Jo Preston and Daniel Alexander

Risky Decisions Creating Better Infrastructure Outcomes

Beca

water NEW ZEALAND
The New Zealand Water & Wastes Association Waiora Aotearoa

water NEW ZEALAND CONFERENCE & EXPO
17–19 OCTOBER 2023
Tākina, Te Whanganui-a-Tara Wellington

Applying Risk to Infrastructure

Clarence Valley Council

- Current population: 54,500
- Forecast growth (2041): 64,000
- Storage for WTP upgrade

Tamworth Regional Council

- Current population: 64,000
- Forecast growth (2041): 80,000
- Additional drinking water storage for growth

Central Coast Council

- Current population: 350,000
- Forecast growth (2050): 470,000
- WTP upgrade capacity

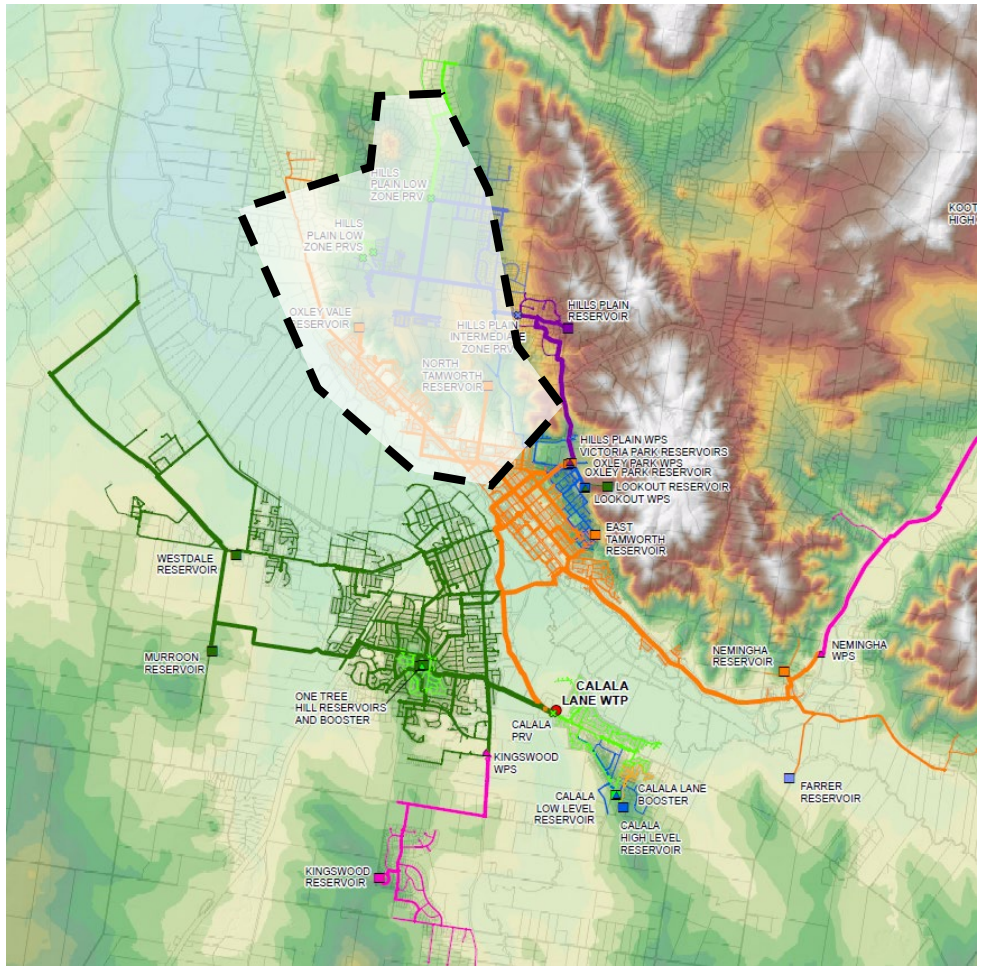
water NEW ZEALAND
The New Zealand Water & Wastes Association Waiora Aotearoa

water NEW ZEALAND CONFERENCE & EXPO 17–19 OCTOBER 2023
Tākina, Te Whanganui-a-Tara Wellington

