

# AUSTRALIAN WATER REFORM ROADSHOW



**TRANCHE 3** STORMWATER, ENGAGEMENT  
THE FUTURE OF WATER

**MODULE 2** STORM WATER, CLIMATE CHANGE  
& RESILIENCE



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# Overview of Stormwater in Australia

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Introduction

Defining Stormwater

Context and Drivers

History and Current State

Future State

Case Studies

Close

## Defining Stormwater

- Surface water runoff that is captured by a drainage network which discharges into a downstream receiving body

## Key facets of Stormwater Management:

- Minor drainage network – roadside swales, small drainage pipes
- Major drainage network – large conveyance channels, flood detention basins, larger drainage pipes
- Water Sensitive Urban Design – stormwater quality treatment
- Rivers and Creeks
- Stormwater harvesting and reuse

## Key facets of Stormwater Management

**Minor Drainage network**  
roadside swales, small  
drainage pipes



**Major Drainage network**  
large conveyance  
channels, flood detention  
basins larger drainage  
pipes



Vegetated Chanel, Metropolitan Melbourne



Flood detention basin, Macedon Ranges Victoria

# Key facets of Stormwater Management

Water Sensitive Urban Design  
stormwater quality treatment



Raingarden, Metropolitan Melbourne



Trin Warren Tam-Boore wetland, Royal Park

Rivers and Creeks



Yarra River, Melbourne CBD



Jacksons Creek, Sunbury Victoria

# Key facets of Stormwater Management

## Stormwater Harvesting and Reuse



Greening the Pipeline – Stormwater Harvesting Scheme



Lake Stormwater Harvesting Scheme, Shepparton Victoria



Mutton Reserve – (Metro Melbourne)

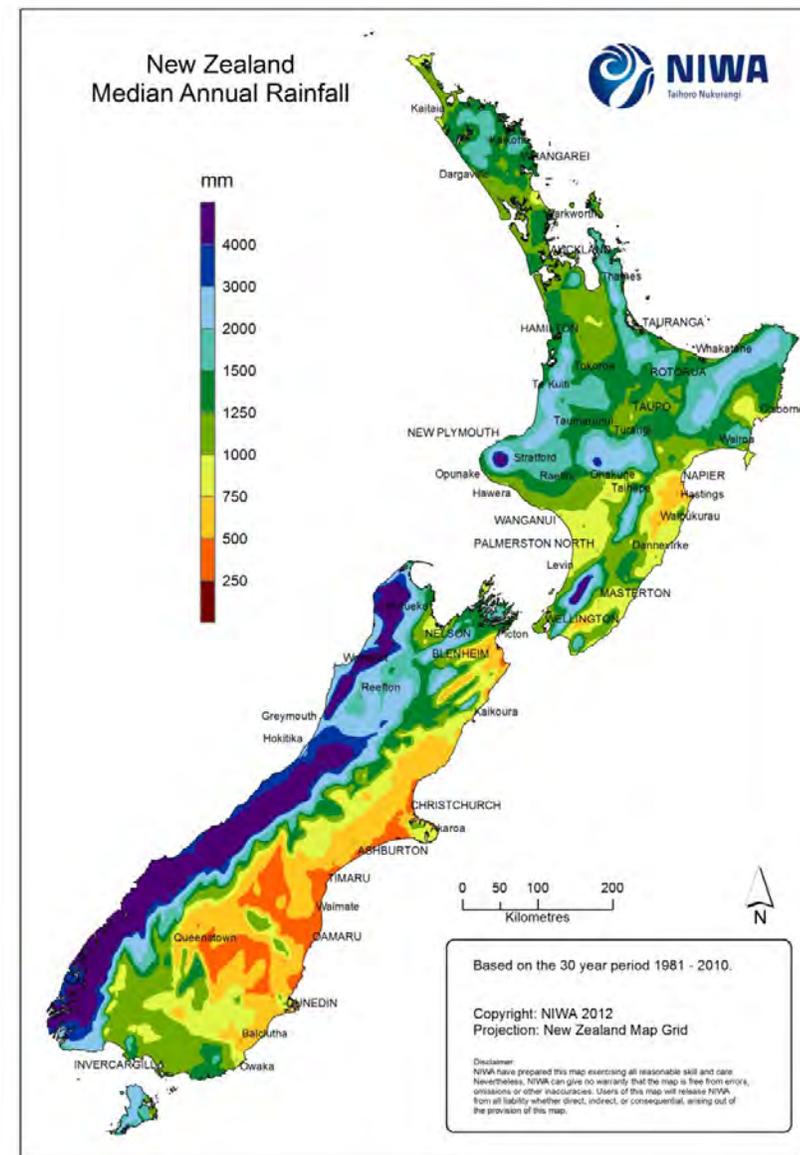
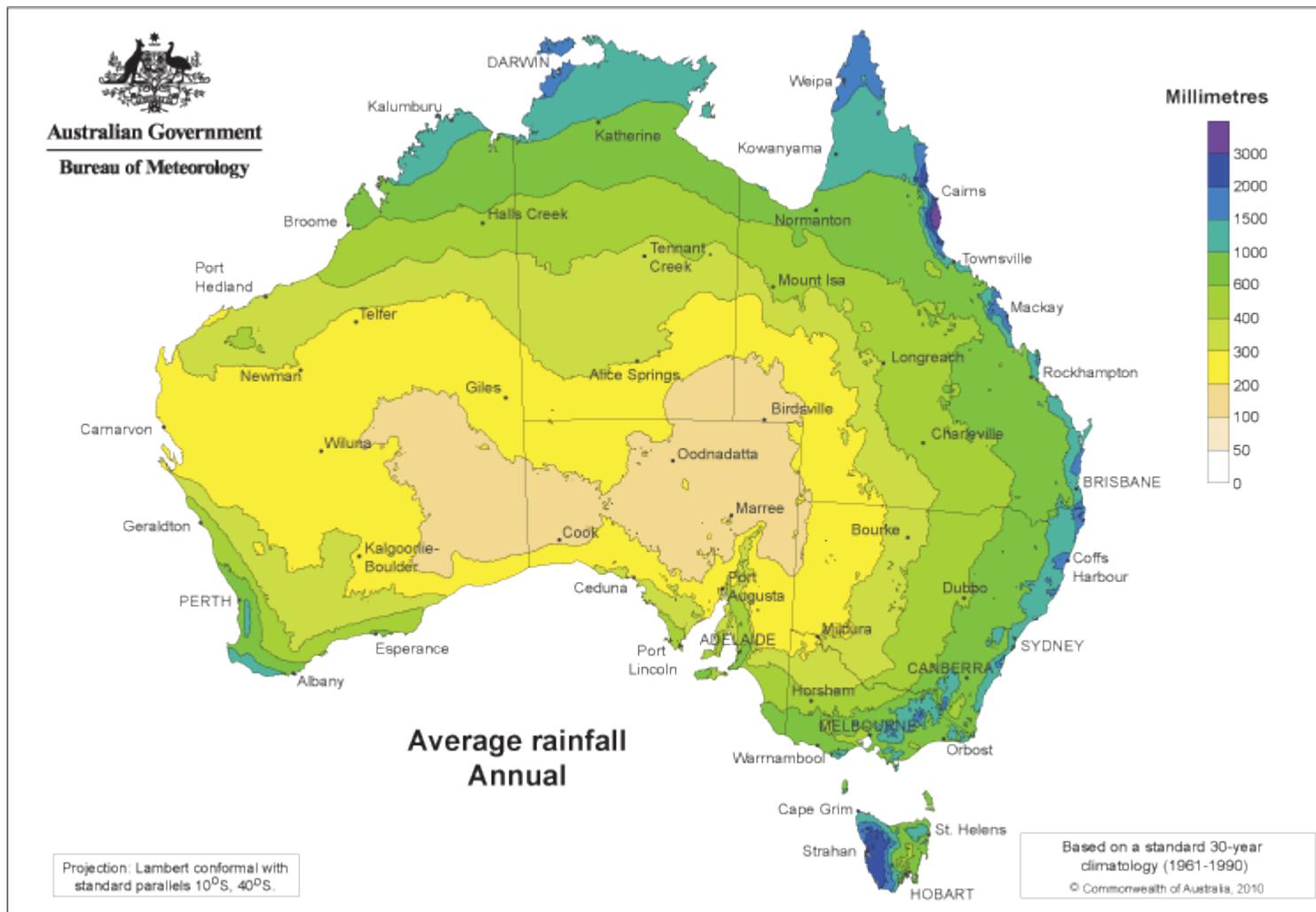


