintenance guide	• A series of documents on critical infrastructure resilience • Identifies ways to improve organisational and infrastructure resilience • Includes a framework, processes and case studies
Scenario assessments	Climate and Disaster Risk: What they are, why they matter and how to consider them in decision making. Guidance on Scenarios (Australian Government, Department of Home Affairs. 2019)	Guidance on scenario assessments when considering future extreme with high levels of uncertainty
Asset management	Integrated Planning and Reporting Handbook for Local Councils in NSW (September 2021)	• Assets Management Planning • The Asset Management Strategy must identify assets that are critical to the council's operations and outline risk management strategies for these assets
	ISO 24516: Guidelines for the management of assets of water supply and wastewater systems	Standards for the management of physical assets focusing on operational activities, at both a strategic and operation level. Covers risk and life cycle aspects.

Area	Guidance	Details
Business continuity	ISO 22301:2019 – Security and Resilience – Business Continuity Management - Requirements	Specifies the structure and requirements for implementing and maintaining a business continuity management system. Includes implementing, maintaining and improving a system to protect against, reduce the likelihood of the occurrence of, prepare for, respond to and recover from disruptions when they arise
	Business Continuity Management Guidelines, Water Directorate, 2012	Business continuity plan guidelines and template plans for risk management, emergency and crisis management and business continuity management.
Incident management	Australasian Inter-Service Incident Management System (AIIMS)	• System for the management of incidents including at a strategic, operational and tactical level. • Strategic-level planning focuses on the longer term effects and the 'bigger picture'.
Drinking water emergencies	Australian Drinking Water Guidelines	Includes planning and response requirements for drinking water related incident and emergencies
Recycled water emergencies	Australian Guidelines for Water Recycling	Includes planning and response requirements for recycled water related incident and emergencies
Fluoride overdose	Fluoride Code of Practice	Includes requirements for an overdosing incident
Dams	Guideline – Emergency plans (Dam Safety NSW)	This guideline contains information on emergency plans for declared dams. It should assist declared dam owners who are preparing or amending their dam emergency plan
Pollution Incident Response Management	Guideline: Pollution Incident Response Management Plans, EPA	Guidelines that set out the requirements for Pollution Incident Response Management Plans (applicable to licenses under the *Protection of the Environment Operations Act 1997*)

Appendix C: Templates, case studies and tools

To support utilities in achieving the strategic planning outcome **understanding other key risks and challenges** to a reasonable standard, we give the following optional how-to case studies and tools:

Case study: Regional water strategies

The Department of Planning and Environment – in partnership with local governments – is leading the development of regional water strategies for 12 regions across the state. The scope of the regional water strategies aligns with expectations in this guidance, for example for:

- setting levels of service for drought response
- undertaking planning for drought response
- engaging with the community on drought response measure.

Therefore, the regional water strategies are an important element of strategic planning for local water utilities. However, as the strategies are regional and involve the operating areas of multiple local water utilities, there is still a need for each local water utility to understand the implications of the strategy specific to its operating area and incorporate it into its own strategic planning.

The department has published a guide for regional water strategies, which details the process for preparing them.[12]

Case study: Melbourne Water's environmental scan

Reference: 2020 Operating Environment Scan (Victorian Government and Melbourne Water)

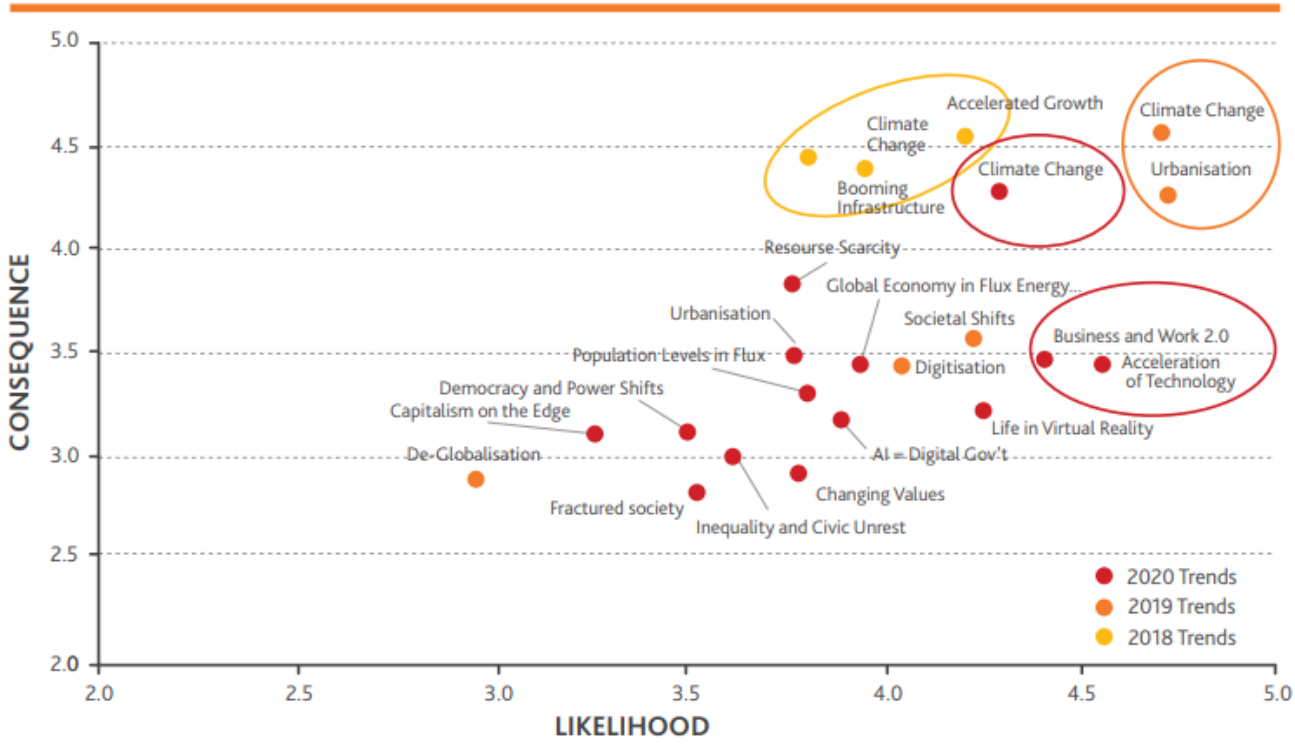
Melbourne Water does an environmental scan annually to identify global and local trends that are shaping its business. The scan supports its business to anticipate new possibilities, opportunities, risks and challenges, and ultimately reshapes action in the present.

