



WATER SERVICES
ASSOCIATION OF AUSTRALIA



INTEGRATED WATER MANAGEMENT

Principles and best practice for
water utilities

Summary Paper

About WSAA

The Water Services Association of Australia (WSAA) is the peak industry body representing the urban water industry. Our members provide water and sewerage services to over 20 million customers in Australia and New Zealand and many of Australia's largest industrial and commercial enterprises.

Acknowledgement

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Citation

Skinner, R and Satur, P, 2020, *Integrated water management: Principles and best practice for water utilities*, Summary paper, prepared for the Water Services Association of Australia by Monash Sustainable Development Institute, Monash University, Melbourne.

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ISBN 978-0-6489242-1-0

Australian and New Zealand water utilities have a long and successful history of providing safe, secure and affordable water, wastewater and drainage services to cities and regions. The water industry contributes to the productivity, public health and public safety of urban areas.

However, Australian and New Zealand cities and regions are in a rapid transformation as populations grow, our climate shifts and community expectations change. These challenges, and the increasing density and urbanisation of our cities and regions mean that the traditional central planning and delivery role of utilities is now being broadened to encompass improved community outcomes in three areas:

1. Optimising water cycle management

As our climate continues to get hotter and drier, heat increases demand for water and the drying climate reduces the water we have available. Total water yield from many catchments is in a long-term decline. In response, water utilities are working towards optimising and investing in a diverse portfolio of water supply sources. There are potentially major gains for communities when water utilities apply an integrated water management process across water, wastewater and drainage systems at all scales (central and local-place based). A critical condition for resilience is to have systems that are adaptable to sudden and significant changes in conditions – for utilities this requires work towards an adaptive planning approach.

2. Liveability

Liveable, sustainable and productive cities and regions are critical to our economic wellbeing and quality of life. In addition to supplying safe, secure and affordable drinking water, wastewater and drainage services, water utilities contribute to broader liveable outcomes, including:

- The provision of water and land for green infrastructure including green parks, open space and corridors to support active healthy lifestyles.
- Supporting blue infrastructure including clean, healthy, beaches and waterways.
- Supporting cool, healthy environments by using water and greening to reduce heat in the urban landscape, providing resilience to chronic and acute heat events and improving air quality.
- Supporting the community through engagement, education, hardship programs and other initiatives.

Liveability outcomes are sometimes the responsibility of water utilities, but most often local government or the private sector are responsible, and so water utilities should aim to integrate their planning and delivery activities with a broader range of stakeholders and the community.

3. Circular economy and integrated water servicing

Water utilities are moving towards a vision of integrated resource recovery. The long-standing, linear approach of extracting freshwater, treating it, using it, collecting it and disposing of it is no longer viable. This approach does not easily allow for realisation of value. This is particularly true in the Australian and New Zealand context, where many urban centres are vulnerable to variable and declining water resources and the disposal of additional biosolids to landfill or to the oceans is no longer acceptable.

Water utilities can become agents for the circular economy and have an opportunity to play an important role as resource stewards. There are opportunities for water utilities to work with a broad range of stakeholders and customers to transform the way the total flow of energy and resources is managed and optimised.

Integrated Water Management (IWM) planning provides water utilities with an approach to optimising water cycle management, liveability and the circular economy.

Definition and scope of Integrated Water Management

Integrated Water Management is a process that brings together all stakeholders involved in the planning and management of all water across the entire water cycle, to ensure that the liveability, resilience and sustainability outcomes that the community is seeking are maximised across our cities and regions.



An IWM approach:

- Is a collaborative process that is owned by all stakeholders involved in the water cycle, from its planning to ongoing management.
- Is customer and community outcomes-driven.
- Takes a whole of water cycle approach to planning with all supply and demand options on the table.
- Takes into account all options related to water, wastewater and drainage services.
- Takes into account the environmental, cultural, social and economic dimensions of place.
- Strategic and statutory land use planning and water planning are closely integrated.
- Supports a circular economy through maximising efficiency and working towards regenerative outcomes.
- Is fit for purpose – can be suited to different scales (e.g. catchment, region, precinct) and context (places and communities).
- Is ambitious and transformative in striving for the broader outcomes of the Sustainable Development Goals.