Hosken Reserve – (Metro Melbourne)



Darling Street – (Metro Melbourne)

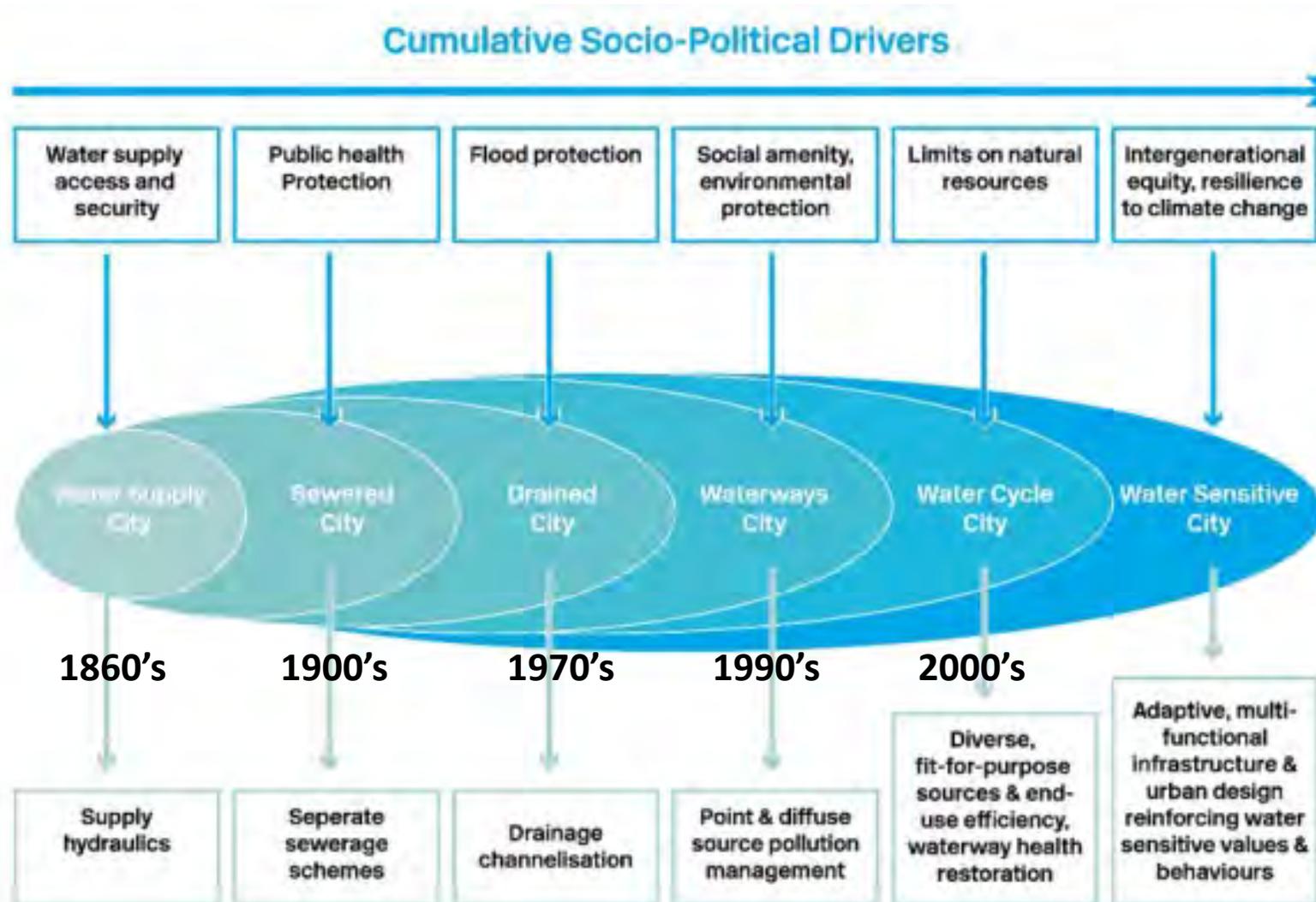
## Rainfall



## Focus for Stormwater Management in Victoria/Australia

- Urban Flooding – nuisance and high risk flooding
- Stormwater quality management
- Waterway health
- Environmental protection
- Stormwater as a resource





## Healthy Waterways at a Glance

This *Healthy Waterways Strategy* provides a single framework for addressing community expectations and the obligations for waterway management, as outlined in relevant State, national and international legislation, policy and agreements. It builds on a long-term regional vision for waterway health.

For each of the five major catchments within the Port Phillip and Westernport region (Werribee, Maribyrnong, Yarra, Dandenong and Westernport), this Strategy provides detailed, catchment-specific visions, goals, long-term targets (10 to 50 years), and 10-year performance objectives. Effort and investment at catchment and sub-catchment levels are prioritised and aligned to ensure they contribute to broader, regional goals and outcomes.

**Research**  
Targets the knowledge gaps and monitoring needs that will help to achieve better waterway outcomes. Provides the basis of understanding of current and changing environmental challenges and waterway conditions. Improves the understanding of issues, such as key sources of litter and essential requirements for the maintenance of groundwater dependent wetlands.

**Capacity Building**  
Encourages organisations and individuals to contribute to a knowledge collective, sharing resources, capability and skill. Allows waterway partners to leverage the efforts of others and achieve greater collective outcomes for waterways and aligns efforts to the agreed waterway priorities in each catchment. Increases the capacity of Traditional Owners to participate in waterway management across the region.