https://freevectormaps.com/australia/new-south-wales/AU-NSW-EPS-02-4001?ref=atr

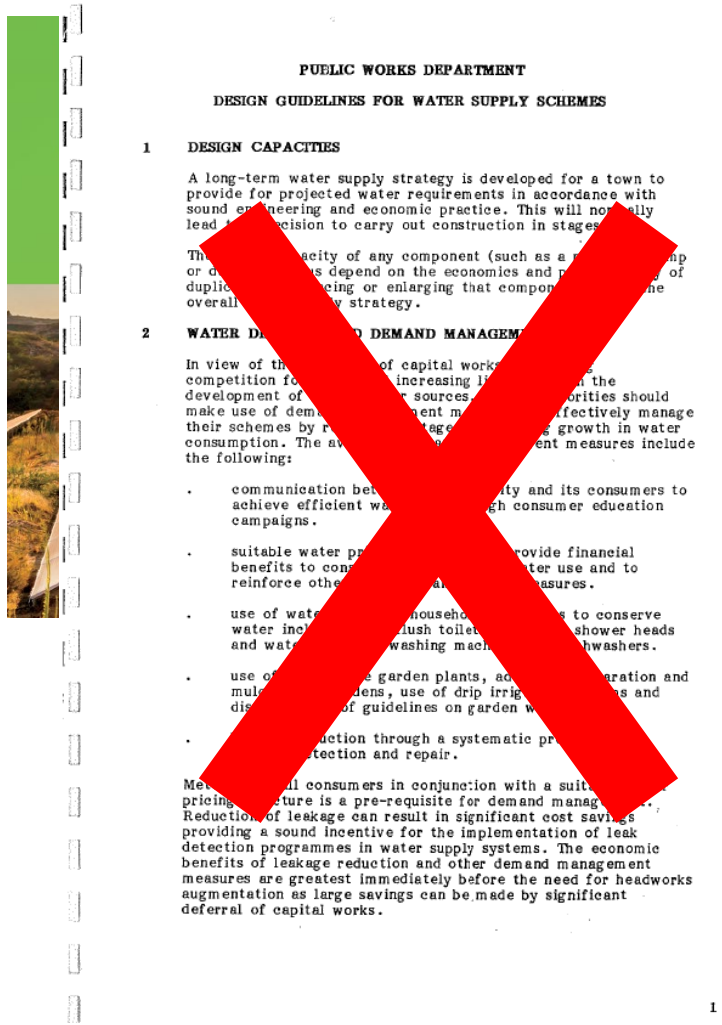

One Tree Hill Reservoir
Tamworth Regional Council

Council Context - Planning



- Major planning decision by Council
- Model build process was triggered by the size of the development area
- Iteration 1 focussed on Hills Plains
- Iteration 2 included all development areas

Flexible Design Criteria



PUBLIC WORKS DEPARTMENT

DESIGN GUIDELINES FOR WATER SUPPLY SCHEMES

1 DESIGN CAPACITIES

A long-term water supply strategy is developed for a town to provide for projected water requirements in accordance with sound engineering and economic practice. This will normally lead to a decision to carry out construction in stages.

The capacity of any component (such as a pipeline or dam) depends on the economics and practicality of duplicating or enlarging that component. The overall strategy.