Principles and best practice outcomes

Presented in this framework are a set of principles and agreed best practice outcomes that allow water utilities to step through the IWM planning process in a way that suits their own particular circumstance:

Step 1 – Being clear on what the IWM process is trying to achieve: Co-designing with stakeholders the vision, objectives and outcomes for IWM projects.

Step 2 – Establishing the enabling environment: Establishing the enabling environment of institutional and organisational leadership foundations exist that underpin the delivery of such outcomes.

Step 3 – Integrated systems planning and delivery: Delivering on-the-ground the IWM outcomes and measures identified in Step 1 by integrating water systems and land use planning.

Step 4 – Developing the case for IWM projects: Applying economic evaluation, funding and financing, and considering the associated challenges and risks.

Specifying vision, objectives, outcomes and indicators

The first step in developing a compelling reason for proceeding with an IWM project is achieving a common agreement, across all stakeholders, of the project's **vision** and **objectives**, the **problem** that needs to be solved and the **outcomes** to be achieved.

The vision is the overarching purpose and shared expectation of the future that inspires stakeholders to commit to the project. Involving all stakeholders in a process of co-designing the vision and objectives is a foundational step.

At the end of the IWM project development process it is expected that all stakeholders should be committed to supporting the project and some will be required to provide resourcing and funding – 'owning' the vision from the outset is therefore critical.

The objectives of the project should be a clear statement of the purpose of the project, which in turn frames the problem that the project is aiming to solve. It is important not to move into problem solving mode until all stakeholders are absolutely confident that the problem(s) is clearly specified and understood.





Case Study – Western Sydney Regional Master Plan

Demonstrates - Developing collaborative vision and shared objectives

Priority strategic context: The Greater Sydney Commission’s vision for a Western Parkland City includes “neighbourhoods with fine grain fabric and human scale that support healthy lifestyles and connected communities”.

Vision: To maximise the value to Sydney Water’s customers by securing the long term vision and benefits of the emerging Western Parkland City ... “Our customers enjoy affordable and essential water services, healthy waterways and vibrant, cool and green places”.

Problems and challenges in Western Sydney: Population growth, climate change, cost of new services, waterway health, unprecedented infrastructure investment, place making imperative.

IWM Outcomes – what are we trying to achieve?

What does the desirable level of liveability, resilience and sustainability of our cities and regions look like? What specific and measurable outcomes is the IWM project seeking to deliver?

This framework proposes a set of **8 Key Outcome Areas with 27 specific Outcomes**, as summarised in Tables below. The outcomes are generally aligned with and reference the Water Sensitive Cities index of the CRC for Water Sensitive Cities (CRCWSC 2018a).

The outcomes are separated into **enabling** and **delivery** outcomes:

- The first three Key Outcome Areas are referred to as **enabling outcomes** that relate to the establishment of institutional, leadership and authorising foundations.
- Key Outcomes 4 to 8 relate to the ‘on-the-ground’ or **delivery outcomes** of IWM.

A foundational premise of IWM is that the successful achievement of on-the-ground delivery outcomes is critically dependent on ensuring all the enabling outcomes are in place before the problem-solving phases commences.

The IWM outcomes presented here are regarded as 'best practice' but it is unlikely that any one project will aspire to achieve all these outcomes. Any project will have outcomes that the project proponent and relevant stakeholders regard as critical for project delivery, and then determine what the **levels of service** for each outcome should be and appropriate measures.

Levels-of-service indicators and measures

Having determined particular outcomes for an IWM project, the indicators and measures for each outcome should be agreed by all stakeholders, including both community groups and potential funding partners. These measures will be used to evaluate options at a later stage of the IWM process. Outcome measures will be unique to individual projects and should be quantifiable.

Establishing the enabling environment

Table 1. Enabling outcomes for IWM.