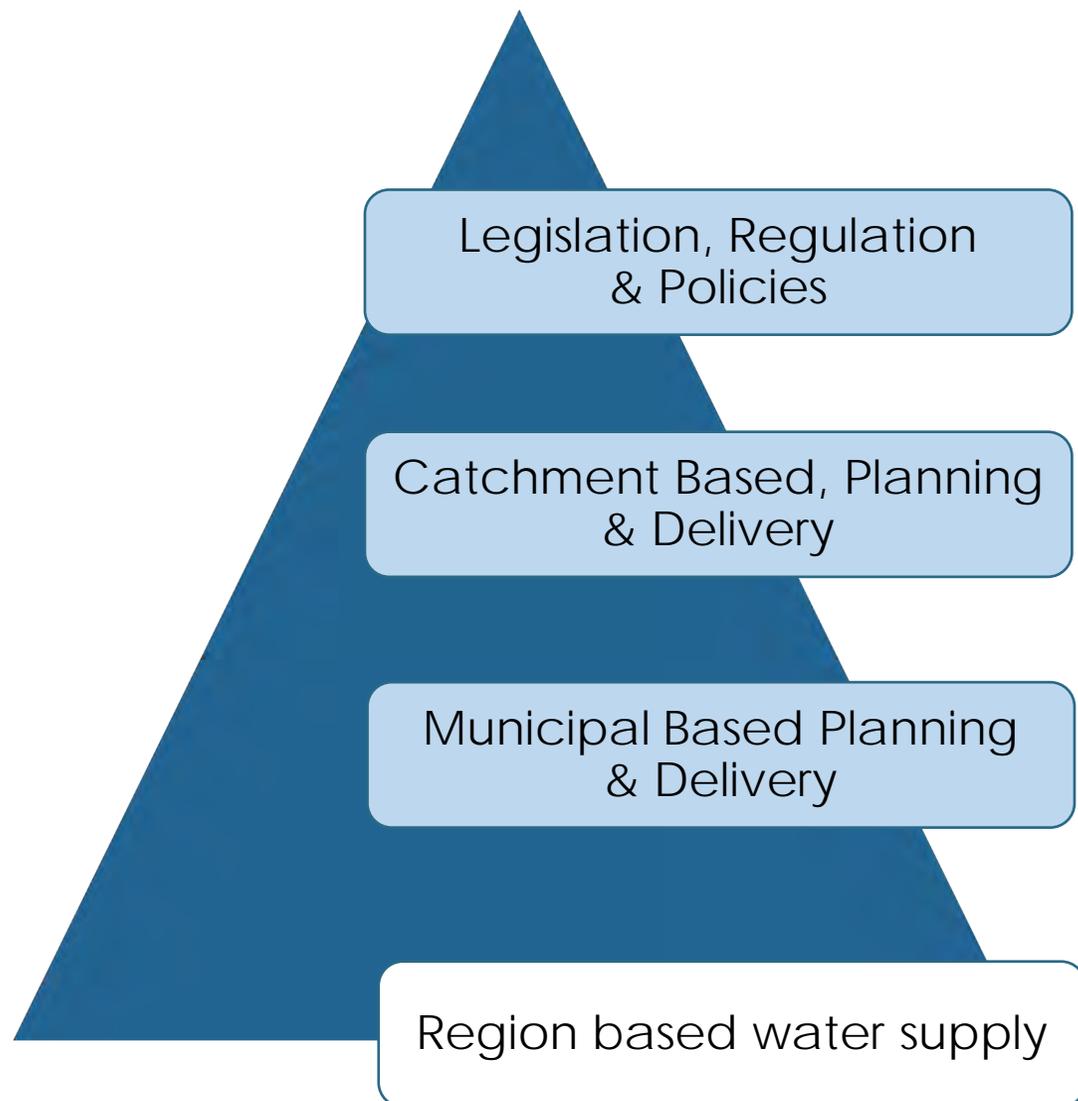
**Government Policy**  
Identifies the need for improvements in land use planning mechanisms to enable a greater capacity to manage and re-use stormwater across the catchments, and to protect the headwaters of catchments from inappropriate use or development. Re-use of an additional 83GL per year of stormwater for environmental, cultural, economic and social purposes, and an additional 23 gigalitre per year infiltration achieved.

**Environmental Economics**  
Applies new international environmental economic standards to demonstrate the economic value of waterways and to understand the return on investment for efforts in waterway management.

**On-Ground Activity**  
Aligns the efforts in the catchments by a diverse range of individuals and organisations to the waterway priorities that will provide the best outcomes and incrementally work towards achieving the community's catchment vision. Includes revegetation for an additional 1888 kilometres of canopy cover alongside waterways.

**Collaborative Implementation**  
Establishes a region-wide leadership group, a waterways lab, and regular catchment implementation forums to bring together the people and organisations working for waterways. Develops a monitoring and reporting framework to track the progress of the Strategy against goals and vision.

- Research
- Environmental Economics
- On-ground activities
- Capacity Building
- Government Policy
- Collaborative Implementation



## State Government

Health, Environmental & Economic

## Catchment Management Authorities

Catchment wide planning and delivery (waterways, stormwater harvesting and larger drains)

## Local Governments

Local Government planning and delivery (smaller drains, stormwater harvesting and reuse)

## Water Authorities

Augmenting of potable water supplies

## How is Stormwater Management Financed?

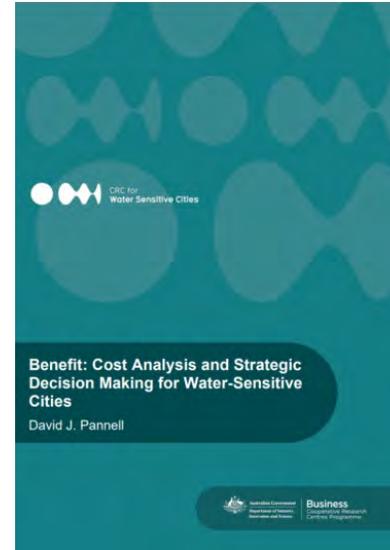
- Minor Drainage Network, Flood Management and Stormwater Quality Improvements - Council rates and charges, grants (Councils)
- Major Drainage Network and Waterways - Through waterway levies (Melbourne Water)
- Stormwater harvesting and reuse – Council rates, waterway levies, grants (joint effort)

## Typical Capital funding on Stormwater Management:

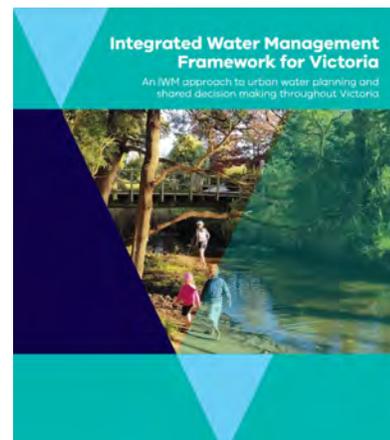
- Funding in metropolitan Melbourne far exceeds regional Victoria
- Councils - varies \$500,000 to \$3.5M annually (fraction of required funding)
- Catchment Management Authorities – \$500M annually
- Water Authorities - Limited

## Key factors in the future planning and management of stormwater

- Integrated Water Management
- Climate change
- Traditional owner and community values
- Economic value of stormwater management