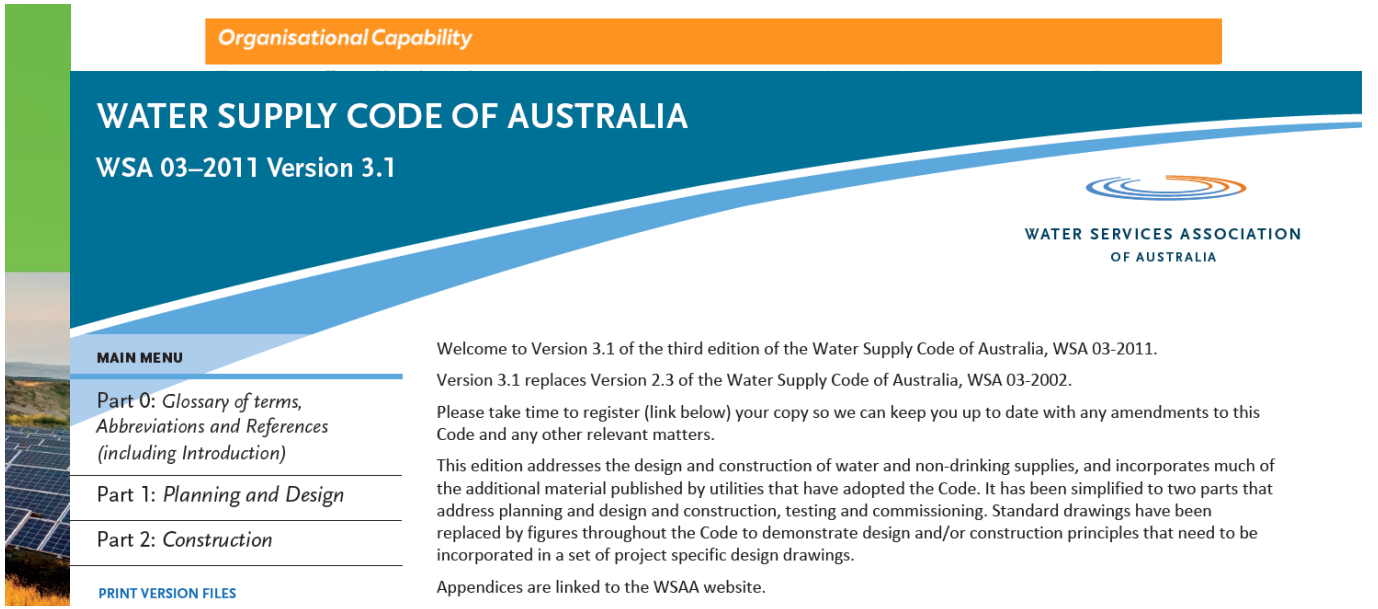
2 WATER DEMAND MANAGEMENT

In view of the cost of capital works and increasing competition for the development of water sources, authorities should make use of demand management measures to effectively manage their schemes by reducing growth in water consumption. The available measures include the following:

- communication between the authority and its consumers to achieve efficient water use through consumer education campaigns.
- suitable water pricing structures to provide financial benefits to consumers for efficient water use and to reinforce other measures.
- use of water saving devices in household appliances such as dual flush toilets to conserve water including shower heads and water saving washing machines and dishwashers.
- use of water conserving garden plants, advice on preparation and mulching of gardens, use of drip irrigation systems and distribution of guidelines on garden watering.
- reduction through a systematic programme of detection and repair.

Metering all consumers in conjunction with a suitable pricing structure is a pre-requisite for demand management. Reduction of leakage can result in significant cost savings providing a sound incentive for the implementation of leak detection programmes in water supply systems. The economic benefits of leakage reduction and other demand management measures are greatest immediately before the need for headworks augmentation as large savings can be made by significant deferral of capital works.

1



Organisational Capability

WATER SUPPLY CODE OF AUSTRALIA

WSA 03–2011 Version 3.1

WATER SERVICES ASSOCIATION OF AUSTRALIA

MAIN MENU

Part 0: *Glossary of terms, Abbreviations and References (including Introduction)*

Part 1: *Planning and Design*

Part 2: *Construction*

PRINT VERSION FILES

Print version of the Code

Artwork for ring binder

Registration form

Welcome to Version 3.1 of the third edition of the Water Supply Code of Australia, WSA 03-2011.

Version 3.1 replaces Version 2.3 of the Water Supply Code of Australia, WSA 03-2002.

Please take time to register (link below) your copy so we can keep you up to date with any amendments to this Code and any other relevant matters.

This edition addresses the design and construction of water and non-drinking supplies, and incorporates much of the additional material published by utilities that have adopted the Code. It has been simplified to two parts that address planning and design and construction, testing and commissioning. Standard drawings have been replaced by figures throughout the Code to demonstrate design and/or construction principles that need to be incorporated in a set of project specific design drawings.

Appendices are linked to the WSAA website.

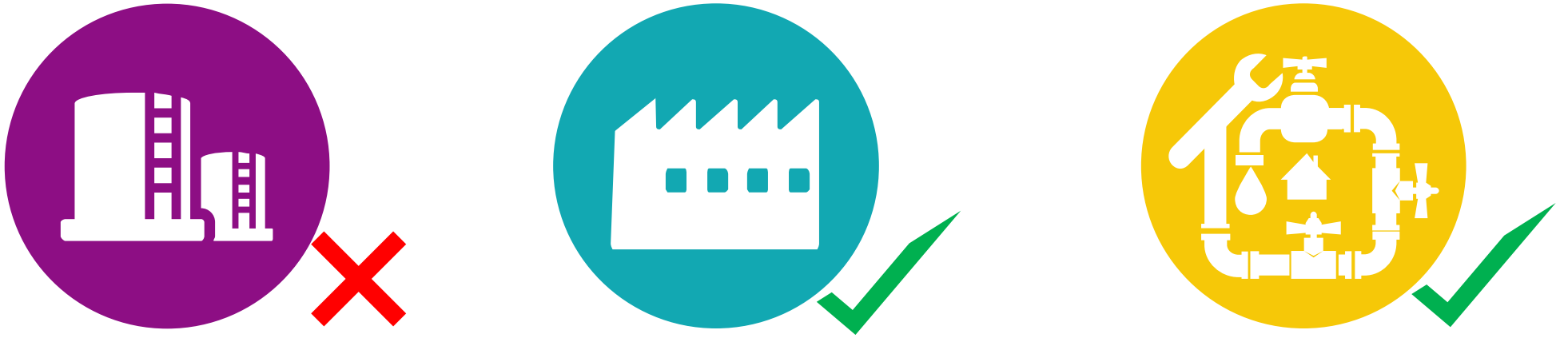
The files contained in this folder are in PDF format which require the Adobe Reader Program, Version 7.0 or later, for viewing. If you do not have Adobe Reader please click on the icon below to download a free copy.