Best Practice IWM Outcomes Framework
<u>Enabling outcomes</u>
Key Outcome Area 1 - An engaged, inspired and knowledgeable community that drives decision making
Outcome 1a - Connection with water and water literacy
Outcome 1b - Shared ownership, management & responsibility
Outcome 1c - Community preparedness and response to extreme events
Key Outcome Area 2 - Leadership and capacity
Outcome 2a - Collective leadership, long-term vision and commitment
Outcome 2b - Knowledge, skills and organisational capacity
Outcome 2c - Indigenous partnership in water planning
Outcome 2d - Constructive organisational culture
Key Outcome Area 3 - Institutional, policy and regulatory arrangements that drive integrated and collaborative approaches to water cycle planning
Outcome 3a - Policy, legislation and regulations
Outcome 3b - Cross-sector institutional arrangements and processes
Outcome 3c - Public engagement, participation and transparency
Outcome 3d - Economic and financial/funding systems

Key Outcome Area 1: An engaged, inspired and knowledgeable community that drives decision making

The IWM approach is:

- a collaborative process that is 'owned' by all stakeholders involved in the water cycle, from its planning to ongoing management, and
- customer and community outcomes-driven.

The capacity and motivation of both customers and community is a key factor in their ability to be water literate and play their role in urban water management. Because of this, water utilities are continually reassessing the way they engage with their customers and the community to determine expectations and to collaborate with other stakeholders in creating value.



Case Study - Oaklands Stormwater Harvesting and Re-use project - Adelaide

Demonstrates – Key Outcome Area 1: an engaged, inspired and knowledgeable community that drives decision making.

Detailed and extended consultation occurred during the feasibility, viability, funding, development application and construction phases of the Oaklands project. This ranged from early engagement with the Kaurna Nation, State and Federal Governments, residents and contractors.

This process enabled the IWM project team to fine-tune the project, delivering multiple community and benefits, not just stormwater harvesting.

The City of Marion uses the wetland for community education purposes. Site tours are promoted via the Council website. Local schools regularly visit the site. Flinders University students also use the wetland for water quality monitoring and ecology classes.

Key Outcome Area 2: Leadership and capacity

IWM requires an authorising environment where customers and the community are able to partner with planning agencies to articulate their needs and priorities. Demonstrating authenticity in this leadership will assist bringing customers and community along for the journey.

Two outcomes in this area warrant particular mention:

Outcome 2c - Indigenous partnership in water planning

A number of Indigenous organisations and advocates have emphasised that the water related rights and aspirations of Indigenous people should first and foremost be established and recognised from Indigenous perspectives, rather than seeking to categorise them under current water planning and management terms, processes and doctrines.

While it is recognised that this is a stretch goal for water utilities, an Indigenous perspective should ideally be incorporated at all levels of an IWM framework, including the institutional and legislative enabling environment, through to processes and protocols for engaging Traditional Owners and Aboriginal communities in planning, management and decision-making.

Practically, this involves at a minimum water utilities meeting their legislative responsibilities (both state and Commonwealth) towards the Traditional Owners within their service area, and supporting their self-determination by engaging early and comprehensively. Currently, this often results in Traditional Owners being swamped by engagement requests from organisations across multiple sectors – agreeing with each Traditional Owner on their priorities for involvement, and developing a strong working partnership based on mutual respect can assist in progress towards this outcome.

Outcome 2d - Constructive organisational culture

IWM deals with complex problem solving, involving a range of technical options delivered by a range of stakeholders, in a planning environment of deep uncertainty. Success requires an organisation and leadership culture that is said to be a ‘problem solving’, or constructive culture that develops in an organisation that:

- Expects and encourages people to collaborate and share ideas openly.
- Understands the importance of ‘below the line’ drivers (trust, openness, relationships, identity).
- Rewards innovative risk-takers.
- Seeks to understand the commitments of all parties involved and then works to achieve alignment on future success.
- Focuses on strengths that help with problem solving rather than focusing on problems.

Key Outcome Area 3: Institutional, policy and regulatory arrangements that drive integrated and collaborative approaches to water cycle planning.

Two outcomes in this area warrant particular mention:

Outcome 3a - Policy, legislation and regulations

The development and delivery of IWM projects can involve a large range of stakeholders and a range of options. Water utilities should endeavour to understand all stakeholders’ relevant policy, legislation and regulatory opportunities and constraints. In addition to water resource and service delivery requirements, IWM is subject to environmental health, public health, price, and planning or built environment regulations.