Water Sensitive Cities, Cost Analysis tools

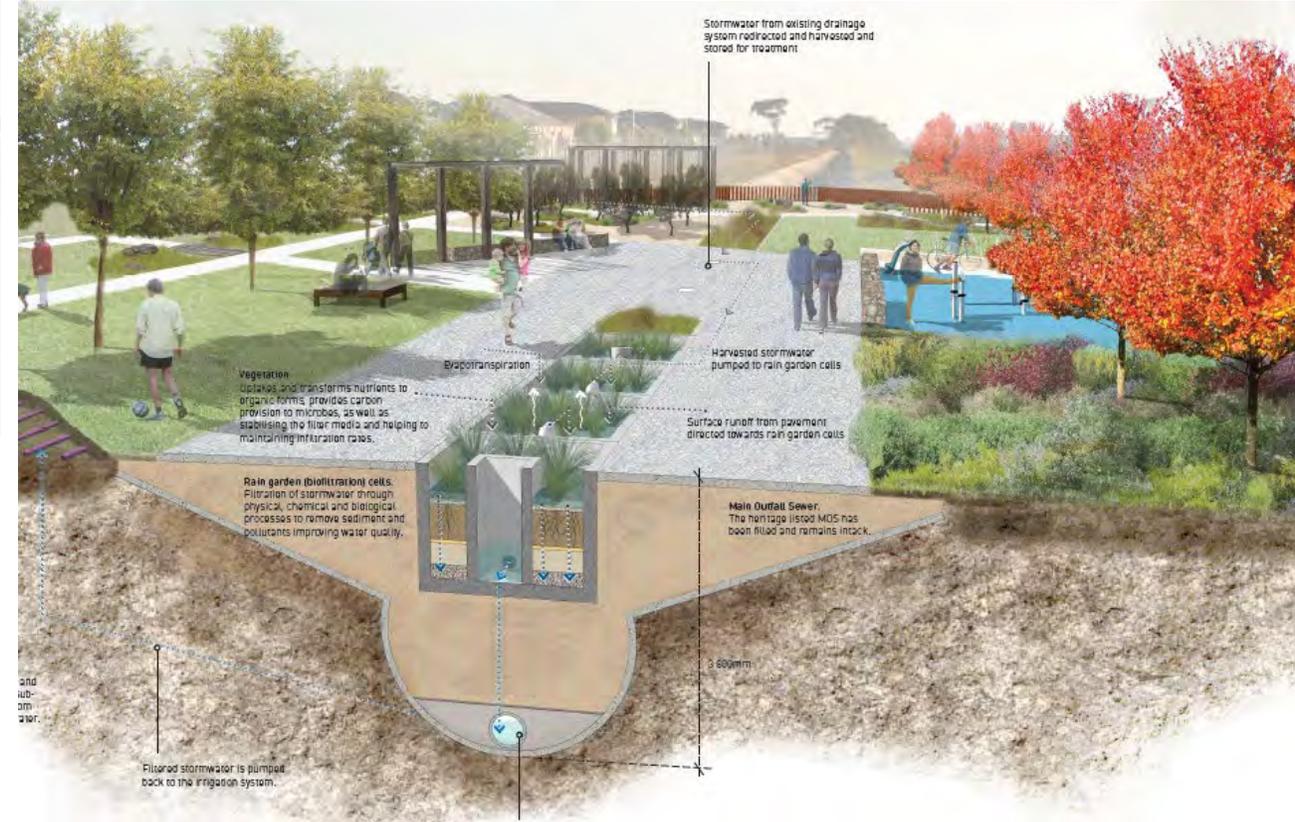


IWM Framework for Victoria

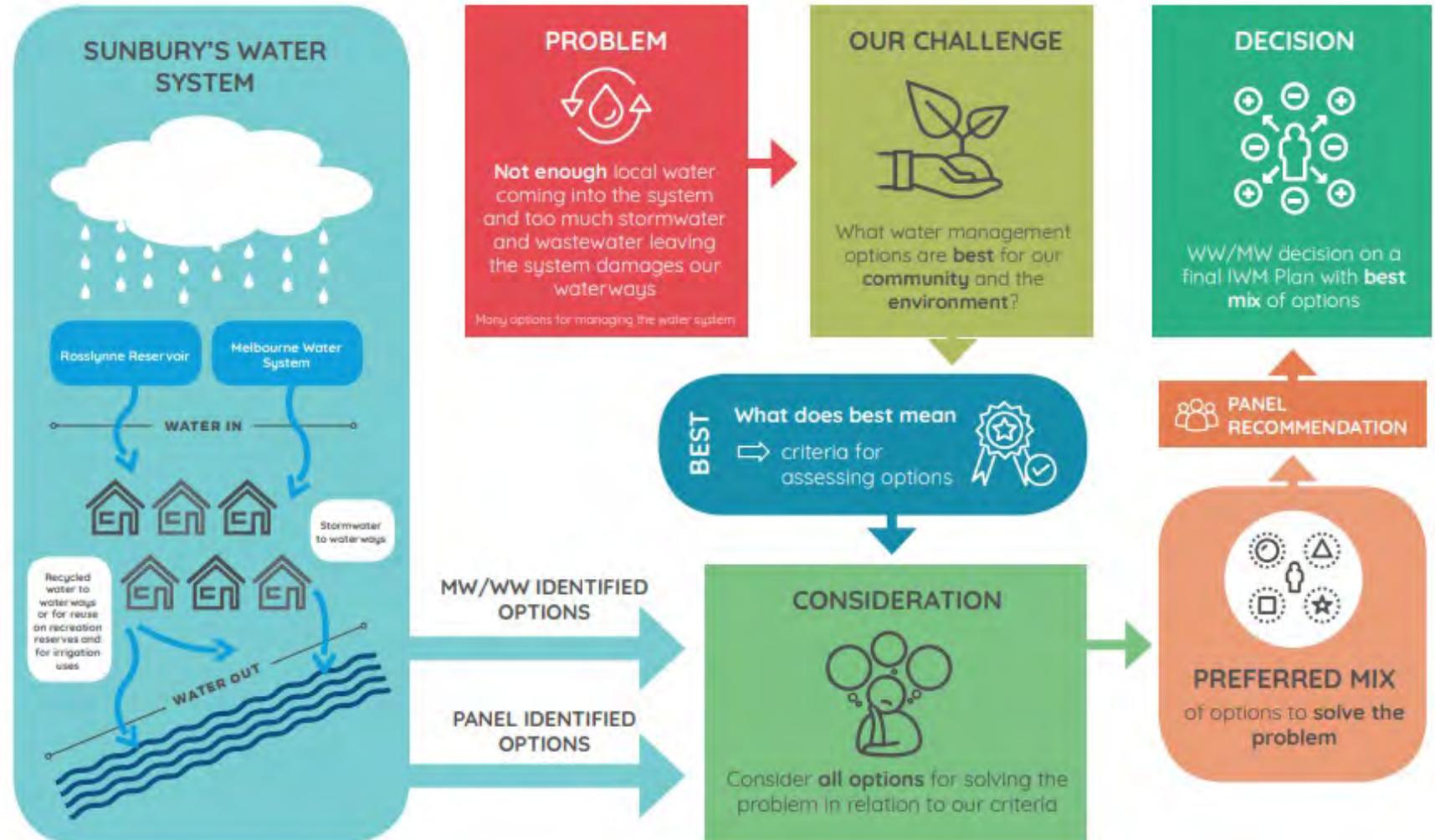


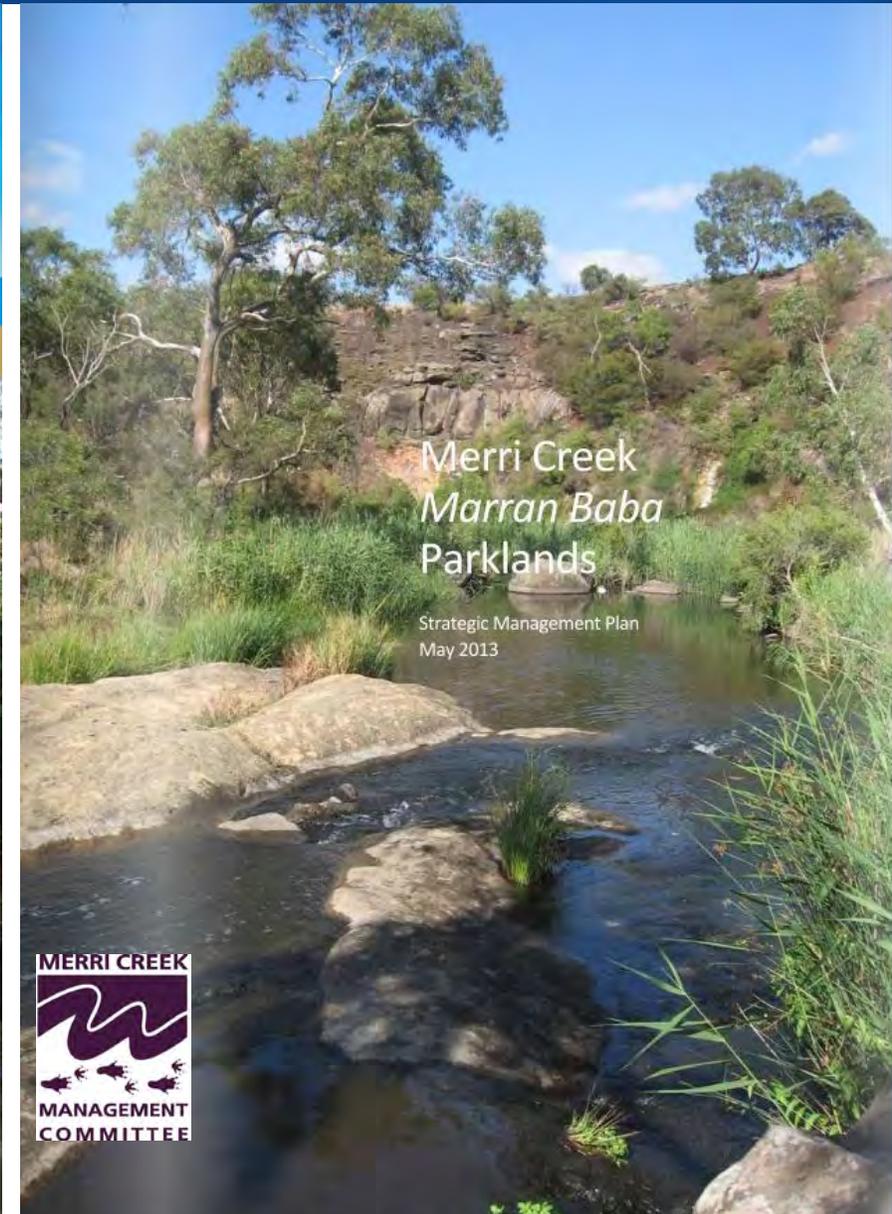
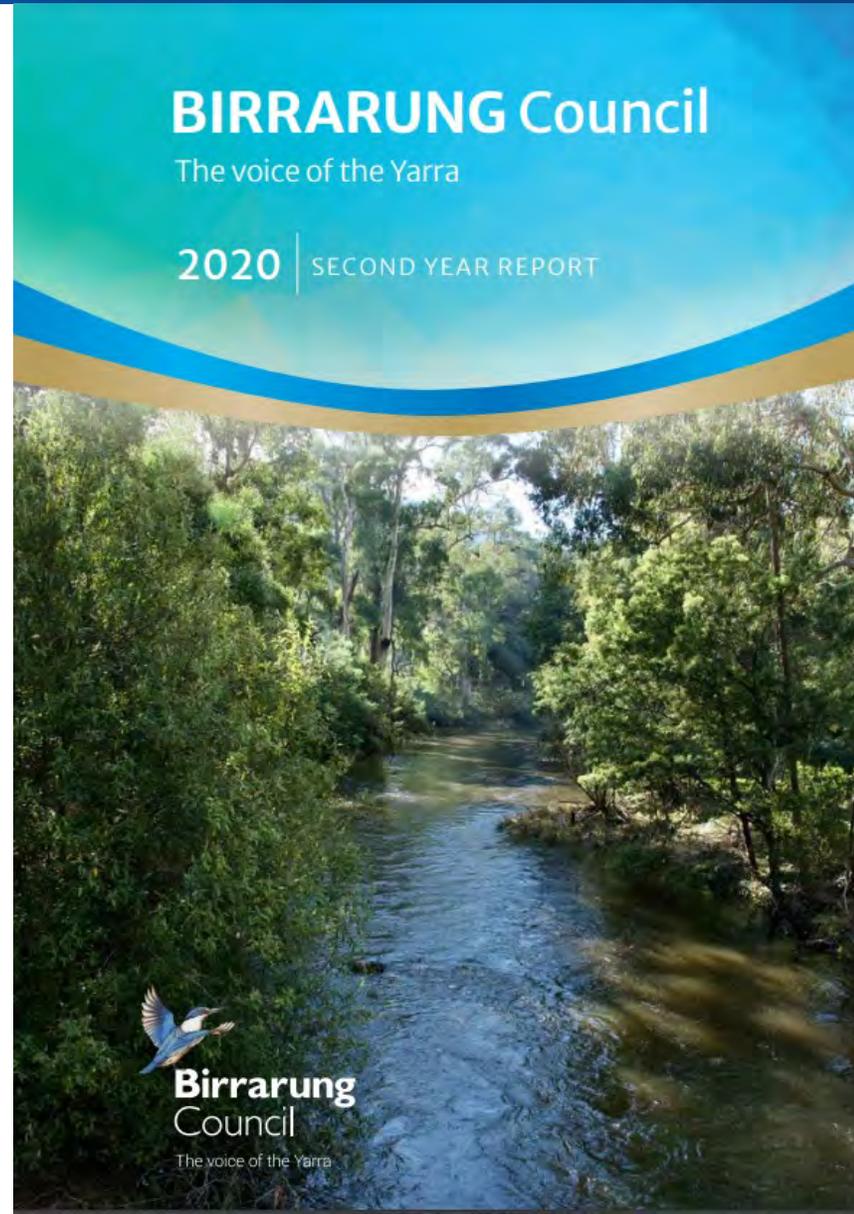
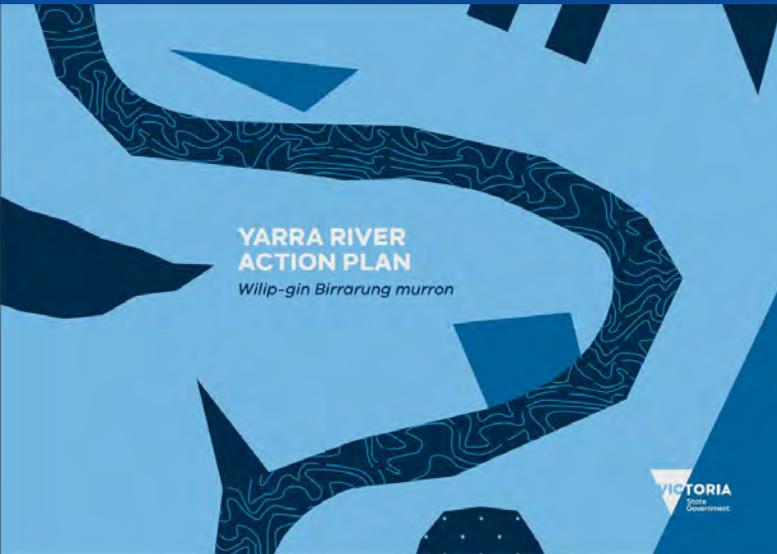
Victorian Government – Water for Victoria, Chapter 6 Recognising and Managing for Aboriginal Values





### SUNBURY'S WATER SYSTEM - ROLE OF THE PANEL





**Authorised Version No. 006**  
**Yarra River Protection (Wilip-gin Birrarung  
murrn) Act 2017**  
No. 49 of 2017  
Authorised Version incorporating amendments as at  
1 July 2021

# Risk & Resilience in the Water Sector



**Helen Foster**

Risk Resilience  
& Assurance Advisor

# Contents

- Managing risk
- Risk and resilience – the need for both
- Resilience - of what (planning)
- Resilience - to what (preparedness)
- Determining criticality (planning, response)
- Mutual aid (recovery)
- A resilience framework model
- Risk and resilience considerations.

# Managing Risk

- Risk is the impact of uncertainty on objectives.
- Objectives can include the organisation's purpose, vision, and values in addition to the goals and targets within different levels of the organisation.
- Managing risk adds and protects value by enabling organisations to achieve objectives more effectively and efficiently, and with greater long-term certainty.
- Effective risk management analyses events and outcomes, including those yet to materialise within an organisation and its operating environment.
- Organisations that continue to succeed are those with the ability to forecast and prepare for risk.

# Risk and Resilience

- Risk is the likelihood that there will be impacts on life, property and infrastructure
- More complex and long-term risks, require assessment and decision processes for communities, governments and authorities.
- Natural events are amplified by long-term changes such as shifting climate patterns, and are exacerbated by decisions such as urban planning made decades ago.
- Planning for these uncertain risks will determine how great the impacts could be now and in the future.

# Resilience - Definition

- Resilience is an organisation's ability to absorb and adapt in a changing environment that is either sudden or incremental.
- Organisational resilience arises from a growing need to manage the uncertainty of complex and interconnected modern societies and economies.

# Resilience Concepts - Australia

- A key outcome of the Australian Government's *Critical Infrastructure Resilience Strategy* (CIR Strategy) is a mature understanding and application of organisational resilience.
- An organisational resilience approach assists organisations to manage unforeseen or unexpected risks.
- This includes events which are not planned for, might never have been experienced by an organisation before or where the consequences are significantly greater than assessed (emerging risk).