Melbourne Water uses a STEEP (social, technological, economic, environmental and political) framework to identify and consolidate trends. It uses techniques such as research and stakeholder engagement to identify 'hits' that it aggregates into trends and then drivers of change. **Error! Reference source not found.** gives the trends Melbourne Water's 2020 environmental scan

[12] www.dpie.nsw.gov.au/__data/assets/pdf_file/0005/499748/regional-water-strategies-guide.pdf

identified. Melbourne Water's environmental scan also gives more details on the assessed likelihood and consequence of the identified trends.[13]

Figure 12. Likelihood and consequence of trends identified by Melbourne Water



Source: Victorian Government and Melbourne Water, 2020 Operating Environment Scan

The next step Melbourne Water will take is to establish plausible scenarios of what might happen, informed by the likelihood and consequence of the trends. This will then allow Melbourne Water to recognise the future strategic implications and incorporate them in planning and risk management.

Case study: Lower Hunter Water Security Plan – Drought Management Plan

The NSW Government and the local community has developed the Lower Hunter Water Security Plan collaboratively. It has been refined and improved over several years as better information and understanding of community preferences has been gained.

An important element of the water security plan is the Lower Hunter Drought Management Plan. The drought management plan includes a range of complementary demand-side and supply-side initiatives that will enable the region to withstand sustained and severe periods of drought.

The drought management plan defines actions in 2 categories:

- Water restrictions and behaviour change
- Infrastructure actions.

[13] Victorian Government and Melbourne Water, 2020 Operating Environment Scan, page 3 (https://www.melbournewater.com.au/media/10916/download

Actions are triggered by changes in storage levels. Decreasing storage levels lead to implementation of higher cost or higher impact benefits. Further detail on triggers and drought response measures can be found in the Lower Hunter Drought Management Plan.[14]

Case study: Decision framework for climate change adaptation

The Water Services Association of Australia (WSAA) has collaborated with water utilities to give them more guidance on how they can apply the overarching adaptative planning approach when responding to climate change. The *Climate Change Adaptation Guidelines (2016)* gives case studies and references specific to water utilities as well as a detailed decision-making framework.[15]

How to assess your system and its resilience

There are several case studies relating to resilience in the NSW Critical Infrastructure Resilience Strategy Guide:

- Enhancing Response and Recovery: Wingecarribee Shire Council
- Redundancy: The Clarence – Coffs water supply project
- Reliability: Orange City Council's holistic approach to water supply resilience.

Table 6 shows an example extract from a criticality assessment for a raw drinking water supplyTable 6.

Table 6. Example criticality assessment of raw water source

Failure modes	What are the consequences to service of the failure?	How is service restored? How long would it take? What resources are required?	Assessment of consequence of failure	What risk mitigation is needed?
No water in dam. Dam structural failure.	Unable to use dam as a raw water source. If backup supply not available, unable to supply water to customers.	Switch to back up supply source if available.	Loss of source – no alternate source available – Severe	Monitor dam levels. Retain reserve volume in dams. Maintain dam structure. Dam safety inspections.

[14] NSW Department of Planning and Environment, *Lower Hunter Water Security Plan*, 2022, Table 1 on Page 84

[15] WSAA, Climate change adaptation guidelines, February 2016, Figure 1 on page 9 (https://www.wsaa.asn.au/publication/climate-change-adaptation-guidelines)

Failure modes	What are the consequences to service of the failure?	How is service restored? How long would it take? What resources are required?	Assessment of consequence of failure	What risk mitigation is needed?
	Dam raw water customers lose water supply			Multiple staff with dam safety certification.
Dam water untreatable	Unable to use dam as a raw water source. Consider alternative treatment processes. Dam raw water customers lose water.	Switch to back up supply source if available.	Loss of source – no alternate source available – Severe	Monitor water quality.