This knowledge is important to ensure compliance and to identify clearly what outcomes the regulations and policy settings are aiming to achieve, though in some jurisdictions this may not be clear. Underpinning success here is a water utility mindset that sees government agencies as constructive and collaborative partners in IWM processes.

Outcome 3b - Cross-sector institutional arrangements and processes

Engaging all stakeholders in co-designing a project's vision and outcomes from the outset is predicated on being able to clearly understand and agree on the accountabilities and responsibilities of all stakeholders, as they relate to:

- Policy and regulation development, implementation and monitoring.
- Service delivery obligations (for system development and maintenance).
- Funding and financing responsibilities and opportunities.
- Resources with the right skill sets and capabilities.
- Developing goals for collaboration, including commitments to use best endeavours to explore opportunities.
- Building inter-organisational trust and modelling constructive behaviour.



Integrating water systems and land use planning

Table 2. Delivery outcomes for IWM.

<p>Best Practice IWM Outcomes Framework</p> <p><u>Delivery Outcomes</u></p> <p>Key Outcome Area 4 - Water Infrastructure and systems that are fit for purpose, resilient and adaptable to change</p> <p>Outcome 4a - Diverse fit-for-purpose water system services</p> <p>Outcome 4b - Adaptable and robust systems</p> <p>Outcome 4c - Integration and intelligent control</p> <p>Outcome 4d - Adequate maintenance</p> <p>Outcome 4e - Equitable access to water system services</p> <p>Key Outcome Area 5 - Improved ecological health and biodiversity of natural environments</p> <p>Outcome 5a - Healthy and biodiverse habitat</p> <p>Outcome 5b - Groundwater quality and replenishment</p> <p>Key Outcome Area 6 - Healthy, cool, green cities and regions supported by blue and green infrastructure</p> <p>Outcome 6a - Activating connected green - blue space</p> <p>Outcome 6b - Infrastructure elements functioning as part of the urban water system</p> <p>Outcome 6c - Urban heat mitigation</p> <p>Outcome 6d - Equitable access to amenity values of water-related systems</p> <p>Key Outcome Area 7 - Resource efficiency and recovery</p> <p>Outcome 7a - Highly efficient use of all sources of water</p> <p>Outcome 7b - Maximised resource recovery and re-use</p> <p>Outcome 7c - Low GHG emissions in water sector</p> <p>Key Outcome Area 8 - Innovative system-wide transformations towards a circular economy</p> <p>Outcome 8a - Beneficial outcomes across other sectors beyond water-related services</p> <p>Outcome 8b - Water-related business opportunities</p>

Key Outcome Area 4: Diverse fit-for-purpose water system services

Two outcomes within this area warrant particular mention:

Outcome 4a - Diverse fit-for-purpose water system services

In times of increasing stress on supply sources, an integrated water management process can deliver flexible and adaptive water systems that are appropriate to the **quality** of service required (including drinking water quality) and **demand** requirements of the end use (consumptive and non-consumptive uses). The guiding principles for achieving this outcome are:

- In the case of water supply options, all sources of water to be considered – that is, all options on the table.
- All geographic scales of systems (centralised and decentralised) to be considered, and integrated where necessary.

- All critical IWM outcomes addressed systematically from the outset – for example, the impact on outcomes related to ecological health, green-blue infrastructure or flood protection should be considered at the same time as traditional water security options being considered – rather than added on later in the process.

Outcome 4b - Adaptable and robust systems

A critical question for utilities engaged in IWM planning and management is how to ensure robust decision pathways that are also flexible and adaptive in order to effectively account for uncertain futures. This outcome sees water service systemsⁱ developed with appropriate governance and procedures to support an adaptive capacity that can embrace complexity and cope with uncertainty. To achieve this:

- Planning processes should embrace a ‘no-regrets’ mindset from the outset.
- All options are considered and attributed value, based on their ability to cope with a range of possible scenarios – rather than the most likely scenario.
- Balancing short and long term needs - identifying actions to be taken now for addressing current and near future needs, and those to be taken to keep options open to adapt if needed in the future.
- No single organisation has ownership of knowledge and techniques - the adaptive planning mindset is one that openly and generously shares knowledge between stakeholders as a formal part of the planning process.