# Resilience Attributes and Indicators





# Organisational Benefits of Resilience

The rapidly changing world gives rise to greater uncertainty and emerging risks which can exceed an organisation's ability to manage them. Increasingly, interdependent networks and infrastructure create new areas of failures and disruptions.

In the face of uncertainty and emerging risks resilient organisations will:

- Have the operational flexibility to seize and maximise new opportunities.
- Have stronger business-as-usual (BAU) performance, and better return on investment.
- Maintain operational continuity for longer and return to BAU more quickly than competitors during disruptions.
- Maintain and build reputation by minimising disruption to customers, communities and businesses reliant on their services.

# Water Sector Resilience - Planning

- Resilience is a strong emerging theme within the water sector.
- Continuity of water and wastewater services have always been an important focus for customers and governments.
- This focus reflects the risks if resilience isn't achieved, including destructive and disruptive asset failures and an inability to cope with floods, droughts, bushfires and other natural hazards.
- A resilience approach can provide value for society and the economy well beyond the immediate benefits to service delivery.



# Water Sector Resilience - Preparedness

- The world the water sector operates in is changing rapidly.
- Challenges such as cyber-attacks and extreme weather events, together with future pressures, such as climate change, population growth, and economic and social change, may increase in intensity and unpredictability.
- Key risks:
  - Cyber security
  - Drought
  - Electricity supply disruption
  - Fire
  - Liquid fuel shortage
  - Severe weather events i.e. floods and storms.
  - Pandemic.

# Resilience to Disruptions



spicae

# Impacts



# Outcomes of Resilience





# A Resilient Water Sector

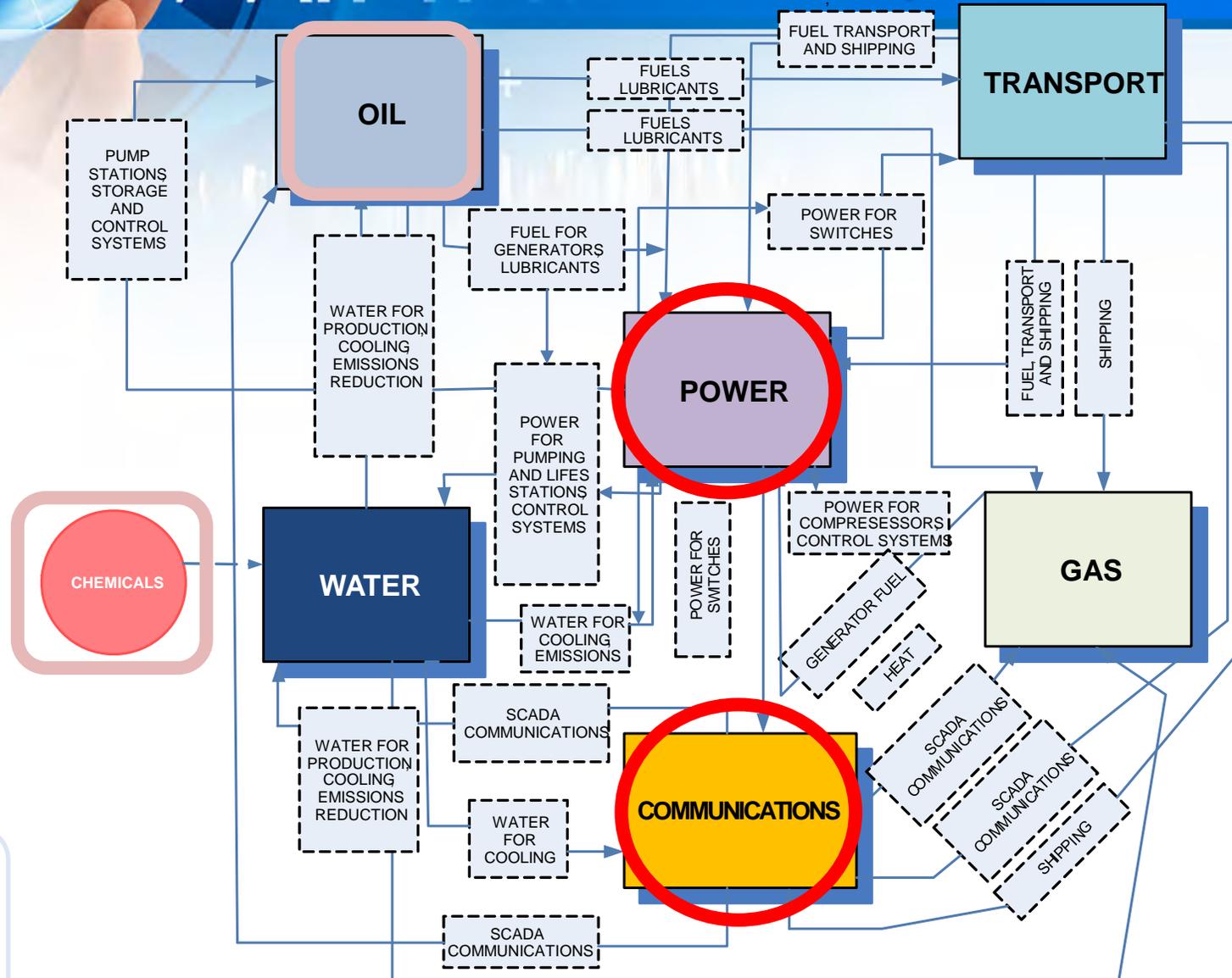
## Characteristics of resilient organisations:

- Clear vision, mission linked to performance.
- Outward looking - conscience of its environment and what is required to survive and thrive in change.
- Inward looking - capable of reflection on performance and how it can change to improve including learning from experience.
- Flexibility in structure and operations to manage disruption.
- Interaction and integration with other functional units (i.e. no silos).
- Networked with the sector and other agencies.
- Communication - internal and external.
- Adaptive leadership.