To print a full copy of the Code please use the print version files (links at left). Copies of the Code front cover and spine artwork are included for your ring binder.

- Employ emerging technologies, such as:

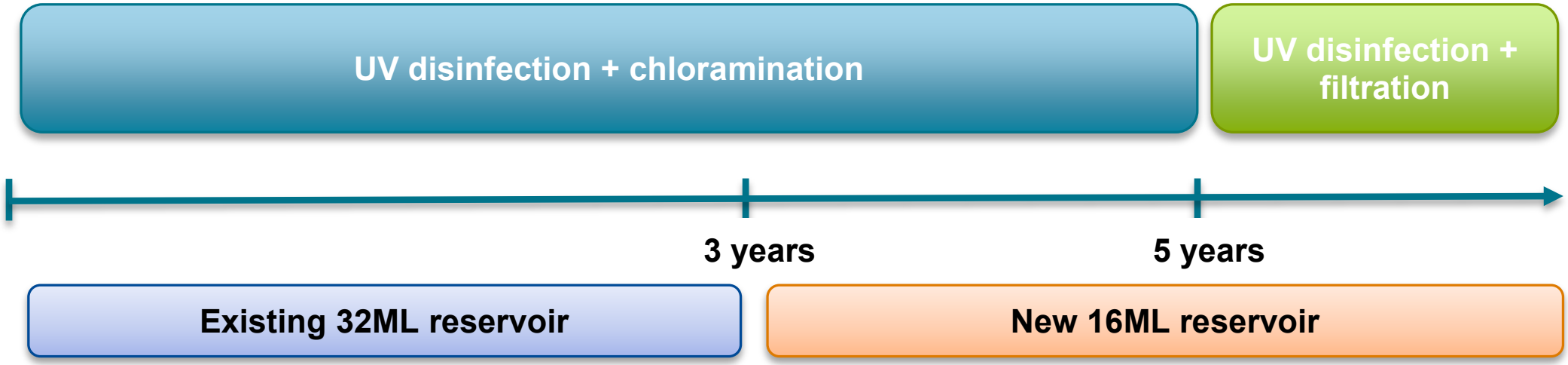
Assessing the Risk

Risk Assessment Outcomes

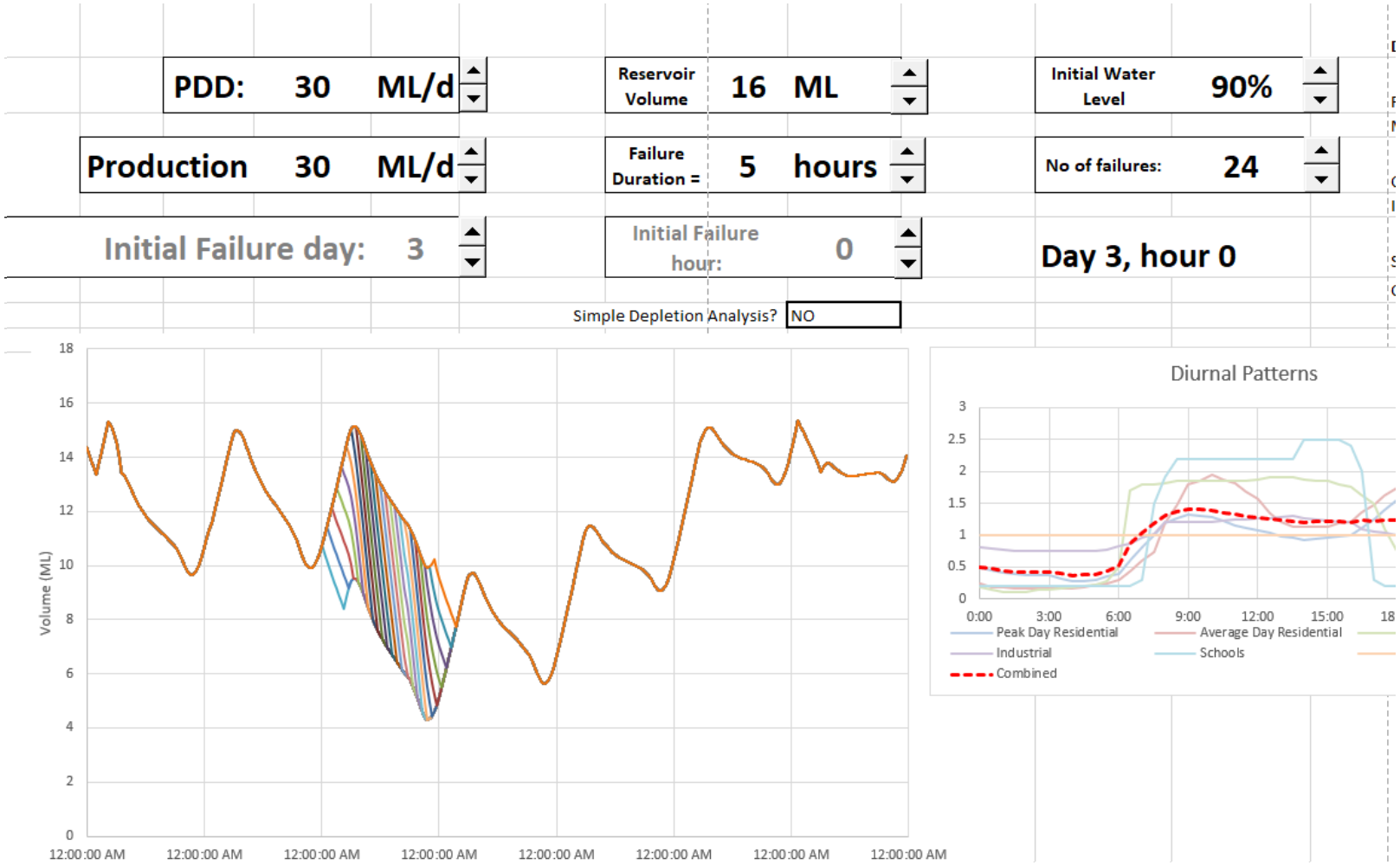


Rushforth Road Reservoir
Clarence Valley Council

Drivers for Change



RISC Tool



Risk Assessment Outcomes

Risk Rating	Risk Event	Projected interruption duration
Extreme	Turbidity	No interruption
High	Algae	No interruption
High	Source contamination	TBD – subject to water quality risk assessment & ALARP actions
High	Bushfire	No interruption
High	Erroneous data	No interruption
High	Outlet failure	No interruption
High	Biofilm (low velocity)	No interruption
High	Tunnel collapse	No interruption
High	Valve seizure	No interruption
High	Loss of UV	No interruption
High	2ML reservoir failure	No interruption
Moderate	Earthquake	No interruption
Moderate	100ML reservoir failure	No interruption
Low	Filter failure	No interruption


Mardi WTP Upgrade
Central Coast Council

Mardi Water Treatment Plant
Central Coast Council

Problem

- ✘ Water quality targets
- ✘ Chlorine decay
- ✘ Disinfection by-products (THM's)