Case study in Adaptive Planning – Icon Water

Demonstrates - Outcome 4b: Adaptable and robust systems

Icon Water used adaptive planning techniques to develop Phase 1 of their iterative, adaptive strategies for the sewerage and non-drinking water systems. Phase 1 intended to answer four primary questions:

- What type of future(s) should we plan for?
- How could the purpose of the sewerage system change?
- How do the strategic responses impact the treatment plants and the sewer collection assets?
- How strategic responses in the sewerage system impact Icon Water's other water and wastewater services?

In 2018-19 Icon Water reviewed their 2010 Sewerage System Strategy. They discovered that the detailed technical plans created either needed to be initiated early or were no longer appropriate, due to rapid population growth in the ACT and an end to the Millennium Drought. This led to a need to review the strategy and an opportunity to adopt new planning techniques allowing for future uncertainty.

Icon Water is using adaptive planning techniques for long-term planning to:

- increase efficacy of asset class strategies and other asset management (AM) artefacts as decision-making tools which integrate future flexibility and present needs,
- unify the future world view of the organisation and resolve differences in planning priorities across the business, and
- highlight adaptive planning tools for long-term planning in the face of a swiftly changing and uncertain future environment.

Icon Water used play-style facilitation to co-create a contrasting but plausible set of future scenarios for the sewerage and non-drinking water systems. Top-level management set the business posture to each of the scenarios, which included the establishment of multiple assumptions of key planning variables which integrated flexibility and adaptability into asset lifecycle decision-making.

The scenarios and resulting asset class strategies are already improving planning and decision-making at Icon Water. The asset strategies have a clear purpose which has flowed to other AM artefacts like asset management plans. Icon Water also has unified pictures of the potential futures across the business and clear guidance around the level of prepared-ness expected and response pathways for each scenario. This has particularly helped decision-making for asset classes like the non-drinking water system, which has less mature service offerings than other systems.

Critical to this success is two factors. First, co-creation of scenarios with the business resulted in a common understanding of the potential futures. It also organically increased literacy of adaptive planning techniques across the business. Second, top-level management direction on postures to scenarios has unified decision-making and allowed for clear integration of adaptability in decision-making.

Icon Water is now well-placed to continue with Phase 2 of the strategy development, which includes significant engagement with our community on their values. Phase 2 also includes development and validation of pathway thresholds, triggers and options, and practical application of the strategy to project and asset lifecycle work.

Key Outcome Area 5: Improved ecological health and biodiversity of natural environments

This outcome area sees water system services that help to protect, restore and create well-functioning ecosystems that contribute to ecological resilience. Surface water quality and flows, and marine environments are improved and protected. Existing areas of high ecological values are protected from impacts of catchment urbanisation.

The two main threats to waterway health are water quality and water quantity in water dependent environments and ecosystems. Water quality pollution can be categorised into point source or diffuse (non-point) source. Common regulatory tools to control point source pollution involve legislation and authorisation or licensing tools.

Water utilities will be well versed in these requirements, however it is often the regulations concerning diffuse sources of pollution that can be most challenging when stormwater is a component of the IWM options under consideration.

Key Outcome Area 6: Healthy, cool, green cities and regions supported by green and blue infrastructure

Three outcomes within this area warrant particular mention:

Outcome 6a - Activating connected green & blue space

This outcome sees the presence of many, distributed and well-connected green spaces and water assets. Green spaces can include formal or informal parkland, and public realm open space that is designed and maintained as a shared/accessible green landscape, for example streetscapes.

Water utilities can contribute to this outcome in at least two ways:

- By reviewing land holdings (eg. pipe easements, catchment and reservoir reserves, flood retarding structures) to identify land that can fulfil its original purpose whilst being repurposed to provide publicly accessible recreation corridors or spaces.
- Working with local government and other planning authorities to maximise the way that water can be incorporated into areas in terms of irrigation and/or providing water features such as lakes or wetlands.

Outcome 6b - Infrastructure elements functioning as part of the urban water system

This outcome sees adequate urban space and built form functioning as an integral part of the water system. Raingardens and other water sensitive urban design (pervious surfaces, heat mitigation through green and blue infrastructure) are good examples of success in meeting this outcome, and requires an understanding of the multi-purpose and interconnected opportunities of water service systems.