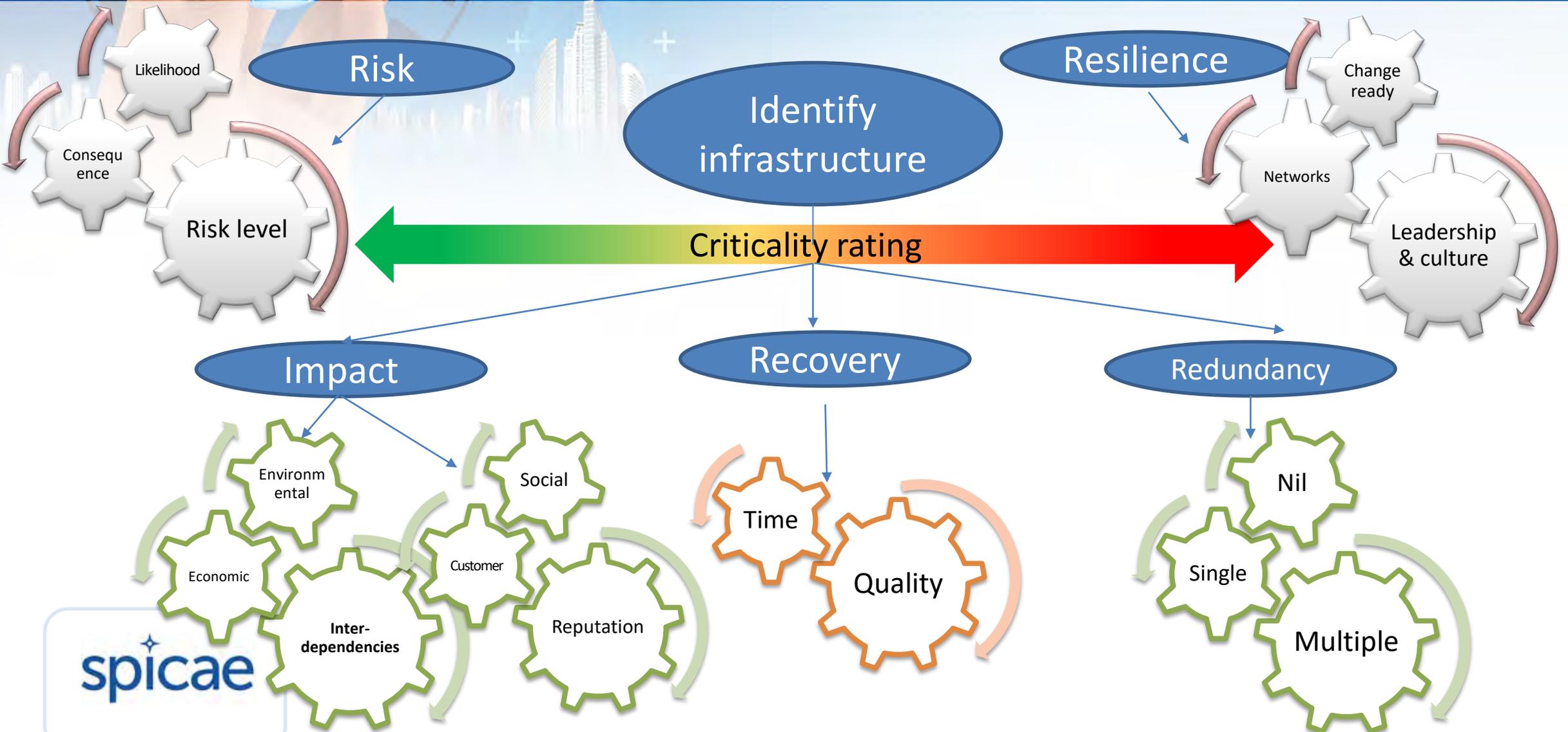
# Critical Infrastructure

*‘those physical facilities, supply chains, information technologies and communication networks which, if destroyed, degraded or rendered unavailable for an extended period, would significantly impact the social or economic wellbeing of the nation or affect Australia’s ability to conduct national defence and ensure national security’.*

# Critical Interdependencies - Planning



# Criticality - Planning and Response

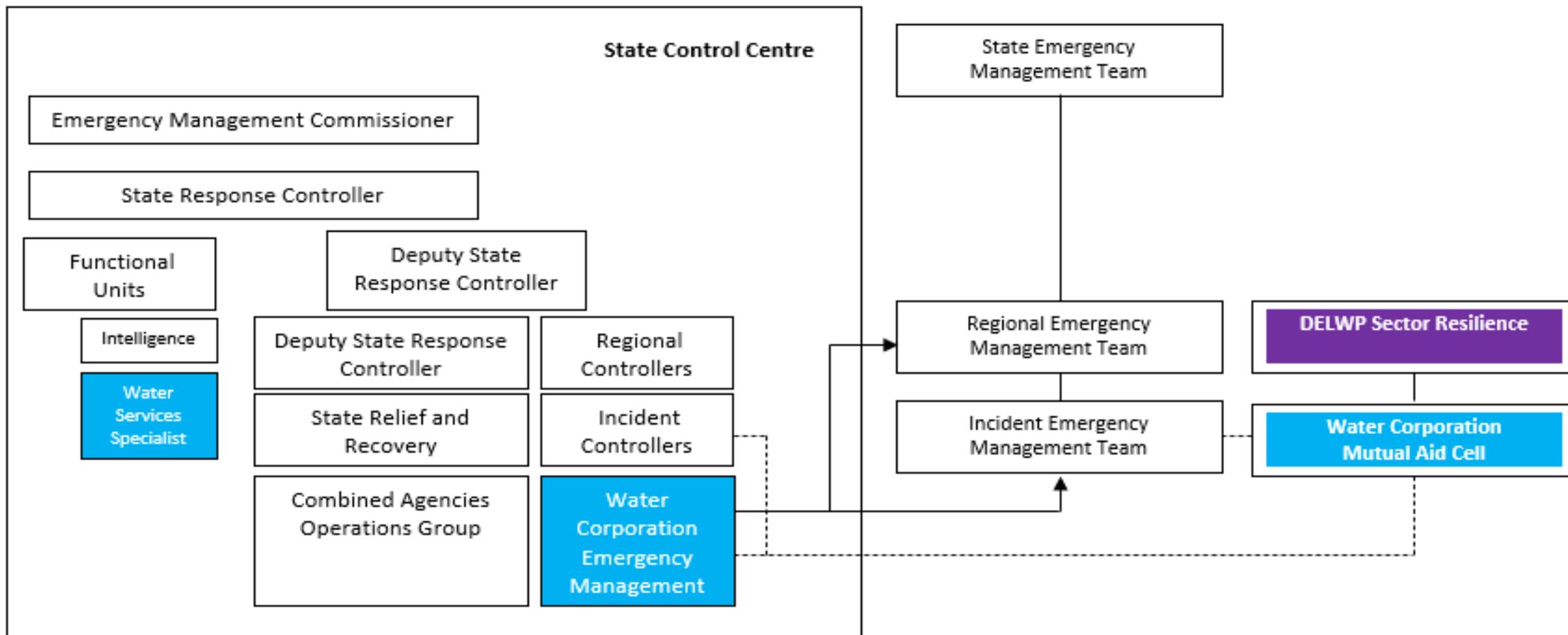


# Mutual Aid - Recovery

- In response to lessons learnt the Water Sector released the Mutual Aid Guidelines. The guidelines facilitate support and the sharing of staff and resources between water industry organisations during times of adversity.
- The mutual aid guidelines were adapted to the international environment, allowing for the deployment of resources in support of the 2011 Christchurch earthquake response. Composed of multiple companies, it was the first trans-Tasman deployment of its kind.
- Christchurch benefitted from the assistance of the taskforce, and Australian companies acquired significant knowledge and experience in responding collaboratively to a major incident.

The logo for spicae, featuring a stylized star above the word "spicae" in a lowercase, sans-serif font.

# Mutual Aid Governance - Victoria



# Resilience Framework Elements

Planning



RISK MANAGEMENT



IT AND CYBER SECURITY



RESOURCING



BUSINESS IMPACT ANALYSIS



ASSURANCE PROCESSES

Preparation



COMPETENT AND TRAINED PEOPLE



ENTERPRISE WIDE PROCESSES



CRITICAL SYSTEM AND INFRASTRUCTURE  
EVALUATION

Response



INCIDENT RESPONSE



CRISIS MANAGEMENT & COMMUNICATIONS

Recovery



BUSINESS CONTINUITY PLANS



IT CONTINUITY PLANS



ASSURANCE PROCESSES

Community involvement

Funding and structural reform

Mature sector

Mandate for change - regulation

Governance and oversight

Goal: Safe, clean water for all communities

Emerging risks

- Pandemic
- Cyber
- Climate

Extreme events

Infrastructure system vulnerabilities

- Ageing infrastructure
- Asset management
- Ill defined critical controls

Risk assessments

- Corporate
- Financial
- Operational - assets

Population growth

Interdependencies, and the hazards that will disrupt them.