- ✘ Blue green algae
- ✘ Transfer arrangements

Solution

- ✓ Treatment process upgrade
- ? Capacity upgrade to 160ML/day

Scenario Analysis

- 11 “most reasonable worst case’ scenarios
- RISC tool variables
- 3 risk ratings per scenarios
  - Current state – 110ML/day
  - Future state – 160 ML/day
  - Optimal state - ?? ML/day

EVENT

Loss of raw water supply to Somersby WTP from pipeline or pump station failure

VARIABLES

All network storages are available; peak demand; no output from SWTP for 1 week; MWTP at full capacity; 30ML/day transfer

RISK OUTCOMES

CURRENT CAPACITY
110 ML/day

Unlikely

+
Catastrophic
(totally depleted)

=
HIGH

PROPOSED CAPACITY
160 ML/day

Unlikely

+
Insignificant
(unaffected)

=
LOW

OPTIMAL CAPACITY
130 ML/day

Unlikely

+
Moderate
(80 ML)

=
MEDIUM

So, what did we discover?

- Current state = supply discontinuity
- 160ML/day = significant risk buffer
- 150ML/day = risk appetite achieved

But what about the uncertainties?

? Growth projections extrapolated

? Climate change impacts

? Population migration

To wrap up

Shift to risk-based design approach

Adapt existing processes

Understand risk appetite

Operational experience + theoretical knowledge

Prudency & efficiency