Outcome 6c - Urban heat mitigation

This outcome sees water infrastructure incorporated into the design of urban precincts in a way that reduces urban heat impacts through shading by trees and evapotranspiration (tree canopies, vegetation cover and soil moisture).

Extreme heat events pose a risk to the health of all individuals, especially the elderly and the chronically ill. Modeling can produce maps of spatial vulnerability that pinpoint areas of high heat-related risks. The challenge now is to use this knowledge and work with planning authorities to achieve measurable reductions in the urban heat islands of our cities.

Key Outcome Area 7: Resource efficiency and recovery

This Key Outcome area sees IWM delivering innovative system improvements and transformations, with measures in place to protect community values during periods of water scarcity (**Outcome 7a**), and cost-effective resource recovery involving all elements of the water cycle and concepts of waste to energy (**Outcome 7b**).

Meeting this outcome area would involve establishing measures for moving towards net-zero GHG emissions, by maximising the use of alternatives to high carbon emitting energy sources of and treatment for water system services.

Given that urban water influences approximately 9% of Australia's per capita GHG emissions, water utilities have a significant role to play in achieving the nation's GHG targets. Utilities leading in this space have their own renewable energy and GHG emissions targets, and have a range of ways to achieve these targets through the way they store, treat and deliver water to properties, and then subsequently collect, treat and dispose of wastewater. These system efficiencies can be included in the evaluation of all water systems options in an IWM project (including structural and non-structural options).

However, IWM provides additional opportunities for utilities to engage in programs and projects that have the potential to achieve even bigger GHG reductions. Two examples here are:

- Collaborating with residential and business customers to deliver behind the meter savings.
- Collaborate with urban planners and designers to deliver more energy efficient developments.

Key Outcome Area 8: Innovative system-wide transformations towards a circular economy

This Key Outcome Area sees beneficial outcomes across other sectors beyond those attained through water related services (**Outcome 8a**). It also envisages new business opportunities being stimulated through innovation in the water sector and in collaboration with other sectors (**Outcome 8b**). Examples that could flow from IWM processes include green infrastructure entrepreneurs (beyond rainwater tank suppliers), technology providers, service providers (nursery, consultants, monitoring and reporting, etc.), and further opportunities through resource recovery.





Case study: Kilmore Treatment Plant Offsets Scheme

Demonstrates - Developing both enabling and delivery outcomes

The water systems outcomes of the project related to the following IWM 'delivery' outcomes:

Outcome 4a - Diverse fit-for purpose water systems

Outcome 5a - Healthy and biodiverse habitat

Outcome 7c - Low GHG emissions in water sector

However, because this project relied heavily on a non-conventional ('non-structural') option, many of the critical IWM outcomes related to the establishment of institutional foundations and enabling environment:

Key Outcome Area 1 - Engaged, inspired and knowledgeable community that drives decision making

Key Outcome Area 2 - Leadership and capacity

Key Outcome Area 3 - Institutional, policy and regulatory arrangements that drive integrated and collaborative approaches to water cycle planning

Paying attention to these Key Outcomes was vital to the success of the project.

Developing the case for IWM projects

Developing a compelling reason for proceeding with an IWM project requires three conditions to be met:

1. There is common agreement across all stakeholders on the problem to be solved and the outcomes to be achieved.
2. The overall total societal benefits of adopting the proposed solution justify the capital and operating costs being imposed over the whole of the project's life.
3. There are parties who are willing and able to pay for the costs, both up-front capital and ongoing maintenance.

Once the first condition is completed, and the supporting and enabling conditions have been established, developing the case for an IWM project follows a set of logical steps:

- Identification of options.
- Measuring the outcomes of options.
- Evaluating the worth of projects.
- Financing and funding of projects.

Identification of options

There may be options other than infrastructure provision that can help meet the project objectives. Influencing government policy, regulations and programs in the areas of planning, health, environment, energy policy and programs can directly, or indirectly deliver IWM outcomes, and may reduce the need to use infrastructure options.