Change management

Training, testing and competency



# Sustainability in the Water Sector

**Tony Overman**

Director at  
Encader Consulting

- SDG's as a Sustainability Framework for the water sector
- Climate Change Impacts and Responses
  - Adaptation
  - Mitigation
- Integrated Water Management



- Sustainable Development Goals (SDGs)
- Define global priorities for sustainability
- Set aspirations for 2030
- Seek to mobilize action for collective impact
- Apply to governments, business, community



- Globally accepted language & framework to guide & communicate sustainability agendas
- Demonstrate alignment with global goals
- Help set policy direction and priorities
- Show sustainability as pillar of business success
- Support engagement about sustainable operations
- Platform for synergies & partnerships



## Water & Sewer Services

Potable & Sewer



Mitigation / Adaptation



Aquatic Environments



Waste



## Stormwater Services

Flood & storm damage



Green-blue infrastructure



Aquatic Environments



Terrestrial biodiversity



13 CLIMATE ACTION



Victoria is already experiencing the impacts of climate change:



**Decrease**  
in average rainfall



Temperature increase of just **over 1.0°C** since 1910



**Significant increase**  
in fire danger in spring

In the future Victoria can expect:

Average annual temperature increase up to 2.4°C



Longer fire seasons, with up to 60% more very high fire danger days



Melbourne's climate could be more like Wangaratta's



Decline in alpine snowfall of 35-75%



Double the number of very hot days



Sea levels will rise by around 24 cm



Decline in cool season rainfall



More intense downpours



13 CLIMATE ACTION



## Service Delivery

- Declining water security
- Reduced quality
- Higher water demand
- Asset integrity & function
  - Potable, sewer, storm
- Power & transport failures

## People & Workplace

- Employee safety
- Access
- Emergency disruption
- Stress due to high emergency demand

## Community

- Heat-related stress
- Urban heat island effect,
- Reduced active travel
- Reduced outdoor recreation

## Environment

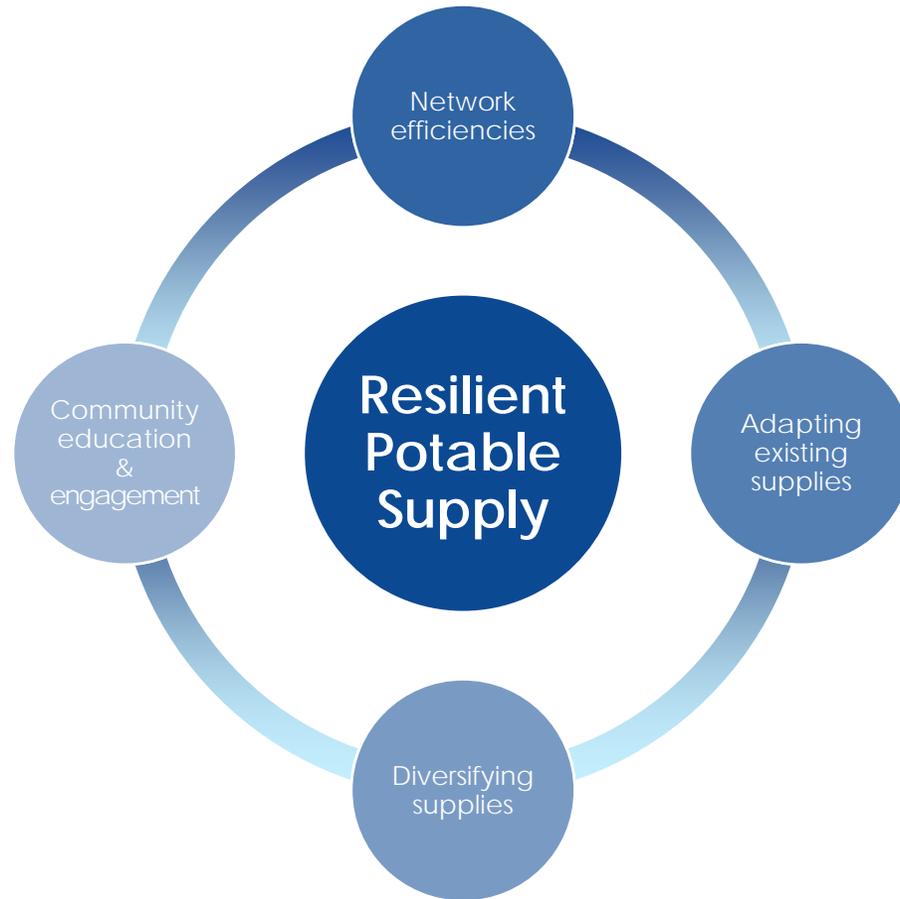
- Loss of biodiversity
- Wildfire
- Increased weed spread
- Aquatic habitat loss

## Green-Blue Infrastructure

- Water stress on trees, turf & gardens
- Increased demand for natural shading
- Stress on WSUD assets

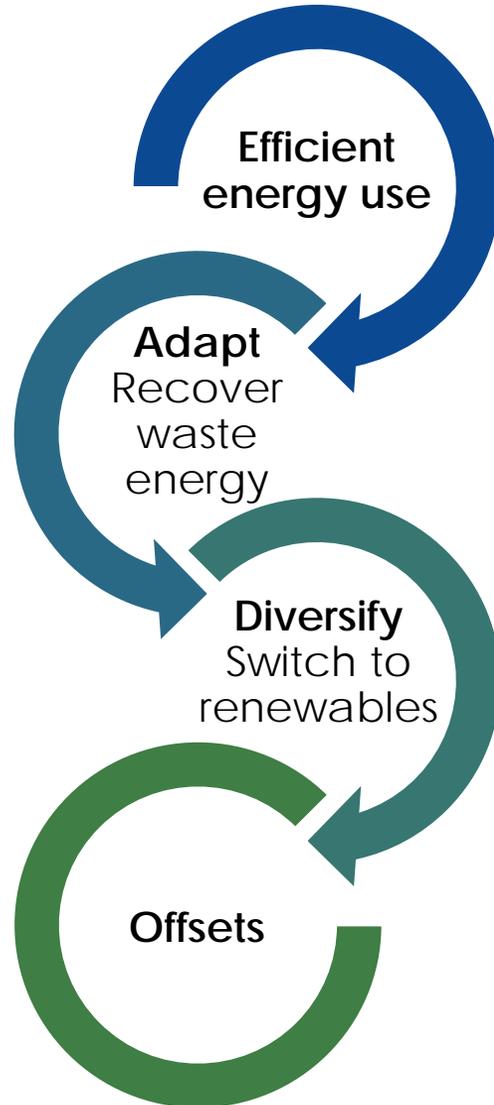


## Water Services



## Green-blue Infrastructure





## • Economic

- Australian water utilities spend approx. \$480M /year on energy
- Operate under strict regulatory requirements to maintain lowest possible costs to the customer
- Renewables through PPAs is cheaper
- Manage financial risks
- Operational and maintenance outcomes for good practices

## • Environmental drivers

- Be part of the global solution

## • Social drivers

- Community awareness
- Social licence to operate/ reputation
- Regulatory drivers



- Fragmented management of the water cycle 'system'
- Conflicts, mixed opportunities
- Needed greater collaboration
- IWM
  - Outcome focused - liveability & resilience
  - Whole system - interconnected
  - Facilitated, collaborative





- Better relationships
- Better waterways, mitigate flood risk
- Better stormwater quality
- Improved green-blue infrastructure
- Cooler, more amenable spaces
- Community connection with nature
- Lower servicing costs
- Alternative water, reduce potable

- Climate change, population growth
  - Impacts on water security & sewer reliability
  - Increasing volumes and intensity of stormwater runoff
  - Rising costs of infrastructure – diverse and adaptive networks
- Limitations on funding – price fixes and rate capping
- Rising community expectations
  - More liveable cities & towns
  - Organisations take responsibility
    - Biodiversity
    - Emissions
    - Waste
- Water sector players are well placed;
  - Leaders through action & advocacy
  - Enablers through facilitation & collaboration
  - Educators through communication & networks
- Sustainability - a lens for building organisational resilience
- SDGs – accepted framework to operationalise sustainability

# AUSTRALIAN WATER REFORM ROADSHOW



**THANKYOU FOR YOUR ATTENDANCE**

**RECORDING & SLIDES WILL BE AVAILABLE FROM:**

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