If infrastructure options are needed, developing a long list of options should be used to cast a wide net over the full range of solution possibilities. The following figure presents a matrix of options that may assist this step.

Integrating water systems

	Structural	Non-Structural
Centralised	E.g. Reservoirs, desalination plants, interbasin pipelines.	E.g. Planning provisions, pricing, water conservation, trading, regulations, social licence, offsets, system efficiencies.
Decentralised	E.g. Local stormwater capture, sewer mining, water sensitive urban design.	E.g. Building regulations, regulatory offsets, operating efficiencies.

Figure 1. Matrix of options - a framework for scanning possible IWM options. Source: Rob Skinner.

The process of identifying options means:

- Consideration of a diverse range of water supply sources to balance supply and demand efficiently.
- Each city and community should consider all options on the table within their local context.
- All options should include assessment of both centralised and decentralised options. Centralised solutions are usually at a regional level and built and operated by water utilities. Decentralised solutions can be provided by a range of stakeholders, including water utilities, local government and the private sector.
- Non-structural options may provide more cost-effective solutions than structural solutions, involving the achievement of outcomes by mechanisms such as pricing, water conservation measures, planning provisions and building design codes, water trading and regulatory offsets.

Options evaluation

The ultimate aim of a project evaluation is to direct investment towards the highest value option that considers all benefits and costs over the life of the project, including externalities and non-market values of water system services.

At a high level, an economic evaluation suitable for the complexities of IWM projects should incorporate the following principles (CRCWSC 2018b):

- Capability to account for all direct and indirect benefits and costs associated with the water-related IWM Outcomes.
- Whole-of-life-cycle assessment – including capital and operating and maintenance costs over the life of the project, as well as costs, risks and benefits for the broader system.
- Values the use of all resources – water, energy and waste in the circular economy.
- Incorporates a mechanism to identify appropriate funding sources, recognising the variety of costs and benefits and variety of stakeholders.

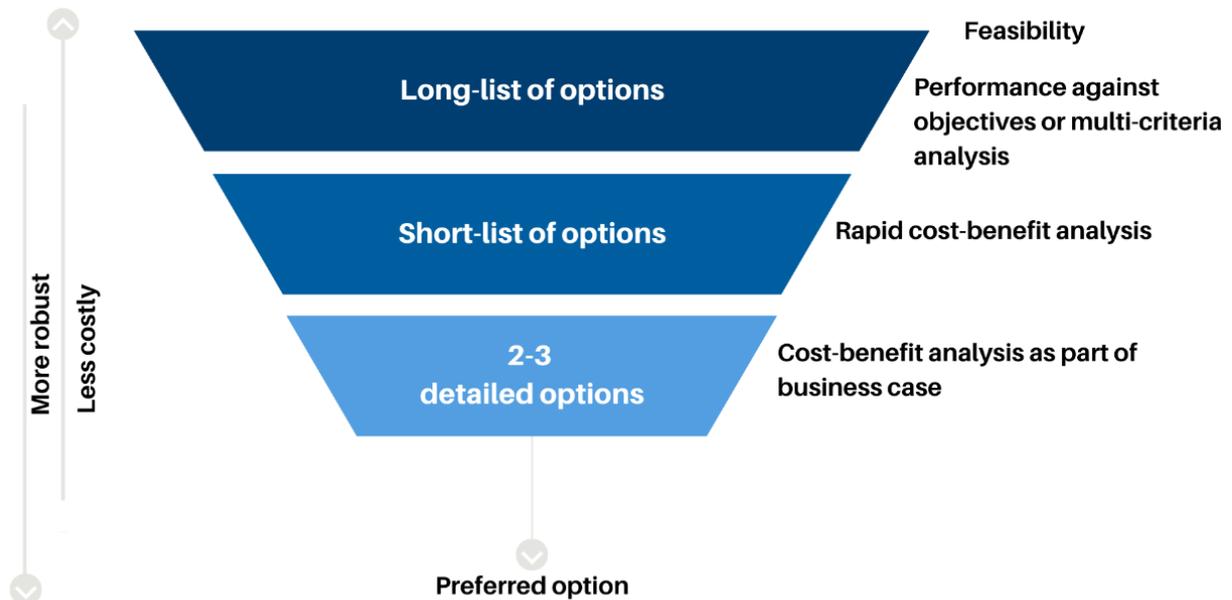


Figure 2. Different evaluation techniques to suit phases of planning. Source: Infrastructure Australia.

Financing and funding of projects

Financing is about who, at the outset, raises the cash for a project. This can be one of, or a combination of, water utilities, local government, Commonwealth and state government or private sector.

Funding is about who ultimately pays for it over the long term – the utility's customers, council rate-payers, government taxpayers, or the users.

For IWM projects aimed at delivering a broad range of liveability outcomes, determining and agreeing on appropriate financing and funding arrangements can be a complex matter. IWM projects often propose innovative investments that provide multiple benefits to many different entities including developers, water utilities and their customers, new householders, waterway managers, and the local environment (and community).

For each IWM project, it is important to identify from a broad group of stakeholder and community groups, which of those may meaningfully contribute to the IWM planning process, and potentially contribute to funding a benefit stream of relevance to them. Usually those with direct responsibilities in the water cycle are a starting point that can serve to demonstrate the value of the project. For projects involving multiple beneficiaries, the most challenging task is often to gain agreement between parties to the levels of contributions or cost shares, and developing agreed ways in which these contributions can be transferred.

There are mechanisms by which these transfers can be facilitated in practice (for example, creating **separate entities** to manage a new function funded by different parties according to the scale of their benefit: **developer charges**; and **value capture** instruments that levy beneficiaries according to the portion of value of the project they receive) but the process will ultimately be one of negotiation by parties informed by data developed in the earlier steps of this framework.

Successfully achieving agreements to contributions will be dependent upon a number of factors. An essential starting point is the agreement by all stakeholders to the outcomes of the project and associated measures for each of the outcomes. With this understanding should come a commitment from the outset that stakeholders will use their **best endeavours** to find financing and funding solutions.

If the outcome measures are mandatory, subject to statutory planning provisions or other legal requirements, the costs of achieving the outcomes can be passed on to customers, ratepayers or through state taxes, whichever is applicable.

Having outcomes included as obligations also provides the market with certainty that in turn provides the environment for innovation in both the public and private sector. Innovation will emerge in the range of solutions that are explored (structural and non-structural solutions) and financing options (for example, outcome-focused grants, incentive payments, green and social impact bonds, private equity investments, crowd funding) (DELWP 2017; Marsden Jacob Associates 2019).

If the outcome measures are not mandated by regulation, it places a higher importance on IWM collaborative agreements between parties to embed their best endeavours to finding financing and funding arrangements. In many IWM projects there are co-benefits to be gained for different groups. What stakeholders will realise in early stages of the IWM process – and what will encourage them to stay in the process – is that these co-benefits would in many cases not be generated in the absence of the IWM process.

Challenges and risks in establishing the case

Proving the worth of a project through a rigorous evaluation process and demonstrating how costs can be allocated equitably does not always guarantee that the decision makers will ultimately agree to the project proceeding. That is, there is a range of risks and challenges in the IWM planning process that, if not addressed carefully, can undermine the seemingly compelling arguments in favour of the project. The CRC for Water Sensitive Cities has presented these risks in the following way (CRCWSC 2018b):

Risk 1 – The problem is not perceived to be urgent (or the business case isn't addressing the real problem).

Risk 2 – The case for change is not compelling – status quo approaches appear effective at dealing with the problem.

Risk 3 – Funders who are paying don't see the benefits.

These risks are always present in project development exercises and a systematic engagement and communications strategy is required that encompasses these issues.

However, the good news is that the challenge of managing these risks is minimised by efforts towards putting in place all the IWM **enabling** outcomes at the beginning project. That is, the best risk mitigation strategy is to invest appropriate resources into achieving:

1. An engaged, inspired and knowledgeable community that drives decision making.
2. Leadership and capacity.
3. Institutional, policy and regulatory arrangements that drive integrated and collaborative approaches to water cycle planning.



References

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ⁱ Water service systems are defined as the systems that deliver water, wastewater and drainage services, including infrastructure assets, green and blue infrastructure, governance frameworks, policy and regulation.